

EFFICIENCY OF SELECTION METHODS IN EARLY  
SEGREGATING GENERATION OF RICE (*Oryza sativa* L.)  
CROSSES



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EFFICIENCY OF SELECTION METHODS IN EARLY  
SEGREGATING GENERATION OF RICE (*Oryza sativa* L.)  
CROSSES

A  
THESIS  
SUBMITTED TO THE  
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By  
*Anuj Kumar Choudhary*

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**2018**

*Reverently*

*Dedicated*

*to*

*my*

*beloved*

*"Late MOTHER"*

# **BIRSA AGRICULTURAL UNIVERSITY**

**DEPARTMENT OF PLANT BREEDING & GENETICS**

**RANCHI – 834006 (JHARKHAND)**

*Dr. Z.A. Haider*

Chairman



## **CERTIFICATE**

This is to certify that the thesis entitled “EFFICIENCY OF SELECTION METHODS IN EARLY SEGREGATING GENERATION OF RICE (*Oryza sativa* L.) CROSSES” submitted in partial fulfillment of the requirements for the degree of DOCTOR OF PHILOSOPHY in PLANT BREEDING AND GENETICS of the Faculty of Post-Graduate Studies, Birsa Agricultural University, Ranchi is a record of bonafide research work carried out by **Mr. Anuj Kumar Choudhary** under my guidance and supervision. The results of the investigation reported in this thesis have not so far been submitted for any other degree or diploma. The assistance and help received during the course of this investigation and source of literature have been duly acknowledged.

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*(Niraj Kumar)*

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*Place:*

*Date:*

*Anuj Kumar Choudhary*

## ABSTRACT

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The experimental material consisted of three crosses *viz*; BG102/BPT5204, BG102/Naveen and BG102/Reshmi (Commercial Pvt. Hybrid Victory seeds) of rice (*Oryza sativa* L.), each of the crosses represented a separate experiment. These F<sub>2</sub> selected plants were grown at rice experimental area, Birsa Agricultural University, Kanke, Ranchi, during *kharif*, 2014 in RBD with two replication and two methods of sowing such as direct seeded and transplanted at twenty days interval; each plot measuring 2.7 x 0.4 meter size. ANOVA revealed that mean sum of square due to progeny of crosses *viz*; Cross-I, Cross-II of F<sub>3</sub> under different selection group followed by two dates of sowing for all most all traits were highly significant except for traits PH and GYP plot while in Cross-III, all characters were found highly significant except GPP in I<sup>st</sup> date of TP under HY group indicating the presence of ample amount of genetic variability among progenies for all characters under study.

### Cross- I

High  $h^2$  coupled with low genetic advance as per cent of mean had recorded for traits DFF in MTL as well as RPS group, which indicated the involvement of non-additive gene action. For trait GPP recorded high  $h^2$  coupled with high GA as per cent of mean in I<sup>st</sup> and 2<sup>nd</sup> date of DS under HY group whereas high GA along with moderate  $h^2$  was obtained in both date of sowing under same selection method indicating the preponderance of additive gene action. Average selection response for all the studied traits had exhibited maximum in LY followed by HY and RPS selection method. In early generation of selection based on the LY criteria as well as high realized  $h^2$  would be most effective.

### Cross- II

Maximum standardized selection response was observed for all studied traits under HY selection method followed by LY selection method, RPS and MTL, while high magnitude of standardized selection differential was recorded under HY followed by RPS, LY and MTL selection method. High realized  $h^2$  was observed in different methods of sowing for all the characters under all methods of selection however as revealed by the table based on the HY selection method would be more effective.

### Cross- III

F<sub>3</sub> progenies exhibited high  $h^2$  coupled with high GA as per cent of mean for traits *viz*; TW, GYP plant and GYP plot in all selection method as well as both date of planting indicating the preponderance of additive gene action suggesting that selection may be effective for these characters in early generation. Suggesting that under normal TP condition in I<sup>st</sup> and 2<sup>nd</sup> method of selection for HY and LY both traits TW and PH may be considered as an important trait for improving the yield potential of rice. Over all methods of selection *viz*; HY, LY, MTL and RPS for all the studied traits like PPP, GPP, TW and GYP except for DFF as well as PH indicated that based on these characters selection in F<sub>2</sub> would be fruitful. Highest standardized selection response was obtained based on HY followed by RPS and MTL while high magnitude of standardized selection differential was recorded under HY selection method followed by RPS, MTL and LY for all most all the studied traits.

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## LIST OF ABBREVIATION

<b>SYMBOLS</b>	<b>DESCRIPTIONS</b>
df	: Degrees of freedom
DFF	: Days to 50 % flowering
PH	: Plant height
PPP	: Panicle per plant
PL	: Panicle length
GPP	: Grains per panicle
GYP plant	: Grain yield per plant
GYP plot	: Grain yield per plot
HY	: High yielder
LY	: Low yielder
MTL	: Multi trait limit
RPS	: Random plant selection
DS	: Direct seeding
TP	: Transplanting
GCV	: Genotypic co efficient of variation
PCV	: Phenotypic co efficient of variation
GA	: Genetic advance
g	: Gram
cm	: Centimeter
n	: 1000 F <sub>2</sub> population

**Table-5: Nature of gene controlling different traits of rice in all three crosses**

<b>Cross</b>	<b>Traits</b>	<b>Genetic parameters</b>	<b>Methods of selection</b>	<b>Nature of gene action involved</b>
Cross-I (BG102/BPT5204)	PPP, GPP and GYP plant	Kurtosis	-	Dominance based complementary gene interaction
	TW	High $h^2$ as well as moderate GA	MTL and LY	additive gene action as well as non-additive gene action
	GPP	High $h^2$ and GA	HY	additive gene action
		GA		
	PPP, GYP plant and GYP plot	High GCV & PCV	MTL and RPS	Additive gene action
Cross-II (BG102/Naveen)	PPP and GYP plant	Kurtosis	-	Dominance based complementary gene interaction
	TW	High $h^2$ and GA	MTL and RPS	Additive gene action
Cross-III BG102/Reshmi (Commercial Pvt. Hybrid Victory seeds)	For all characters	High GCV & PCV	MTL and RPS	Additive gene action
	For all characters	High $h^2$ and GA	MTL and RPS	Additive gene action

Rice (*Oryza sativa* L.) is the staple food for around 2.5 billion world's population which is about 60% of the total population and may escalate to 4.6 billion by the year 2050; especially for most of the people of South-East Asia. Among the rice growing countries in the world, India has the largest area under rice crop and ranks second in production next to China. It plays vital role in the national food grain supply. It accounts for about 43% of food grain production in the country. In Jharkhand rice is one major crop harvested by the farmers as a *kharif* crop and fulfilling their energy requirements; even cattle as well as draft animals are dependent on paddy straw.

Rice production environment in India is characterized by extreme diversity and disparity in many ways. Rice is grown in different ecosystems like upland, mid-land, low land and deep water but in Jharkhand it is grouped as *Don I*, *Don II*, *Don III* and *Tanr* land. Low land and deep water face high temperature and drought in early phase, in later phase face water-logging due to lack of drainage as well as low temperature at reproductive phase. The rainfed lowland ecosystem is side-lined from the benefit of green revolution. It has been estimated that out of the total of 45 million hectares of harvested area under rice in the country, about 38 per cent are rainfed low land and 14 per cent flood-prone. The average productivity of rainfed low land is very low and the mainly rainfed lowlands rice areas are in Eastern India, such as, Assam, Odisha, Bihar, Jharkhand, West Bengal, Eastern U.P. and Chhattisgarh. The yield potential of irrigated rice areas is already higher than rainfed low land. It is very necessary to increase yield potential of rainfed lowland. The low land varieties are high tillering and small panicles with large number of unproductivity tillers, limit sink size and lodging susceptibility are major factors for improvement in such type of varieties and increase the yield. Deep water faces submergence due to flash flood and high water depth up to 2-4 meters right from vegetative to early reproductive phase. Due to green revolution, we achieved considerable increase in productivity of rice in the country. But this revolution was limited to irrigated ecosystem. Rice is grown in three seasons in India, *Kharif* season accounts for 88% production whereas *Rabi* contributes only 12% production. Rice is the single most important food crop in India and occupies 44.6 m ha while Jharkhand contributes about 14.69 lakh ha under rice cultivation Meera *et al.* (2014)

Once a cross is made, it is important to evaluate its genetic potential in early segregating generations as  $F_2$  and  $F_3$  in order to use the available resources by reducing the amount of material to be handled and in an efficient manner, at the same time retain the good recombinants for the traits under improvement. Early generation selection has been advocated since long in order to increase the possibility of selecting the desirable plants in later generations (Boerma and Cooper, 1975, Sneep 1977). With views of Shebeski (1967), who advocated that the most desirable gene combinations can be identified even in the heterozygote. The essential point of this view is that the proportion of plants with the most desirable combination of genes decreases rapidly with the advancing generations and if these are not selected in the earliest generations even if heterozygote, they will be lost.

Whan *et al.* (1982) suggested that selection for grain yield in early generation need to be done at many sites simultaneously at an early growth stage. Selection response can be maximised either by selecting the best genotype available in the population or by increasing the rigour of selection (Verma and Mani, 2000). A very rigorous selection may not be desirable as it can eliminate some promising genotypes. However, the identification of promising homozygous plants in the early segregating generations is equally difficult. It is a tedious and complex process; to overcome these difficulties by constructing selection index on the basis of higher and lower yielder as well as yield attributing traits by creating selection pressure in  $F_2$  generation. The changes produced by selection that chiefly interests in the change of population mean is known as response to selection. It is the difference of mean phenotypic value between the offspring of selected parents and the whole parental generation before selection. In population improvement programmes, several traits with varying degrees of agronomic and economic importance are usually considered at the same time. However, genetic correlations exist between traits, their selection could not be considered separately. The improvement of one will provoke changes in others, usually in a sense contrary to that desired. In rice, for example, if only the trait, number of grains per panicle is selected, the best families will surely have smaller panicles or grains of less weight. The alternative methodology available to plant breeder to counteract this type of problem comprises selection indices (Hazel, 1943). For evaluating the merits of individuals or families in terms of several traits. Selection based on indices permits maximizing the response to selection for one or a group of traits. In reality, selection based on indices reflects not only the response with direct selection, but also the correlated response as

selection is practised for other traits. The presence of large amount of variability is must for selecting desirable genotypes. And it is possible by following two points.

1. The population size should be large because in small population selection may not be effective.
2. There should be adequate selection intensity.

The present investigation is aimed to collect the information on effectiveness of the selection in the improvement programme based on the performance of individual groups of three crosses selection from F<sub>2</sub> generation, keeping yield/plant, no. of grains /panicle, thousand grain weight, plant height, and panicle/plant under *Don I* in Jharkhand with the following objectives

1. Validation of early generation selection
2. Assessing effective method of early generation selection.

The present investigation was undertaken to analyse the range, mean variance and covariance within and among each population, genetic parameters, such as, genetic variability, heritability, genetic advance, genotypic and phenotypic correlation coefficient, path analysis and selection indices in segregating generations of 1000 F<sub>2</sub> population and 200 F<sub>3</sub> population of each crosses of *Indica* rice. The review of literature so far available on these aspects have been presented brief under the following head:

- 2.1. Skewness and kurtosis
- 2.2. Genetic variability
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### **2.1. Skewness and kurtosis**

The study of distribution properties such as co efficient of skewness (third degree statistic) and kurtosis (fourth degree statistic) provides insight about the nature of gene action (Fisher *et al.* 1932) and number of genes controlling the traits (Robson, 1956), respectively. The parameter 'd' and 'h' in the genetic expectations of skewness ( $-3/2 d^2/h$ ) represents additive gene effects and dominance gene effects, respectively. Skewness and kurtosis are more powerful than first and second degree statistics which reveal interaction genetic effects (Choo and Reinbergs, 1982). The skewed distribution of a trait in general suggests that the trait is under the control of non-additive gene action, especially epistasis and influenced by environmental variables (Pooni *et al.* 1977; Kimberg and Bingham, 1998 and Roy, 2000). Positive skewness is associated with complementary interaction and negative skewness is associated with duplicate (additive × additive) gene interactions predominantly in the same directions. Complete ambidirectional epistasis however produces kurtosis while distribution stays symmetrical around mean (Pooni *et al.* 1977). The genes controlling the trait with skewed distribution tend to be predominantly dominant irrespective of whether they have increasing or decreasing effects on the expression of the trait.

Thirugnanakumar *et al.* (2011) reported the distribution pattern of the segregating generations revealed that, the F<sub>3</sub>'s of the cross ADT 38 x ADT 37 for hundred seed

weight and the  $F_3$ 's the cross ADT 38 x ADT 44 for grain yield per plant showed normal symmetrical distribution. The kurtosis value was almost negligible indicating mesokurtic nature of the distribution. The  $F_3$ 's of ADT 38 x ADT 44 recorded high mean coupled with higher coefficient of variation, indicating the presence of additive genetic control. The higher mean performance in  $F_3$  may be due to accumulation of favourable genes. All the other crosses and generations showed asymmetric distribution in positive as well as negative direction, for almost all the characters of interest.

Kiran *et al.* (2013) stated that skewness and kurtosis indicated dominance based complementary gene interaction involving large number of genes having decreasing effect in the inheritance of total tillers per plant, days to panicle emergence, productive tillers per plant, grains per panicle and grain yield in both the crosses and for 1000-grain weight in 'Jaya × BPHR-1'. However, duplicate interaction was noticed for panicle length in both the crosses; while, 1000-grain weight showed complete ambi-directional epistasis in the cross 'IR 64 × BPHR-1'. Contrary to this, plant height exhibited dominance based complete interaction for few segregating genes with majority of them having decreasing effect.

Banu and Jagadeesh (2014) observed that estimated coefficients of skewness and Kurtosis indicated the presence of genetic interactions for yield and yield attributing traits like plant height, test weight, showed platykurtic with right skewed distribution, indicating the presence of large number of minor genes with increasing effects and dominance property in the expression of these traits. It indicates the presence of duplicate gene interaction. Selections would be rapid under mild selections from the existing variability among the lines. Platykurtic with left skewed distribution found for panicle length and grain yield per plant indicating the presence of large number of minor genes with increasing effects and dominance property in the expression of these traits. It indicates the presence of complementary gene interaction. Whereas, spikelet fertility was found to be right skewed leptokurtic distribution, this indicates the involvement of fewer numbers of genes with majority of them having decreasing effect and dominance based duplicate (additive × additive) type of interaction. The method of using skewness and kurtosis for detecting additive epistasis is very simple and can be used for crop improvement.

Lestari *et al.* (2015) reported that panicle length and weight were controlled by many genes with additive gene action in the Gampai x IR77674 derived population, while panicle weight was controlled by few genes with complementary epistatic additive gene

action in both Bintang Ladang x US2 and Progol x Asahan derived populations. The more genes controlling a character, the more distribution classes formed and the greater variance among genotypes.

## 2.2. Genetic variability

Kumar *et al.* (2001) stated that the population of 42 progenies derived from seven rice crosses was studied in segregating generation for 10 quantitative characters, during the kharif season. The phenotypic coefficient of variation was comparatively higher than the corresponding genotypic coefficient of variation for all the characters studied.

Devi *et al.* (2006) observed that plant height, panicle length, tillers per hill, spikelets per panicle, 50% flowering and grain yield per plant. All characters exhibited significant variation. Phenotypic coefficients of variation (PCV) were higher than the genotypic coefficients of variation (GCV) for all the characters studied. High values for phenotypic coefficient of variation, heritability and genetic gain were observed for characters, i.e. plant height, grain yield per plant and spikelets per panicle, suggesting the involvement of additive genes and scope of high selection response.

Kumar *et al.* (2007) revealed that the  $F_2$  populations of the cross  $P_1 \times P_3$  showed high PCV, GCV coupled with high heritability estimates and high genetic advance as percentage of mean for number of filled grains per panicle, 100 grain weight, and grain yield per plant.

Raut *et al.* (2009) revealed that seed yield per plant exhibited highest GCV and PCV followed by 1000-grain weight, grains per panicle and effective tillers per plant among 40 genotypes of rice.

Chakraborty and Chakraborty (2010) reported that days to 50% flowering, plant height, effective tillers per hill, panicle length, and grain yield per hill. Very small difference between GCV and PCV was observed for the characters like days to 50% flowering. Wide difference between GCV and PCV was observed for the characters like plant height, effective tillers per hill, panicle length and yield per plant.

Nandeshwar, *et al.* (2010) stated that the analysis of variation revealed significant differences in the genotypes for all the characters studied. High GCV and PCV were observed for grain yield per plant, panicle number per plant.

Praveen and Pandey (2010) showed that PCV (phenotypic coefficient of variance) in general was higher than GCV (genotypic coefficient of variation) for

various characters. However the difference between GCV and PCV was low for most of the characters studied. This indicates less degree of environmental influence on manifestation of these characters. High heritability coupled with high genetic advance were recorded for number of spikelets per panicle.

Roy (2010) reported that genotypic co-efficient of variability (GCV) and phenotype coefficient of variability (PCV) for days to 50% flowering, plant height, and 100-grain weight were found to be very close to each other suggesting marginal influence of the environment governing those characters. Moderate to high GCV along with high  $h^2$  and GA were discernible for days to 50% flowering, plant height, number of filled grains per plant, and grain yield per plant. Which indicates simple selection would be effective in genetic improvement of these characters.

Mohan and Chauhan (2011) revealed that phenotypic coefficient of variation (PCV) was higher than genotypic coefficient of variation (GCV) for all the characters studied, indicating the influence of environment on the characters. High GCV was estimated for plant height, seeds per panicle, moderate for 1000-seed weight and days to flowering, whereas low was estimated for panicle length. High genetic advance were estimated for plant height number of panicles per plant, 1000-seed weight and number of seeds per panicle, however moderate 50% flowering.

Ratnakar *et al.* (2012) reported that crosses I (BPT 5204 × JBT 36/14) and Cross II (KMP 148 × JBT 36/14) registered high PCV and GCV values for almost all traits except days to 50 % flowering and panicle length. However, all traits registered high broad sense heritability accompanied with high genetic advance.

Seyoum *et al.* (2012) stated that significant ( $p < 0.01$ ) variation was obtained for days to 50% flowering, days to 85% maturity, plant height, panicle length, spikelets per panicle and thousand grains weight. Significant difference ( $p < 0.05$ ) were noted for panicles per plant, grains per panicle and grain yield. Days to 50% flowering, plant height, grains per panicle, spikelets per panicle, thousand grains weight and grain yield showed relatively high GCV and PCV estimates. Grains per panicle had maximum positive direct effect and highly significant ( $r = 0.906^{**}$ ) genotypic correlation coefficient with grain yield.

Dutta *et al.* (2013) reported that high heritability (broad sense) and high genetic advance as percentage of mean were exhibited by eight characters *viz.* tillers per plant, days to 50% flowering, spikelets per panicle, spikelets per plant, panicles per plant and grain yield. Thus these characters were under the influence of additive gene action and a

satisfactory selection programme for agronomic improvement on the basis of these characters is possible.

Huang, *et al.* (2013) reported that analysis of variance (ANOVA) was highly significant genetic variation between families for all the traits tested. Transgressive segregation was observed for most traits in the  $F_{2:3}$  families. Estimates of additive genetic Coefficient of Variation (GCA) ranged from 8.03 to 33.49. Estimates of the narrow sense heritability ( $h^2$ ) of the other 7 traits were moderate to high ( $h^2 = 0.42-0.90$ ). The results suggested that genetic variation for these traits was largely controlled by additive genes.

Rajendar *et al.* (2013) observed that heritability in broad sense and genetic advance were high for number of grains per panicle, grain yield per plant whereas, the estimates were relatively low-moderate for the remaining characters. The crosses, RNR 2354  $\times$  Sye 632002 and YAMINI  $\times$  BM 71 for number of grains per panicle, PUSA 1121 X MTU 1010 for grain yield per plant, PUSA 1121  $\times$  BM 71 and PUSA 1121  $\times$  MTU 1010 for kernel length were identified as better crosses for further advancement to develop pure lines with high yield and quality.

Singh *et al.* (2013) stated that maximum genotypic coefficient of variation (GCV) and phenotypic coefficient of variation (PCV) was observed only for number of spikelets per panicle, while plant height, flag leaf length, flag leaf width, panicle length, harvest index and grain yield per plant showed moderate GCV and PCV.

Venkanna *et al.* (2014) reported that in  $F_2$  population of 36 crosses were studied to estimate the variability, heritability, and genetic advance and genetic advance as percentage of mean for agronomic and grain quality traits. The Genotypic Coefficient of Variation (GCV) and Phenotypic Coefficient of Variation (PCV) were low to moderate with low heritability indicating that the character is highly influenced by non-additive genetic effects and thus the selection would be ineffective. Genetic coefficient of variation is a measure of relative genetic variation. It is used to compare range of genetic variation present in the population with respect to different quantitative traits.

Devi *et al.* (2016) stated that analysis of variance were highly significant differences among 27 genotypes for all the yield components and most of the kernel quality traits indicating that enough variability is present in the studied material. The magnitude of difference between PCV and GCV was less for the traits indicating little influence of environment. The higher estimates of PCV and GCV were observed for yield per plant (42.42; 42.04) and filled seeds per panicle (34.67;33.19) indicates

possibility of genetic improvement through direct selection for these traits, while day to 50% flowering, panicle length showed low PCV and GCV values indicating the need for creation of variability by hybridization or mutation followed by selection. High heritability in broad sense and high genetic advance as percent of mean exhibited by the traits, effective tillers (88.8; 30.2), plant height (96.0; 35.3) test weight (96.0; 39.1), yield per plant (98.0;68.7) indicating preponderance of additive gene action, which provide good scope for further improvement by selection.

Gala *et al.* (2016) stated that analysis of variance having significant differences among genotypes for all traits. The high genotypic coefficient of variability (gcv) and phenotypic coefficient of variability (pcv) was recorded for number of filled grains/panicle indicating the existence of wide spectrum of variability for this trait and offer greater opportunities for desired trait through phenotypic selection. The phenotypic variance was higher than the corresponding genotypic variance for all traits. Estimation of heritability ranged from 49.16% to 99.52% for number of panicle/plant.

### **2.1.2 Heritability and genetic advance**

Heritability and genetic advance are important genetic parameters. Heritability estimates along with genetic advance are normally more helpful in predicting the gain under selection than heritability estimates alone. However, it is not necessary that a character showing high heritability will also high genetic gain (Johnson *et al.* 1955). Heritability in broad sense the measure for the overall performance of hereditary determination of a character. It may be defined as the proportion of observed variability which is due to heredity, the remainder being due to environmental causes (Allard, 1960). Genetic advance provides information on expected genetic gain resulting from selection of superior genotypes. It is generally expressed at 5 % or 1% selection intensity. Genetic advance as percentage of mean is the expected percentage increase in the mean performance of genotypes.

Knight (1948) defined heritability as a portion of observed variance for which difference in heredity is responsible. The heritable variation has a great importance for a plant breeder. Panse (1957) and Lush (1949) suggested the use of additive genetic components of variation to the total variance for computing the heritability. The higher values of the heritability estimates are advantageous where improvement is sought through phenotypic selection. It is the improvement in mean genotypic value of selected plant over the parental population.

Lokaprakash *et al.* (1992) reported that heritability an increasing trend from F<sub>2</sub> to F<sub>3</sub> generation but variances and genetic advances were reduced. Among the characters, 1000-grain weight, and number of fertile spikelets per panicle recorded high heritability coupled with moderate to high genetic advance, indicating that they were governed by additive gene action and therefore these traits offer greater scope for further improvement through selection. Among the crosses, high x low gca combinations exhibited high mean and variability in both F<sub>2</sub> and F<sub>3</sub> generations for all the characters, which implies that high x low combination is likely to produce higher frequency of transgressive segregates than either high x high or low X low combinations.

Kumar *et al.* (2001) stated that heritability was higher for days to 50% flowering, plant height and 1000-grain weight.

Raut *et al.* (2009) observed that high heritability coupled with high genetic advance was observed for grains per panicle, plant height, days to maturity and 1000-grain weight suggesting the additive genetic control the inheritance of these characters.

Chakraborty and Chakraborty (2010) observed that high heritability associated with high genetic advance was found for the trait grain yield per hill. This character was predominantly governed by additive gene action. High heritability along with moderate genetic advance was observed in the character plant height. Moderate heritability associated with moderate genetic advance was recorded for the character effective tillers per hill. Lastly, high heritability with low genetic advance was recorded for the character days to 50% flowering. This indicated that these characters were mostly governed by non-additive gene action (dominance and epistasis).

Nandeshwar, *et al.* (2010) stated that grain yield per plant showed maximum genetic advance as percentage of mean followed by plant height.

Singh *et al.* (2013) reported that high estimates of heritability coupled with high genetic advance as per cent of mean was observed for plant height, flag leaf length, flag leaf width, number of spikelets per panicle and grain yield per plant.

Tuhina *et al.* (2015) stated that for traits number of filled grains/panicle and yields/plant (g) were exhibited high heritability coupled with high genetic advance, could be used as a selection criterion for hybridisation programmes in the future.

Lingaiah (2015) high heritability associated with high genetic advance as per cent of mean was found for the characters number of grains per panicle, yield, test weight and plant height indicating the role of additive gene action in controlling these characters.

Gala *et al.* (2016) stated that high heritability coupled with high genetic advance was observed for growing period and plant height and indicate the lesser influence of environment in expression of these traits and prevalence of additive gene action in their inheritance hence, amenable of simple selection. The promising rice lines GZ9461-4-2-3-1 and GZ10147-1-2-1-1 performed better as compared with the commercial variety. Selection of these traits would be more effective for yield improvement in rice and these promising lines would be more valuable materials for breeders engaged in the development of high yielding cultivars.

### **Correlation and path analysis studies**

Yield being the most important characters for a plant breeder, is the outcome of the action and interaction of factors both in which the plants grow. Selection process can be mere easily extended on any of the component characters with yield.

Galton (1881) was the first to show that independently measurable characters could be compared and their relationships measured by studying the coefficient of correlation calculated as:

$$r = \frac{\text{Cov}\sigma_{1/2}}{\sigma_1 \cdot \sigma_2}$$

Where,

$\sigma_{1/2}$  is the covariance of two traits and  $\sigma_1$  and  $\sigma_2$  are their standard deviation. Fisher (1918) derived the exact distribution of Galton's correlation coefficient and with Pearson completed the table of correlation. It was noticed that association of economically important quantitative characters which are statistically determined by correlation coefficients have been quite helpful as a basis of selection. It is used to find out the degree and direction of relationships between two or more variables.

Verma and Mani (1999) observed that correlated response to selection for number of tillers per plant, panicle length, number of grains per panicle and 1000 grain weight in 280 F<sub>3</sub> progenies of the cross UPR 83-34/Sita during *Kharif*, 1993 in random and biased (on the basis of grain yield per plant) populations selected from four different plant spacing *viz.*, 15 x 10 cm, 20 x 10 cm, 20 x 15cm and 20 x 20 cm during *Kharif*, 1992. Though no definite trend could be established, random selection by and large, resulted in positive correlated response for different yield components. The correlated response varied from character to character in the plant progenies selected on the basis of grain yield alone (biased selection).

Verma and Mani (2000) reported that selection gave higher means than the random selection in  $F_2$ , but differences got dissipated in the next generation. The estimates of selection differential were, in general, positive and higher for biased selection than for corresponding random selection. The realized selection responses were mostly negative for biased selection and positive random selections.

Vir and Singh (2005) observed that correlation coefficients between selected  $F_3$  progenies and corresponding  $F_4$  lines were highly significant and positive with respect to grain yield per plant, and 1000-seed weight.

Choudhary *et al.* (2009) reported that grain yield exhibited high degree of positive correlation and high positive direct effect with number of fertile grains per panicle, leaf area and thousand grain weight in *kharif* season.

Kumar *et al.* (2009). reported that, the  $F_2$  selected plants showed inconsistent significant correlation with their  $F_3$  progenies over crosses for all the characters, while  $F_3$  selected plants had significant correlations with their  $F_4$  progenies for 100-grain weight and grain yield per plant in both the crosses.

Raut *et al.* (2009) reported that seed yield exhibited positive and significant correlation with days to 50 per cent flowering, plant height, effective tillers per plant, panicle length and 1000-grain weight indicating that these characters are major yield contributing characters. There is a better chance for improvement of seed yield through direct selection of these three characters in rice.

Senapati *et al.* (2009) showed that grain yield per plant exhibited significant correlation with panicle number per plant, panicle weight and grain number per panicle in positive direction while it had negative correlation with plant height. Panicle number per plant imparted the highest positive direct effect on grain yield per plant followed by grain number per panicle, 1000 grain weight and panicle length in this regard. Thus, correlation studies and path analysis reveal the fact that panicle number per plant and grain number panicle should be considered as the most important characters during selection for yield improvement in segregating generations of rice.

Chakraborty and Chakraborty (2010) reported that genotypic correlation coefficient to be higher than the corresponding phenotypic correlation coefficient. This indicates a strong inherent association among grain yield per plant. The characters effective tiller per hill and panicle length showed significant positive genotypic correlation with grain yield per hill. Effective tiller per hill and panicle length had high

co-heritability with grain yield suggesting that selection for these characters would improve grain yield.

Nandeshwar, *et al.* (2010) reported that grain yield per plant exhibited significant positive correlation with panicle number per plant, and grain number per panicle whereas it had significant negative correlation with plant height. Panicle per plant having high direct effect on grain yield followed by number of grain panicle per, 1000-grain weight and panicle length in this regard.

Roy (2010) revealed that plant height, panicle length, number of filled grains per panicle and 100-grain weight bear significant association with grain yield per plant both at phenotypic and genotypic levels. Panicle length exerted maximum direct influence on grain yield per plant followed by 100-grain weight and plant height. IR 54447-B-B-B-10-2, IR 54313-106-2-3, IR 47554-3B-4-2B-1-2 and IR 5996-3B-18-1 were found to be high yielding characterized with moderate number of panicles per plant and 100-seed weight.

Kiani and Nematzadeh (2012) showed that for traits, the panicles per plant and grains per panicle significantly correlated with grain yield. Path coefficient analysis revealed that grain yield was associated with panicles per plant and grains per panicle with the direct effects of respectively. The greatest indirect effect belonged to panicle length through grains per panicle.

Ratnakar *et al.* (2012) stated that for the trait grain yield per plant exhibited highly significant and positive association with productive tillers, filled grains per panicle and 1000 seed weight while days to 50 % flowering registered significant negative association with grain yield. The path analysis indicated that productive tillers had highest positive direct effect followed by filled grain per panicle on grain yield in both the crosses.

Sanghera *et al.* (2012) stated that high genetic advance were observed for grain yield (47%) followed by biological yield per plant (27%) and harvest index (25%). Days to 50% flowering was positively and significantly correlated with days to maturity, and panicle length at genotypic level. For the traits harvest index and biological yield have highest direct effect on yield followed by days to maturity and number of grains per panicle. Biological yield per plant has highest indirect effect on yield via days to flowering followed by grain weight via biological yield per plant.

Seyoum *et al.* (2012) reported that high heritability was obtained for plant height (92.17%), followed by 50% flowering (90.16%), thousand grains weight (83.17%),

panicle length (79.25%) and spikelet per panicle (60.25%). High to medium estimates of heritability and genetic advance were obtained for plant height, days to 50% flowering, panicles per plant, spikelets per panicle, grains per panicle and thousand grains weight, indicating the roles of additive gene action and a good scope of selection using their phenotypic performance.

Dutta *et al.* (2013) stated that high genotypic and phenotypic co-efficient of variations, high heritability (broad sense) and high genetic advance as percentage of mean were obtained for characters *viz*; tiller per plant, days to 50 % flowering, grains per panicle, panicles per plant and grain yield. Thus these characters were under the influence of additive gene action and satisfactory selection programme for agronomic improvement on the basis of these characters is possible.

Huang, *et al.* (2013) observed association of grain yield per plant with filled grains per plant, grain per panicle, seed setting rate and 1000-grain weight was positive and significant.

Kohnaki *et al.* (2013) revealed that positive and significant correlation relation for grain yield per plant with panicle length, panicle per plant, total grain number and filled grains per panicle. Path coefficient analysis indicated that filled grains per panicle had highest direct effect on yield followed by panicle length, plant height, and panicle per plant. Panicle per plant had highest indirect effect on grain yield. This study revealed that selection based on filled grains per panicle, panicle length and panicle per plant will be highly effective for yield improvement in rice breeding programs.

Singh *et al.* (2013) reported that grain yield showed positive and significant correlation with plant height and panicle length at both genotypic level and phenotypic level.

Venkanna *et al.* (2014) reported that seed yield had highly significant positive correlations with 1000-seed weight. Path analysis revealed that number of filled grains per panicle had the highest positive and direct effect on grain yield followed by total biomass, kernel length and harvest index. Number of filled grains per panicle showed highly positive indirect effect through panicle density, total biomass and days to 50% flowering on grain yield. The study revealed that genetic improvement of grain yield in rice is admissible by selecting character having high positive correlation and positive direct effect.

## **Selection response**

Selection from segregating generation based on different methods of selection *viz*; high yield, low yield, high selection indices and low selection indices play an important role in crop improvement. The presence of variability of desired traits that can be easily identified in breeding population is pre requisite for selection. Hence, the success of breeding work depends entirely upon the variability which may be generated either by direct introduction or gene recombination after hybridization, mutations and polyploidy. The parameter for measuring variations in the breeding population are range, variances, co variances and coefficient of variation.

Yield is dependent upon a number of component characters which is quantitatively inherited and considerably effected by environment. Therefore, direct and indirect selection for yield may not be effective. Efficiency of selection under such circumstances can be improved by taking other component characters to consideration. Component characters care combined together in to a score or index and selection is applied to the index. Hazel (1943) developed a selection index based on path analysis.

Fasoules (1981) high intensity of selection maximized genetic advance as has also been observed in the present study.

Chakraborty and Hazarika (1996) reported that selection of genotype based on usual observation for different polymeric traits is less rewarding. In this study, selection of superior genotype by assigning ranks to each genotype for various quantitative traits followed by rank correlation study was attempted using this method, only five promising local genotypes for traits *viz*; grain yield, plant height, panicle length, panicle per plant, and 1000-grain weight simultaneously.

Verma and Mani (2000) reported that F<sub>2</sub> plant of cross UPR 83-34/ Sita were planted at four different plant spacing *viz*. 15 x 10, 20 x 10, 20 x 15 and 20 x 20 cm and subjected to biased and random selection followed by the estimation of selection differential for number of tillers per plant, panicle length (cm), number of grain per panicle, 1000-grain weight (g) and grain yield per plant (g). The resulting F<sub>3</sub> progenies were also evaluated for the same traits to find out the realised selection response. Based selection gave higher means than the random selection in F<sub>2</sub>, but differences got dissipated in the next generation. The estimates of selection differential were, in general, positive and higher for biased selection than for corresponding random selection. On the hand, the realized selection responses were mostly negative for biased selection and positive random selections

Vir and Singh (2005) reported that lowest selection intensity, standardized selection differential was the highest for all traits. Standardized response to selection at such low selection intensity was the highest for all traits in E-II and equally good in E-I. Realized heritability for grain yield per plant was high at 5%, 10% and 15% selection intensities in E-II. For 1000-grain weight the estimated realized heritability was high in all cases.

Kumar *et al.* (2009) stated that effectiveness of plants selected in early segregating  $F_2$  and  $F_3$  populations was estimated in their corresponding  $F_3$  and  $F_4$  generation of two rice crosses, Jhona 349 X IET-12944 and Narendra 80 X Lalmati. Both the  $F_2$  and  $F_3$  selected plants showed consistency in increment of response to selection and realized heritability in their corresponding  $F_3$  and  $F_4$  generation for grain yield per plant and 100-grain weight, whereas these estimates were inconsistent for spikelets per main panicle and in undesirable direction for panicle per plant.

Eshghi *et al.* (2011) stated that most genetic advance in grain yield and traits such as number of tillers and plant height was accomplished through a completely new index in which economic values were calculated via multiplication of broad-sense heritability values and values of direct effects of path analysis. The results also indicated that taking advantage of Smith-Hazel and Brim-Williams indices led to almost similar genetic advance in the traits under study.

Barma and Borah (2012) reported that  $F_3$  generation showed significant positive selection response for plant height, number of panicles per plant, and days to 50 % flowering, thus indicating the effectiveness of selection for these characters. Grain yield showed non - significant response in  $F_2$  generation which indicates straight selection for this character during early generation may not be effective.  $F_4$  generation showed positive selection response for all the characters i.e. plant height, number of panicles per plant, grain density, days to 50 % flowering and grain yield. This indicates the effectiveness of selection for these characters in  $F_3$  or latter generation.

Singh *et al.* (2013) reported that genetic advance and relative efficiency of selection indices was ranged from 0.13 (Index III)-33.23 per cent (Index XXI) and 4.20 (Index III) – 1093.09 per cent (Index XXI), respectively.

Ahmad *et al.* (2017) reported that the data on  $F_2$  and  $F_3$  generations of *Solanum Lycopersicum* were collected in 2015 and 2016, respectively and the values of mean, range, selection differential, heritability, genetic advance and response to selection were calculated for both the generations. The phenotypic variance, genotypic variance,

heritability and genetic advance % was found to be higher in  $F_2$  generation than in  $F_3$  for all the parameters. Highest value of heritability% was observed for fruit diameter while lowest value was estimated for flowers/cluster in  $F_2$  generation. In  $F_3$  generation highest value of heritability was found for fruit weight and the lowest value was calculated for yield/plant. Highest and lowest genetic advance % was calculated for number of fruits/plant and yield/plant in  $F_2$  and for fruit weight and yield/plant in  $F_3$ , respectively. The maximum and minimum range in  $F_2$  was observed to be wider than in  $F_3$ . Selection differential and response to selection were found to be positive for all the parameters. The study reveals that judicious selection leads to improvement in next generation.

**Location and weather conditions**

The present investigation was carried out during *kharif* 2013 and 2014 in Rice Experimental Area, Birsa Agricultural University, Ranchi, Jharkhand. Geographically, it is located at 23<sup>o</sup> 17 N latitude and 85<sup>o</sup> 19 E longitude with an altitude of about 625 meters above mean sea level. The agriculture in Jharkhand is mainly monsoon dependent. The average annual rainfall in this area is around 1400 mm, the maximum downpour being during July, August and September, sometimes it extends up to mid of October also.

**Experimental materials**

The experimental material consisted of three crosses *viz*; BG102/BPT5204, BG102/Naveen and BG102/Reshmi (Commercial Pvt. hybrid Victory seeds) of rice (*Oryza sativa* L.). Each of the crosses represented a separate experiment which were obtained from Rice Project, Department of Plant Breeding and Genetics, Birsa Agricultural University, Ranchi, Jharkhand. All the materials come under single cross, except, BG102/ Reshmi (Commercial Pvt. hybrid Victory seeds) which is a three way cross. The F<sub>2</sub> materials were grown in nursery on 6<sup>th</sup> June, 2013. Thirty (30) days old seedlings were transplanted in the puddled field. Out of total 5000 F<sub>2</sub> established population, 1000 F<sub>2</sub> were tagged randomly after flowering of each cross *viz*; BG102/BPT5204, BG102/Naveen and BG102/Reshmi (Commercial Pvt. hybrid Victory seeds) respectively and represented as Cross- I, Cross- II and Cross- III. The data recording and harvesting of each plant was done separately so that these F<sub>2</sub> plants be categorized and selected. On the basis of these data 50 plants were selected in each groups *viz.*, high yielder (HY), low yielder (LY), multi trait limit (MTL) and random plant selection (RPS). Each group comprising 50 plants but in MTL having only 48, 49 and 42 plants in each cross *viz*; Cross- I, Cross- II and Cross- III respectively. Variation in number of plants in respective crosses is due to some plants occupied in two groups of same plants i.e. HY and MTL thereafter that plants placed in HY group only. High and low yielder plants were selected on the basis of their high and low yield potential, however, in MTL group optimum plants were selected by fixing certain traits range *viz*; PH (70-110 cm), PPP (5-25), PL (18-35 cm), GPP (80-250) and test wt. (100 seed, 1.9-3.0 g) for selection of superior plants but in RPS group plant was selected on random

basis. These F<sub>2</sub> selected plants were grown during *kharif*, 2014 in RBD with two replication and two methods of sowing, such as, direct seeded and transplanted at twenty days interval; each plot measuring 2.7 x 0.4 meter size. The row to row distance was kept at 20cm while plant to plant distance was maintained at 15cm. A fertilizer dose of 80 : 40 : 30 N:P:K Kg/ ha was applied in two parts 40 kg of N, all phosphate and potash were applied as a basal and the remaining 40 kg N was applied as top dressing in two split doses.

**Table-1: Source of three F<sub>2</sub> population used in the present study**

Sl. No.	Crosses		Source of procurement
1.	Single cross	GEB 24 x TN 1// Mahsuri ↓ BG 102 x BPT 5204	Birsa Agricultural University, Kanke, Ranchi, Department of PBG
2.		Sattari x Jaya ↓ BG 102 x Naveen	
3.	Three way cross	BG 102/Reshmi (Commercial Pvt. hybrid Victory seeds)	Birsa Agricultural University, Kanke, Ranchi, Department of PBG

### 3.5 Collection of data

The observations during present investigation were recorded on fifteen competitive randomly selected F<sub>3</sub> plants in each replication for all the characters. The recording of observations were done as per standard evaluation system (IRRI).

#### 3.5.1 Days to 50 % flowering

Days to fifty per cent flowering was calculated by using the following formula.

$$DAFF = DFF - DS$$

Where,

DAFF = Days to 50 per cent flowering

DFF = Date of 50 per cent flowering

DS = Date of sowing in the nursery bed

#### 3.5.2 Plant height (cm)

Plant height was measured in centimeters from the base of the plant to the tip of the tallest panicle bearing tillers excluding awns, when plant attained 75 per cent of physiological maturity.

### **3.5.3 Panicle per plant**

Total number of panicle per plant of fifteen selected plants were counted at maturity stage and the average was taken to get the number of panicles per plant.

### **3.5.4 Grains per panicle**

The average number of grains of randomly selected plant was divided by the number of panicles to get the number of grains per panicle.

### **3.5.5 Test weight (g)**

Sun dried 100 or 1000 grains were counted and their weight was recorded in grams using electronic balance for F<sub>2</sub> and F<sub>3</sub> respectively.

### **3.5.6 Grain yield per plant (g)**

Total grain yield of each of the randomly selected plant was recorded in grams using an electronic balance. Thereafter, the average was worked out.

### **3.5.7 Grain yield per plot (g)**

All plants of 1.08 m<sup>2</sup> plot size were harvested and their grain yield was recorded in grams

## **3.6 Statistical analysis**

The recorded replicated data was subjected for analysis in Randomized Block Design to estimates the significance difference among the treatments.

### **3.6.1 Range**

The lowest and highest value of a particular character was regarded as range of that character.

### **3.6.2 Arithmetic mean**

The sum of all observations in a samples divided by their number.

Arithmetic mean  $(\bar{x}) = \Sigma X/N$

Where,

$\Sigma$  = summation

X = observation in a sample

N = number of observation in a sample

For computing number of class intervals formula have been developed by Sturges (1926), which is expressed as K

Where,

$$K = 1 + 3.332 \log_{10}(N)$$

$$N = \text{Number of observed data}$$

$$\text{Width of the Class-intervals (W)} = \frac{X_{\text{highest}} - X_{\text{lowest}}}{K}$$

### 3.7 Skewness and Kurtosis

Skewness, the third degree statistics and kurtosis, the fourth degree statistics were estimated as per Snedecor and Cochran (1974) to understand the nature of distribution of 11 frequency classes for quantitative traits in 1000 F<sub>2</sub> population of each cross. The 11 frequency classes of each cross were used to estimate coefficients of skewness. Three types of kurtosis are recognized based on the kurtosis value which depends on distribution curve (Robson, 1956).

If kurtosis value = 3 = Normal curve = Mesokurtic

If kurtosis value > 3 = Leaping curve = Leptokurtic

If kurtosis value < 3 = Flat curve = Platykurtic

Similarly, the lack of symmetry *i.e.*, skewness was recognized based on the coefficient of skewness values which range from -3 to +3.

The type of distribution based on the skewness values are as follows.

If skewness value is zero = Symmetrical distribution

If skewness value is negative = Negatively skewed distribution

If skewness value is positive = Positively skewed distribution

### 3.8 Analysis of variance

The analysis of variance was carried out by using procedure given by Panse and Sukhatme, 1967.

To test the hypothesis

$H_0 = t_1 = t_2 \dots = t_v$ , the fixed effect model for the analysis of variance in RBD is as follows:

$$Y_{ij} = \mu + t_i + b_j + e_{ij}$$

Where,

$$Y_{ij} = \text{Yield performance of } i^{\text{th}} \text{ treatment in } j^{\text{th}} \text{ replication.}$$

- $\mu$  = General mean effect.
- $t_i$  = Effect of  $i^{\text{th}}$  entry ( $i = 1, 2, \dots, v$ )
- $b_j$  = Effect of  $j^{\text{th}}$  replication ( $j = 1, 2, \dots, r$ )
- $e_{ij}$  = Random error.

### 3.8.1 Correction factor

The desired correction factors were calculated as

$$\text{Correction factor (CF)} = \frac{(\text{Grand Total})^2}{\text{Number of observations}}$$

$$3.8.2 \text{ Total S.S. (TSS)} = \sum_{i=1}^v \sum_{j=1}^r x_{ij}^2 - \text{CF}$$

$$3.8.3 \text{ Replication S.S. (R.S.S)} = \frac{\sum_{j=1}^r B_j^2}{t} - \text{CF}$$

$$3.8.4 \text{ Treatment S.S. (TSS)} = \frac{\sum_{i=1}^v T_i^2}{r} - \text{CF}$$

$$3.8.5 \text{ Error S.S. (ESS)} = \text{Total S.S.} - \text{R.S.S.} - \text{Treatment S.S.}$$

Where,

- $T_i$  = Sum of the  $i^{\text{th}}$  entries
- $B_j$  = Sum of the  $j^{\text{th}}$  replication

### Critical Difference

Critical difference was calculated to determine whether the difference between two treatments was significant or not. It was calculated by the following formula:

$$\text{CD} = \sqrt{2\sigma^2_e/r} \text{ at error df}$$

### Analysis of variance

Source of variation	df	SS	MS	E(MS)	F- ratio
Replication	$r-1$	SSR	MSR	$\sigma^2_e + \sigma^2_r$	MSR/MSE
Genotypes	$t-1$	SST	MSG	$\sigma^2_e + r\sigma^2_v$	MSG/ MSE
Error	$(r-1)(t-1)$	SSE	MSE	$\sigma^2_e$	
Total	$r \cdot t - 1$	TSS			

Where,

- $R$  = Number of replications
- $G$  = Number of genotypes

MSR	=	Replication mean sum of square
MSG	=	Genotype mean sum of square
MSE	=	Error mean sum of square

### Phenotypic and Genotypic Variances

Genotypic ( $\sigma^2g$ ) and phenotypic ( $\sigma^2p$ ) variances were calculated as follows:

$$\sigma^2g = \frac{(\sigma^2g + r\sigma^2e) - \sigma^2e}{r}$$

$$\sigma^2p = \sigma^2g + \sigma^2e \text{ [When Cov. G x E=0]}$$

Where,

$\sigma^2g$	=	Genotypic variance
$\sigma^2e$	=	Environmental variance or error

### Coefficient of Variability

Variability present in the grain yield and yield contributing characters was estimated according to the method advocated by Burton, 1952.

#### i. Genotypic Coefficient of Variation (GCV)

The genotypic coefficient of variation was computed by dividing the square root of genetic variance by population mean and multiplying it by 100.

Thus,

$$GCV = \frac{\sqrt{\sigma^2g}}{\bar{X}} \times 100$$

Where,

$\sigma^2g$	=	Genotypic variance
$\bar{X}$	=	Population mean

#### ii. Phenotypic Coefficient of Variation (PCV)

For computing phenotypic coefficient of variation the square root of the phenotypic variance was divided by the population mean and then it was multiplied by 100. It was calculated by the following formula:

Thus,

$$PCV = \frac{\sqrt{\sigma^2p}}{\bar{X}} \times 100$$

Where,

$$\begin{aligned}\sigma^2_p &= \text{Phenotypic variance} \\ \bar{X} &= \text{Population mean}\end{aligned}$$

### Heritability

It was calculated by the formula suggested by Lush (1949) and Johnson *et al.*, (1955) which is the ratio of additive or fixable genotypic variance to the phenotypic variance i.e. total variance.

Thus,

$$h^2 \text{ (Broad sense)} = \frac{\sigma^2_g}{\sigma^2_p} \times 100$$

Where,

$$\begin{aligned}\sigma^2_g &= \text{Additive variance} \\ \sigma^2_P &= \text{Phenotypic variance} \\ h^2 &= \text{Heritability (Broad sense)}\end{aligned}$$

As suggested by Johnson *et al.* (1955), heritability values are categorized as:

Low	:	Less than 30 %
Moderate	:	30-60 %
High	:	More than 60%

### Genetic Advance (G.A.)

Improvement in the mean genotypic value of selected plants over the parental population. Genetic advance was estimated by using the formula suggested by Lush (1949) and followed by Johnson *et al.*, (1955) and Allard (1960).

$$\text{Genetic advance (G.A.)} = K \cdot \sigma_p \cdot h^2$$

Where,

$$\begin{aligned}K &= \text{Selection differential, which is 2.06 at 5 \% selection intensity in} \\ &\quad \text{large sample from normally distributed population} \\ \sigma_p &= \text{Phenotypic standard deviation} \\ h^2 &= \text{Heritability in broad sense}\end{aligned}$$

Genetic advance as percentage of mean was calculated by following formula:

$$\text{GA (as per cent of mean)} = \frac{\text{GA}}{\bar{X}} \times 100$$

Where,

GA = Genetic advance

$\bar{X}$  = Mean of the character

The range of genetic advanced as percent of mean is classified as suggested by Johnson *et.al.* (1955).

Low : Less than 10 %

Moderate : 10-20 %

High : More than 20%

### **Analysis of covariance**

Covariance analysis of the replicated data from lines of all combinations of characters was done and used for estimation of correlation coefficients both genotypic and phenotypic covariance were calculated by using the formula suggested by Federer (1955).

$$\text{Genotypic covariance 1.2} = \frac{[\text{Tr.Mp 1.2} - \text{E.Mp 1.2}]}{r}$$

Where,

Tr.Mp 1.2 = Treatment mean sum of products of trait one and two

E.Mp 1.2 = Error mean sum of products of trait one and two

r = Number of replications

1 and 2 = are the two traits

Phenotypic Covariance 1.2 = Genotypic covariance 1.2 + Error covariance 1.2

### **Correlation Coefficient**

Correlation coefficient gives the measure of the degree of association between two variables. Correlation coefficients were calculated to find out the relationship of the independent variables with yield and interrelationship between themselves. Phenotypic and genotypic correlation coefficients were calculated from the variance and covariance component as suggested by Aljibouri *et al.* (1958) as well as Panse and Sukhatme (1967).

Correlations were calculated using the following formula:

$$r (X_1, X_2) = \frac{\text{Cov} (X_1, X_2)}{\sqrt{V (X_1). V (X_2)}}$$

Where,

$r(X_1, X_2)$  is the correlation between  $X_1$  and  $X_2$

$Cov(X_1, X_2)$  is the covariance between  $X_1$  and  $X_2$

$V(X_1)$  is the variance of  $X_1$

$V(X_2)$  is the variance of  $X_2$

### **Genotypic correlation coefficient**

Considering genotypic values ( $\sigma^2 g_i$  and  $\sigma^2 g_j$ ) the genotypic correlation were calculated:

$$r(g_i, g_j) = \frac{Cov(g_i, g_j)}{\sqrt{V(g_i) \cdot V(g_j)}}$$

Where,

$r(g_i, g_j)$  is the genetic correlation between  $g_i$  and  $g_j$ .

$Cov(g_i, g_j)$  is the covariance between  $g_i$  and  $g_j$ .

$V(g_i)$  is the variance of  $g_i$

$V(g_j)$  is the variance of  $g_j$

### **Phenotypic correlation coefficient**

Similarly, phenotypic correlation was calculated by using phenotypic variance and co-variance by using the following formula:

$$r(p_i, p_j) = \frac{Cov(p_i, p_j)}{\sqrt{V(p_i) \cdot V(p_j)}}$$

Where,

$r(p_i, p_j)$  = Phenotypic correlation between  $p_i$  &  $p_j$

$Cov(p_i, p_j)$  = Covariance between  $P_i$  &  $P_j$

$V(p_i)$  = variance of  $P_i$

$V(p_j)$  = variance of  $P_j$

### **Test of significance of correlation coefficient**

The calculated  $r$  can be tested for its significance (i.e. whether greater than 0) by comparing it with the table value of  $r$  available in standard books at  $N-2$  degrees of freedom.

### 3.10. Path co efficient analysis

Path co efficient were calculated at both phenotypic and genotypic level by adopting the method of Dewey and Lu (1959) and subsequently followed by Ramanujam and Rai (1963) to partition the phenotypic correlation into direct and indirect effects.

#### i. Estimation of direct effect

$$\begin{aligned}
 P_{1y} + r_{1.2} P_{2y} + r_{1.3} P_{3y} + \dots + r_{1n} P_{ny} &= r_{1y} \\
 P_{2y} + r_{2.1} P_{1y} + r_{2.3} P_{3y} + \dots + r_{2n} P_{ny} &= r_{2y} \\
 \dots & \\
 \dots & \\
 P_{ny} + r_{n.1} P_{1y} + \dots + r_{ny} &
 \end{aligned}$$

Where,

- $r_{1y}$  to  $r_{ny}$  = Co efficient of correlation between independent character 1 to n and dependent character, yield (y)
- n = Total number of character
- $P_{1y}$  to  $P_{ny}$  = The direct effect of independent character 1 to n on the dependent character.

#### ii. Estimation of indirect effect

The indirect effects for a particular characters through the other character J was obtained by multiplication of direct path and corresponding correlation coefficient between 'i' and 'j' respectively.

$$\text{Indirect effect} = r_{ij} \times P_{ij}$$

Where,

- i and j = 1,2, ..... n (total no. of characters) ( $i \neq j$ )

#### iii. Residual effect

The contribution of residual factor was estimated as

$$\text{Residual factors (x), } P_{xy} = \sqrt{1 - R^2}$$

Where,

$$\begin{aligned}
 R^2 &= \sum_{i=1}^n P_{iy}^2 + 2 \sum_{i \neq j} P_{iy} P_{jy} r_{ij} \\
 i &= 1, 2, \dots, n
 \end{aligned}$$

- n = Number of independent characters  
 $P_{iy}$  = Direct effect of  $i^{\text{th}}$  character on yield (y)  
 $r_{ij}$  = Correlation co-efficient between  $i^{\text{th}}$  and  $j^{\text{th}}$  characters

**Response to selection based on different selection criteria:**

The equation for the response to selection (RS) for a trait, is given as follows (Falconer and Mackay, 1996):  $RS = ds \text{Cov}_{PO} / \sigma^2_p$

Where,

RS is the expected response to selection ds is the selection differential related to the intensity of selection applied to the trait.

$\text{Cov}_{PO}$  is the covariance of parents and offspring, which is genetic in nature as the parents and offspring are in different environments and, as a result, not correlated. Moreover, this can be expressed as a genetic variance as it concerns selection and response in the same trait (X or Y)

$\sigma^2_p$  is the phenotypic variance of the selection unit (parents)

Standardized selection differential ( $S/\sigma_p$ ) = Mean of selected parent - Population mean  
 standardized selection response ( $R/\sigma_p$ ) = Progeny mean - Population mean

$$\text{Realized heritability (R/S)} = \frac{\text{Standardized selection differential (S/\sigma p)}}{\text{Standardized selection response (R/\sigma p)}}$$

Where,

- S = Selection differential  
 R = Selection response  
 $\sigma_p$  = Phenotypic variance

The experimental material consisted of three crosses *viz*; BG102/BPT5204, BG102/Naveen and BG102/Reshmi (Commercial Pvt. hybrid Victory seeds) of rice (*Oryza sativa* L), each of the crosses represented a separate experiment which were obtained from Rice Project, Department of Plant Breeding and Genetics, Birsa Agricultural University, Ranchi, Jharkhand. All the materials come under single cross, except, BG102/ Reshmi (Commercial Pvt. hybrid Victory seeds) which is a three way cross. These F<sub>2</sub> materials were grown in nursery on 6<sup>th</sup> June, 2013. Thirty (30) days old seedlings were transplanted in the puddled field. Out of total 5000 F<sub>2</sub> established population, 1000 F<sub>2</sub> were tagged randomly after flowering of each cross *viz*; BG102/BPT5204, BG102/Naveen and BG102/ Reshmi (Commercial Pvt. hybrid Victory seeds) respectively and it was represented as Cross- I, Cross- II and Cross- III. These F<sub>2</sub> selected plants were grown during *kharif*, 2014 in RBD with two replication and two methods of sowing such as direct seeded and transplanted at twenty days interval; each plot measuring 2.7 x 0.4 meter size. The row to row distance was 20cm while plant to plant distance was maintained at 15cm. A fertilizer dose of 80: 40: 30 N:P:K Kg/ ha was applied. Total phosphate, potash and a half of nitrogen was applied as basal while remaining 40 kg N was applied as top dressing in two split doses. The results of present investigation of each cross are presented separately under following heads:

- IV.1 Analysis of variance
- IV.2 Range, mean, skewness and kurtosis
- IV.3 Genetic variability
- IV.4 Character association
- IV.5 Direct and indirect effect
- IV.6 Selection response

#### **Cross- I**

Mean value of 1000 F<sub>2</sub> plants and their frequency as well as 50 selected plants in each groups are presented in Appendix I and II.

#### **IV.1 Analysis of variance**

Analysis of variance for traits PH, DFF, PPP, GPP, TW, GYP plant and GYP plot have been presented in (Table 4.1a). The mean sum of square due to progeny were found

to be highly significant for all most all traits except to PH and GYP plot in all methods of planting, both date of sowing as well as different methods of selection.

## **IV.2 Range and mean**

Out of seven characters higher values have been considered to be desirable for the traits Panicles per plant (PPP), Grains per panicle (GPP), 1000 seed wt, Grain yield per plant (GYP plant), and Grain yield per plot (GYP plot), whereas lower value have been considered as desirable for Days to 50 per cent flowering (DFF) and Plant height (PH).

### **IV.2.1 Days to 50 per cent flowering**

The trait DF of 1000 F<sub>2</sub> plants ranged from 77 (progeny of plant no. 867, 964, 68, 995, 885, 276, 214, 220, 476, 344, 679, 382, 648, 746, 722 and 843) to 98 (progeny of plant no. 788, 478 and 999) days with the general mean 83.97 days. (Table 4.2a)

In I<sup>st</sup> method of selection (HY), DFF ranged from 72 (plant no. 398) to 91 days (progeny of plant no. 695) and 70 (progeny of plant no. 398) to 87days (progeny of plant no. 695) with the general mean 72 and 70 days in the I<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In I<sup>st</sup> date of DS out of 50 F<sub>3</sub> progenies only 22 progenies were found significantly short duration and rest of the plant were at par with the plant comprising maximum DFF. In 2<sup>nd</sup> date of DS 38 plants were short duration and rest of the plant were found to be at par with the plant comprising maximum DFF. In TP, DFF ranged from 80 (progeny of plant no. 398) to 97 days (progeny of plant no. 695) and 89 (progeny of plant no. 398) to 106 days (progeny of plant no. 695) with the general mean 80 and 89 days in the I<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In I<sup>st</sup> date of TP, out of 50 F<sub>3</sub> progenies only seventeen plants were significantly superior and rest of progenies were at par with the plant which recorded maximum DFF. In 2<sup>nd</sup> date of TP 31 plants were found short duration however, rest of plants were significantly superior and rest of progenies were at par with the plant which recorded maximum.

In 2<sup>nd</sup> method of selection (LY), DFF ranged from 69 (plant no. 275) to 83 days (progeny of plant no. 542) and 68 (progeny of plant no. 435) to 82 days (progeny of plant no. 54) with the general mean 69 and 68 days in the I<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In I<sup>st</sup> date of DS out of 50 F<sub>3</sub> progenies only 15 progenies were found significantly short duration and rest of the plant were at par with the plant comprising maximum DFF. In 2<sup>nd</sup> date of DS 28 plants had short duration and rest of the plants were found to be at par

with the plant comprising maximum DFF. In TP, DFF ranged from 78 (progeny of plant no. 435) to 91 days (progeny of plant no. 54) and 87 (progeny of plant no. 435) to 101 days (progeny of plant no. 54) with the general mean 78 and 87 days in the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, 38 progenies had short PH and rest of progenies were at par with the plant had maximum DFF. In 2<sup>nd</sup> date of TP, 22 plants had short duration however, rest of progenies were at par with the plant which recorded maximum.

In 3<sup>rd</sup> method of selection (MTL), DFF ranged from 70 (plant no. 582) to 86 days (progeny of plant no. 279) and 70 (progeny of plant no. 806) to 82 days (progeny of plant no. 339) with the general mean 70 and 70 days in the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS out of 50 F<sub>3</sub> progenies 40 progenies significantly short duration and rest of the plant were at par with the plant comprising maximum DFF. In 2<sup>nd</sup> date of DS 43 plants were short duration and rest of the plant were found to be at par with the plant comprising maximum DFF. In TP, DFF ranged from 80 (progeny of plant no. 806) to 92 days (progeny of plant no. 339) and 89 (progeny of plant no. 806) to 101 days (progeny of plant no. 339) with the general mean 80 and 89 days in the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, out of 50 F<sub>3</sub> progenies only 37 progenies had dwarf nature while rest of progenies were at par with the plant which had maximum DFF. In 2<sup>nd</sup> date of TP 43 plants had short duration however, rest of progenies were at par with the plant which recorded maximum.

In 4<sup>th</sup> method of selection (RPS), DFF ranged from 70 (plant no. 572) to 89 days (progeny of plant no. 853) and 69 (progeny of plant no. 572) to 87 days (progeny of plant no. 853) with the general mean 70 and 69 days in the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS, all progenies were found significantly short duration except one plant i.e. 853. In 2<sup>nd</sup> date of DS, all progenies were found significantly short duration except two plant i.e. 496 and 853. In TP, DFF ranged from 78 (progeny of plant no. 572) to 96 days (progeny of plant no. 853) and 88 (progeny of plant no. 572) to 106 days (progeny of plant no. 853) with the general mean 78 and 88 days in the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, 47 progenies had dwarf nature and rest of progenies were at par with the plant which had maximum DFF. In 2<sup>nd</sup> date of TP, all progenies were found mid duration except one plant i.e. 853 (Table 4.3a).

#### IV.2.2 Plant height (cm)

For the trait PH of 1000 F<sub>2</sub> plants ranged from 73 (progeny of plant no. 992) to 158 cm (progeny of plant no. 491) with the general mean 116.15 cm (Table 4.2a).

The PH was exhibited platykurtic (0.21) and negatively skewed (-0.07) distribution in F<sub>2</sub> population (Fig. 1).

In I<sup>st</sup> method of selection (HY), PH ranged from 108 (progeny of plant no. 1) to 133 cm (progeny of plant no. 319) and 108 (progeny of plant no. 811) to 135 cm (progeny of plant no. 922) with the general mean 122 and 122 cm for the I<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In I<sup>st</sup> and 2<sup>nd</sup> date of DS, out of 50 F<sub>3</sub> progenies only three and ten plants were exhibited dwarf and semi dwarf nature however, rest of the plants were at par with plants recorded maximum PH. In TP, PH ranged from 106 (progeny of plant no. 930) to 132 cm (progeny of plant no. 275) and 104 (progeny of plant no. 339) to 138 cm (progeny of plant no. 575) with the general mean 121 and 122 cm for the I<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In I<sup>st</sup> date of TP only twelve progenies were recorded maximum PH and rest of progenies were at par with the plant which recorded maximum PH. In 2<sup>nd</sup> date of TP fourteen progenies were obtained dwarf and semi dwarf nature however, rest of the progenies were at par with the tallest plant.

In 2<sup>nd</sup> method of selection (LY), PH ranged from 109 (progeny of plant no. 490) to 137 cm (progeny of plant no. 157) and 105 (progeny of plant no. 709) to 139 cm (progeny of plant no. 157) with the general mean 122 and 122 cm for the I<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In I<sup>st</sup> and 2<sup>nd</sup> date of DS only twenty and thirty two progeny were obtained dwarf and semi dwarf nature however, rest of progeny were found to be at par with progeny recorded maximum PH. In 2<sup>nd</sup> date of DS, PH ranged from 108 (progeny of plant no. 479) to 160 cm (progeny of plant no. 819) and 109 (progeny of plant no. 672) to 137 cm (progeny of plant no. 487) with the general mean 121 and 122 cm for the I<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In I<sup>st</sup> date of TP all 50 F<sub>3</sub> progenies were found significantly dwarf and semi dwarf nature with the plant comprising maximum PH except progeny of plant no. 319. In 2<sup>nd</sup> date of TP twenty one plants were obtained dwarf and semi dwarf nature however, rest of the plants were at par with plants recorded maximum PH.

In 3<sup>rd</sup> method of selection (MTL), PH varied from 101 (progeny of plant no. 756) to 129 (progeny of plant no. 449) cm and 102 (progeny of plant no. 813) to 134 (plant no. 449) cm with the general mean 117 and 118 cm for the I<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In I<sup>st</sup> date of DS eleven plants were found significantly dwarf than the plant

which had maximum PH. In 2<sup>nd</sup> date of DS twenty five plants were exhibited dwarf and semi dwarf nature however, rest of the plants were at par with plants recorded maximum PH. In TP, PH varied from 103 (progeny of plant no. 547) to 131 (progeny of plant no. 836) cm and 94 (progeny of plant no. 836) to 135 (progeny of plant no. 654) cm with the general mean 115 and 115 cm for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP only twelve plants were found significantly dwarf than the plant which had maximum PH. In 2<sup>nd</sup> date of TP twenty plants were obtained dwarf and semi dwarf nature however, rest of the plants were at par with plants recorded maximum PH.

In 4<sup>th</sup> method of selection (RPS), PH ranged from 101 (progeny of plant no. 853) to 148 (progeny of plant no. 155) cm and 96 (progeny of plant no.734) to 147 (progeny of plant no. 931) cm with the general mean 121 and 124 cm for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS and TP out of 50 F<sub>3</sub> progenies only thirty three and nine progenies respectively exhibited significantly dwarf with the plant comprising maximum PH. In 2<sup>nd</sup> date of DS as well as TP thirty nine and twenty plants were obtained dwarf and semi dwarf nature however, rest of the plants were at par with tallest plants. In TP, PH ranged from 96 (progeny of plant no. 640) to 139cm (progeny of plant no. 273) and 99 (progeny of plant no. 102) to 145 (progeny of plant no. 931) cm with the general mean 123 and 124 cm for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively (Table 4.3.1a).

#### **IV.2.3 Panicle per plant**

For the trait PPP of 1000F<sub>2</sub> plants varied from 2 (progeny of plant no. 226) to 20 (plant no.211) with the general mean 8.08 (Table 4.2a).

The leptokurtic (0.67) and positively skewed (0.75) distribution were found in 1000 F<sub>2</sub> population for the trait PPP indicated dominance based complementary gene interaction involving fewer number of genes having decreasing effect in the inheritance of PPP (Fig. 2).

In 1<sup>st</sup> method of selection (HY), PPP ranged from 9 (progeny of plant no. 377 and 856) to 16 (progeny of plant no. 339) and 8 (progeny of plant no. 498 and 930) to 15 (progeny of plant no. 922) with the general mean 12 and 11 for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> and 2<sup>nd</sup> date of DS twenty four and thirty three plants progenies respectively recorded highest PPP however, rest of the plants were at par with plants recorded maximum PPP. In TP, PPP ranged from 8 (progeny of plant no. 375) to 15 (plant no.130) and 4 (progeny of plant no. 1) to 16 (progeny of plant no. 377) with the general mean 11 and 12 for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, out of

50 F<sub>3</sub> progenies only thirty four plants were found superior with the plant comprising maximum PPP, whereas in 2<sup>nd</sup> date of TP twenty six plants were obtained dwarf and semi dwarf nature however, rest of the plants were at par with plants recorded maximum PPP.

In 2<sup>nd</sup> method of selection (LY), PPP ranged from 7 (progeny of plant no. 991) to 12 (progeny of plant no. 196) and 8 (progeny of plant no. 711) to 13 (progeny of plant no. 636) with the general mean 10 and 10 for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> and 2<sup>nd</sup> date of DS only twenty two and twenty nine progenies respectively were exhibited highest PPP however, rest of the plants were at par with plants recorded maximum PPP. In TP, PPP ranged from 7 (progeny of plant no. 898) to 14 (progeny of plant no. 771) and 6.96 (progeny of plant no. 991) to 12 (plant no.196) with the general mean 10 and 10 for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> and 2<sup>nd</sup> date of TP forty three and nineteen plants respectively were exhibited maximum PPP and rest of the plants were at par with plants recorded maximum PPP.

In 3<sup>rd</sup> method of selection (MTL), PPP varied from 6 (progeny of plant no. 39) to 13 (progeny of plant no. 335) and 7 (progeny of plant no. 39) to 16 (progeny of plant no. 472) with the general mean 9 and 9 for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In both date of DS forty progenies were recorded maximum PPP and rest of the plants were at par with plants recorded maximum PPP. In TP, PPP ranged from 6 (progeny of plant no. 499) to 18 (progeny of plant no. 447) and 1 (progeny of plant no. 932) to 12 (progeny of plant no. 160) with the general mean 9 and 8 for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP forty two plants were recorded maximum PPP, whereas in 2<sup>nd</sup> date of TP thirty seven plants were obtained lowest PPP however, rest of the plants were at par with plants recorded maximum PPP.

In 4<sup>th</sup> method of selection (RPS), PPP showed 3 (progeny of plant no. 155) to 13 (progeny of plant no. 845) and 7 (progeny of plant no. 294) to 15 (progeny of plant no. 155) with the general mean 10 and 9 for the 1<sup>st</sup> and 2<sup>nd</sup> date DS respectively. In both date of DS thirty and forty seven progenies respectively were recorded highest PPP however, rest of the plants were at par with plants recorded maximum PPP. In TP, PPP ranged from 6 (progeny of plant no. 640) to 14 (progeny of plant no. 914) and 7 (progeny of plant no. 294) to 25 (plant no.360) with the general mean 9 and 9 for the 1<sup>st</sup> and 2<sup>nd</sup> date TP respectively. In both date of TP thirty six and twenty plants were obtained low PPP however, rest of the plants were at par with plants recorded maximum PPP (Table 4.3.2a).

#### IV.2.4 Grain per panicle

The mean GPP of 1000 F<sub>2</sub> plants ranged from 12 (progeny of plant no. 716) to 176 (progeny of plant no. 292) with the general mean 78 (Table 4.2a).

Leptokurtic (0.18) and positively skewed (0.55) distribution were obtained for trait GPP in 1000 F<sub>2</sub> populations suggested the dominance based complementary gene interaction involving large number of genes having decreasing effect in the inheritance of grain yield in both the populations (Fig. 3).

In I<sup>st</sup> method of selection (HY), the mean of GPP ranged from 36 (progeny of plant no. 542) to 113 (progeny of plant no. 572) and 56 (progeny of plant no. 727) to 132 (progeny of plant no. 319) with the general mean 81 and 99 for the I<sup>st</sup> and 2<sup>nd</sup> date DS respectively. In both date of DS thirty two and twenty nine plants respectively recorded highest GPP however, rest of the plants were at par with plants recorded maximum GPP. In TP, GPP ranged from 54 (progeny of plant no. 1) to 143 (progeny of plant no. 51) and 18 (progeny of plant no. 1) to 118 (progeny of plant no. 142) with the general mean 103 and 88 for the I<sup>st</sup> and 2<sup>nd</sup> date TP respectively. In both date of TP only thirty seven and thirty four plants were obtained maximum GPP however, rest of the plants were at par with plants which recorded maximum GPP.

In 2<sup>nd</sup> method of selection (LY), GPP ranged from 50 (progeny of plant no. 305) to 135 (progeny of plant no. 157) and 52 (progeny of plant no. 305) to 138 (progeny of plant no. 157) with the general mean 88 and 89 for the I<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In both date of DS, forty five plants were recorded maximum GPP however, rest of the plants were at par with plants recorded maximum GPP. In TP, GPP ranged from 66 (progeny of plant no. 589) to 130 (progeny of plant no. 15) and 50 (progeny of plant no. 97) to 135 (progeny of plant no. 807) with the general mean 103 and 88 for the I<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In both date of TP, forty three and forty four plants were exhibited maximum GPP and rest of the plants were at par with plants which recorded maximum GPP.

In 3<sup>rd</sup> method of selection (MTL), GPP ranged from 54 (progeny of plant no. 242) to 141 (progeny of plant no. 689) and 59 (progeny of plant no. 340) to 116 (progeny of plant no. 689) with the general mean 85 and 88 for the I<sup>st</sup> and 2<sup>nd</sup> date DS respectively. In both date of DS forty seven and ten plants were recorded highest GPP and rest of the plants were at par with plants recorded maximum GPP. In TP, GPP ranged from 57 (progeny of plant no. 86) to 124 (progeny of plant no. 500) and 25 (progeny of plant no. 932) to 110 (progeny of plant no. 410) with the general mean 86 and 84 for the I<sup>st</sup> and 2<sup>nd</sup>

date TP respectively. In 1<sup>st</sup> date of TP, out of 48 F<sub>3</sub> progenies thirty four plants were found recorded maximum GPP while, in 2<sup>nd</sup> date of TP twenty three plants were obtained lowest GPP however, rest of the plants were at par with plants recorded maximum GPP.

In 4<sup>th</sup> method of selection (RPS), GPP varied from 62 (progeny of plant no. 2) to 135 (progeny of plant no. 962) and 64 (progeny of plant no. 2) to 133 (progeny of plant no. 962) with the general mean 89 and 88 for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In both date of DS forty three and forty four plants were recorded highest GPP however, rest of the plants were at par with plants recorded maximum GPP. In TP, GPP ranged from 47 (progeny of plant no. 566) to 112 (progeny of plant no. 288) and 69 (progeny of plant no. 294) to 176 (progeny of plant no. 284) with the general mean 83 and 89 for the 1<sup>st</sup> and 2<sup>nd</sup> date TP respectively. In 1<sup>st</sup> as well as 2<sup>nd</sup> date of TP, thirty seven and forty nine plants were obtained maximum GPP however, rest of the plants were at par with plants recorded maximum GPP (Table 4.3.3a).

#### **IV.2.5 Test wt (g)**

In 1<sup>st</sup> method of selection (HY) for TW ranged from 18 (progeny of plant no. 374) to 25 g (progeny of plant no. 130 and 237) and 18 (progeny of plant no. 374 and 714) to 25 g (progeny of plant no. 130) with the general mean 22 and 22 g for the 1<sup>st</sup> and 2<sup>nd</sup> date DS respectively. In both date of DS forty five and forty seven progenies respectively recorded highest TW however, rest of the plants were at par with plants recorded maximum TW. In TP, Tw ranged from 17 (progeny of plant no. 624) to 25 g (progeny of plant no. 1374) and 18 (progeny of plant no. 624) to 26 g (progeny of plant no. 339) with the general mean 21 and 22 for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In both date of TP only forty nine and forty eight plants respectively obtained maximum TW however, rest of the plants were at par with plants recorded maximum TW.

In 2<sup>nd</sup> method of selection (LY), TW ranged from 17 (progeny of plant no. 672) to 27g (progeny of plant no. 589) and 17 (plant no.807) to 27 g (progeny of plant no. 4) with the general mean 21 and 21 g for the 1<sup>st</sup> and 2<sup>nd</sup> date DS respectively. In 1<sup>st</sup> date as well as 2<sup>nd</sup> date of DS forty eight and forty seven plants respectively exhibited highest TW however, rest of the plants were at par with plants recorded maximum TW. In TP, TW ranged from 17 (progeny of plant no. 370) to 27g (progeny of plant no. 26) and 18 (progeny of plant no. 487) to 27 g (plant no.73) with the general mean 21 and 21 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In both date of TP forty seven and forty six plants

respectively exhibited maximum TW, whereas, rest of the plants were at par with plants recorded maximum TW.

In 3<sup>rd</sup> method of selection (MTL), TW showed 18 (progeny of plant no. 282) to 25 g (progeny of plant no. 21) and 17 (progeny of plant no. 972) to 25 g (plant no.138) with the general mean 21 and 21 g for the 1<sup>st</sup> and 2<sup>nd</sup> date DS respectively. In both date of DS forty four plants were obtained maximum TW and rest of the plants were found to be at par with plants recorded maximum TW. In TP, TW varied from 17 (progeny of plant no. 61) to 25g (progeny of plant no. 500) and 18 (progeny of plant no. 612) to 25 g (progeny of plant no. 500) with the general mean 21 and 21g for the 1<sup>st</sup> and 2<sup>nd</sup> date TP respectively. In both date of TP forty four and forty three plants respectively obtained lowest TW however, rest of the plants were at par with plants had maximum TW.

In 4<sup>th</sup> method of selection (RPS), TW ranged from 19 (progeny of plant no. 111) to 24 g (progeny of plant no. 867) and 19 (progeny of plant no. 605) to 26g (plant no.531) with the general mean 21 and 22 g for the 1<sup>st</sup> and 2<sup>nd</sup> date DS respectively. In both date of DS thirty seven and forty six plants were recorded highest TW however, rest of the plants were at par with plants recorded maximum TW. In TP, TW varied from 19 (progeny of plant no. 734) to 25 g (progeny of plant no. 531) and 18 (progeny of plant no. 111) to 24 g (progeny of plant no. 867) with the general mean 21 and 21 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In both date of TP forty five and forty three plants respectively recorded maximum TW however, rest of the plants were at par with plants recorded maximum TW (Table 4.3.4a).

#### **IV.2.6 Grain yield per plant.**

The mean GYP plant of 1000 F<sub>2</sub> plants ranged from 0.5 (plant no.730) to 36 (progeny of plant no. 182) g with the general mean 10.12 g (Table 4.2a).

Leptokurtic (1.88) and positively skewed (1.18) distribution were exhibited in F<sub>2</sub> populations for the trait GYP plant (Fig. 4).

In 1<sup>st</sup> method of selection (HY), GYP plant varied from 15 (progeny of plant no. 237) to 36 g (progeny of plant no. 182) and 9 (plant no.237) to 28g (progeny of plant no. 728) with the general mean 25 and 20 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In both date of DS, forty three and thirty seven plants respectively were recorded highest GYP plant however, rest of the plants were at par with plants recorded maximum GYP plant. In TP, GYP plant ranged from 14 (progeny of plant no. 237) to 35 g (progeny of plant no. 182) and 8 (progeny of plant no. 1) to 26 g (progeny of plant no. 853) with the

general mean 24 and 17 g for the 1<sup>st</sup> and 2<sup>nd</sup> date TP respectively. In both date of TP, out of 50 F<sub>3</sub> progenies only forty and forty plants had maximum GYP plant however, rest of the plants were at par with plants recorded maximum GYP plant.

In 2<sup>nd</sup> method of selection (LY), GYP plant varied from 2.4 (progeny of plant no. 821) to 24g (progeny of plant no. 375) and 12 (progeny of plant no. 871) to 21 g (progeny of plant no. 405) with the general mean 16 and 16 g for the 1<sup>st</sup> and 2<sup>nd</sup> date DS respectively. In both date of DS, thirty six and forty seven plants respectively exhibited highest GYP plant however, rest of the plants were at par with plants recorded maximum. In TP, ranged from GYP plant 8 (progeny of plant no. 487) to 24 g (progeny of plant no. 405) and 2 (progeny of plant no. 821) to 24 g (progeny of plant no. 375) with the general mean 15 and 16 g for 1<sup>st</sup> and 2<sup>nd</sup> date TP respectively. In 1<sup>st</sup> as well as 2<sup>nd</sup> date of TP, thirty eight and forty six plants respectively exhibited maximum GYP plant rest of the plants were at par with plants recorded maximum GYP plant.

In 3<sup>rd</sup> method of selection (MTL), GYP plant varied from 4 (progeny of plant no. 908) to 21 g (progeny of plant no. 449) and 6 (progeny of plant no. 242) to 19 g (progeny of plant no. 472) with the general mean 11 and 11 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In both date of DS, thirty nine and thirty eight plants respectively recorded maximum Tw. In TP, GYP ranged from 3 (progeny of plant no. 138) to 19 g (progeny of plant no. 886) and 8 (progeny of plant no. 932) to 17g (progeny of plant no. 612) with the general mean 10 and 11g for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In both date of TP, out of 48 F<sub>3</sub> progenies thirty nine plants were recorded maximum GYP plant. In 2<sup>nd</sup> date of TP forty three plants were obtained lowest GYP plant however, rest of the plants were at par with plants recorded maximum GYP plant.

In 4<sup>th</sup> method of selection (RPS), GYP plant showed 3 (progeny of plant no. 1000) to 21 g (progeny of plant no. 834) and 9 (plant no.834) to 29 g (progeny of plant no. 531) with the general mean 16 and 15 g for the 1<sup>st</sup> and 2<sup>nd</sup> date DS respectively. In both date of DS, sixteen and forty five plants respectively recorded highest GYP plant however, rest of the plants were at par with plants recorded maximum GYP plant. In TP, GYP ranged from 12 (progeny of plant no. 640) to 20 g (progeny of plant no. 875) and 12 (progeny of plant no. 576) to 20 g (progeny of plant no. 590) g with the general mean 15 and 15 g for the 1<sup>st</sup> and 2<sup>nd</sup> date TP respectively. In 1<sup>st</sup> both date of TP, twenty seven and forty plants respectively obtained maximum GYP plant however, rest of the plants were at par with plants recorded maximum GYP plant (Table 4.3.5a).

#### IV.2.6 GYP plot (g)

GYP plot ranged from 188 (progeny of plant no. 165) to 355 g (progeny of plant no. 54) and 146 (progeny of plant no. 727) to 319 g (progeny of plant no. 856) with the general mean 256 and 218 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively in 1<sup>st</sup> method of selection (HY). Thirty five and forty five progenies were recorded highest GYP plot in 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively however, rest of the plants were at par with plants recorded maximum GYP plot. In TP, GYP plot ranged from 174 (progeny of plant no. 165) to 342 g (progeny of plant no. 54) and 151 (progeny of plant no. 165) to 319 g (progeny of plant no. 54) with the general mean 241 and 218 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In both date of TP thirty three plants were obtained maximum GYP plot however, rest of the plants were at par with plants recorded maximum GYP plot.

In 2<sup>nd</sup> method of selection (LY), GYP plot ranged from 184 (progeny of plant no. 404) to 342 g (progeny of plant no. 73) and 136 (progeny of plant no. 709) to 303 g (progeny of plant no. 157) with the general mean 243 and 208 g for the 1<sup>st</sup> and 2<sup>nd</sup> date DS respectively. In both date of DS forty two and thirty four plants respectively were recorded maximum GYP plot and rest of the plants were at par with plants recorded maximum GYP plot. In TP, GYP plot ranged from 168 (progeny of plant no. 404) to 326.g (progeny of plant no.73) and 184 (progeny of plant no. 404) to 342 g (progeny of plant no. 73) with the general mean 227 and 243 g for the 1<sup>st</sup> and 2<sup>nd</sup> date TP respectively. In 1<sup>st</sup> date of TP, forty two plants were found superior with the plant comprising maximum GYP plot. In 2<sup>nd</sup> date of TP, forty two plants were obtained lowest GYP plot however, rest of the plants were at par with plants recorded maximum GYP plot.

Under 3<sup>rd</sup> method of selection (MTL), GYP plot ranged from 143 (progeny of plant no. 42) to 262 g (progeny of plant no. 886) and 132 (progeny of plant no. 791) to 262 g (progeny of plant no. 472) with the general mean 217 and 185 g for the 1<sup>st</sup> and 2<sup>nd</sup> date DS respectively. In both date of DS, fourteen and thirty two plants respectively were exhibited superior and rest of the plants were at par with plants recorded maximum GYP plot. In TP, GYP plot ranged from 156 (progeny of plant no. 113) to 249 g (progeny of plant no. 886) and 120 (progeny of plant no. 113) to 225 g (progeny of plant no. 886) with the general mean 209 and 179 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, twelve plants were recorded maximum GYP plot. In 2<sup>nd</sup> date of TP, nineteen plants were obtained lowest GYP plot however, rest of the plants were at par with plants recorded maximum GYP plot.

GYP plot varied from 17 (progeny of plant no. 188) to 309 g (progeny of plant no. 190) and 123 (progeny of plant no. 531) to 303 g (progeny of plant no. 290) with the general mean 238 and 180 g for the 1<sup>st</sup> and 2<sup>nd</sup> date DS respectively under 4<sup>th</sup> method of selection (RPS), In 1<sup>st</sup> as well as 2<sup>nd</sup> date of DS, twenty one and forty two plants respectively were recorded highest GYP plot however, rest of the plants were at par with plants recorded maximum GYP plot. In TP, GYP plot ranged from 158 (progeny of plant no. 604) to 295 g (progeny of plant no. 290) and 123 (progeny of plant no. 604) to 261g (progeny of plant no. 290) with the general mean 223 and 189 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In both date of TP, thirty three and thirty six plants respectively were obtained maximum GYP plot however, rest of the plants were at par with plants recorded maximum GYP plot (Table 4.3.6a).

### **IV.3 Genetic variability**

Genetic variability for all seven characters under present investigation was studied in two methods of planting as well as on two dates of sowing with the help of different genetic parameter *viz*; genotypic coefficient of variation (GCV), phenotypic coefficient of variation (PCV), heritability in broad sense ( $h^2$ ), genetic advance (GA) and GA as per cent of mean. All these parameters presented in Table (4.4a).

#### **IV.3.1 Genotypic and Phenotypic coefficient of variation**

For all the characters general phenotypic coefficient of variation (PCV) was bit higher than genotypic coefficient of variation (GCV) in both methods of planting and date of sowing as well as in four methods of selection *viz*; HY, LY, MTL and RPS groups. The each character divided into three groups based on the magnitude of GCV:

1-10 Low GCV

11-20 Moderate GCV

>20 High GCV

In both methods of planting and all dates of sowing as well as in four methods of selection, low GCV were observed for the characters, DFF and PH, whereas low to moderate GCV were exhibited for the traits *viz*; PPP, TW and GYP plot in all most all the methods of sowing as well as two date of sowing under all methods of selection. High GCV and PCV had been observed in MTL group for traits PPP and GYP plant in 1<sup>st</sup> of TP and 1<sup>st</sup> date of TP as well as DS respectively.

### IV.3.2 Heritability

Heritability ( $h^2$ ) in broad sense was estimated for all the characters under four methods of selection as well as different methods of planting and both dates of sowing. It classified on the basis of magnitude in three classes

- |                         |                |
|-------------------------|----------------|
| (i) Low heritable       | Less than 30 % |
| (ii) Moderate heritable | 30 – 60 %      |
| (iii) High heritable    | More than 60 % |

In all methods of selection low heritability ( $h^2$ ) was observed for the trait PH in all methods of planting as well as both dates of sowing except under low yield (LY) group of 2<sup>nd</sup> date of DS; PPP also exhibited low heritability ( $h^2$ ) in HY group. Moderate heritability ( $h^2$ ) was recorded for the traits GYP plant under LY as well as in MTL group except on 2<sup>nd</sup> date of TP; whereas GYP plot under HY group. High heritability ( $h^2$ ) have been recorded for the characters *viz*; DFF and TW in all selection group except for DFF in 2<sup>nd</sup> date DS of HY as well as LY groups. For trait GPP recorded high  $h^2$  coupled with high GA as per cent of mean in 1<sup>st</sup> and 2<sup>nd</sup> date of DS under HY group.

Low genetic advance were obtained for the characters *viz*; DFF and PH in all group of selection methods except in 1<sup>st</sup> date of DS under HY group and 2<sup>nd</sup> of DS under RPS respectively. Moderate genetic advance was recorded for trait i.e. TW under RPS group, whereas rest of the traits *viz*; PPP, GPP, TW, GYP plant and GYP plot were exhibited moderate to high genetic advance.

### IV.4 Character association

Genotypic as well as phenotypic correlation were worked out for all character combination as shown in (Table 4.5a, 4.5.1a and 4.5.2a).

Among 1000F<sub>2</sub> population of Cross I exhibited significant and positive correlation between PH/GPP (0.175) and PH/GYP plant (0.228), while PPP had showed positive and significant correlation with GYP plant (0.503). Positive and significant correlation was observed among GPP/GYP plant (0.439).

Table 4.5.1a revealed that correlation between F<sub>2</sub> and F<sub>3</sub> generations DFF was exhibited positive and significant correlation with all selection methods and both dates of sowing as well as two methods of planting except for MTL in 2<sup>nd</sup> date of sowing. PPP was obtained positive and significant correlation among all selection methods and 1<sup>st</sup> dates of sowing as well as two method of planting except for LY and MTL in 1<sup>st</sup> date of TP. GPP exhibited positive and significant correlation with all selection methods in 2<sup>nd</sup>

date of DS, whereas it was observed same pattern in MTL and RPS of I<sup>st</sup> date of DS only, while for GPP was obtained positive and significant correlation with HY as well as LY of I<sup>st</sup> date of TP. GYP plant exhibited positive and significant correlation among all selection methods and I<sup>st</sup> dates of sowing as well as two method of planting except for RPS.

Positive and significant correlation were observed between PPP and TW as well as GPP and GYP plant in I<sup>st</sup> date DS under HY group while in TP, of same group positive and significant correlation was observed between DFF and PPP. In 2<sup>nd</sup> date of DS, in I<sup>st</sup> method of selection (HY), PH had shown positive and significant correlation with PPP and GPP while; in 2<sup>nd</sup> method of selection for LY under DS positive and significant correlation was observed between PH and TW.

In 2<sup>nd</sup> date of TP, I<sup>st</sup> method of selection for HY, PH exhibited positive and significant correlation with GPP (0.401) and GYP plant (0.380), PPP showed positive and significant correlation with GPP (0.659), Tw (0.626) and GYP plant (0.408), TW/GYP plant (0.338).

In 2<sup>nd</sup> date of TP, 2<sup>nd</sup> method of selection for LY positive and significant correlation was observed between PH and PPP (0.283) as well as PPP and TW (0.491).

In 2<sup>nd</sup> date of DS, 4<sup>th</sup> method of selection for RPS positive and significant correlation was recorded between PH and PPP (0.365), PPP and GYP plant (0.438) as well as TW/GYP plant (0.392).

In 3<sup>rd</sup> method of selection (MTL) under 2<sup>nd</sup> date of TP, positive and significant correlation was observed between PPP/GPP (0.452), PPP/TW (0.575) and GPP/TW (0.527) while in 2<sup>nd</sup> date of TP, 4<sup>th</sup> method of selection for RPS positive and significant correlation was observed among PH with PPP (0.549), TW (0.398) and GYP plant (0.307).

#### **IV.5 Direct and indirect effect**

The path analysis was used to study the direct and indirect causes of association and for partitioning of correlation coefficient into direct and indirect effect. Genotypic path analysis being free from environmental effect can give a better picture of cause and effect relationship than phenotypic path analysis. The direct and indirect effect of component characters on yield in F<sub>3</sub> have been presented in the (Table 4.6a).

In I<sup>st</sup> date of DS, I<sup>st</sup> method of selection for HY, GPP shown positive and significant correlation with GYP plant comprising high and positive direct effect.

In 2<sup>nd</sup> date of TP, 1<sup>st</sup> method of selection for HY, PH, PPP, and TW exhibited positive and significant correlation with GYP plant having their high and positive direct effect.

In 2<sup>nd</sup> date DS, 3<sup>rd</sup> method of selection for MTL, PPP exhibited positive and significant correlation with GYP plant comprising its high and positive direct effect.

In 2<sup>nd</sup> date DS, 4<sup>th</sup> method of selection for RPS, PPP and TW exhibited positive and significant correlation with GYP plant comprising their high and positive direct effect.

In 2<sup>nd</sup> date of TP, 4<sup>th</sup> method of selection for RPS, PH had positive and significant correlation with GYP plant comprising their high and positive indirect effect of TW.

#### **IV.6 Selection response**

The early generation testing is one of the best options to reduce the amount of material to be handled in the segregating generations and at the same time retain the good recombinant lines for the traits under improvement. It is also enhanced by selection response which maximises either by selecting the best genotype available in the population or by increasing the rigour of selection. A very rigorous selection may not be desirable as it can eliminate some promising genotypes. Whan *et al.* (1982) suggested that selection for grain yield in early generation need to be done at many sites simultaneously at an early growth stage. Grain yield is a complex character and is the result of interaction of many variables due to different gene association that might exist in different population and might result in quite different relationships. It is also largely influenced by environment. Further genotype and environmental interaction reduces the effectiveness of early generation of selection. Large environmental differences may lead to failure of parental yield to be indicative of the yield of progeny. In the present investigation, selection and evaluation of genotypes were carried out in direct seeding as well as transplanted rice to get the information on response to early generation selection and realized heritability for adopting efficient selection in Cross- I derived gene pool of rice for yield improvement.

Table 4.7a revealed that at 5% selection intensity, standardized selection differential was the highest for GYP plant 2.68, PPP 1.41 and GPP 1.14 in HY selection method followed by LY for the traits GYP plant 1.11 and PPP 0.66., whereas 0.43 under RPS respectively. Maximum standardized selection response was obtained for GYP plant

2.60 and 2.53 under I<sup>st</sup> date of DS and TP respectively; result exhibited lowest value for traits PH (-0.11) and GYP plant 0.11 with under I<sup>st</sup> date of DS. However average selection response for all the studied traits had exhibited maximum in LY method of selection followed by HY and RPS. The realized heritability for all most all characters exhibited high in all selection method as well as all methods of planting and both dates of sowing; moderate realized heritability for the trait PPP (0.55) and (0.38) in I<sup>st</sup> and 2<sup>nd</sup> date of TP respectively which comes under MTL, GPP (0.32) in 2<sup>nd</sup> date of TP and in I<sup>st</sup> date of DS, under high yield and RPS group respectively while, with all realized heritability were recorded maximum for the traits PH and PPP in LY followed by HY selection method whereas for the traits GPP and GYP plant in LY followed by MTL and RPS respectively.

## **Cross II**

### **IV. 1 Analysis of variance**

Analysis of variance for traits PH, DFF, PPP, GPP, TW, GYP plant and GYP plot have been presented in (Table 4.1b). The mean sum of square due to progeny were found to be highly significant for all most all traits except to PH and GYP plot in all methods of planting, both date of sowing as well as different methods of selection.

#### **IV.2.1 Days to 50 % flowering**

The mean DF of 1000 F<sub>2</sub> plants ranged from 79 (progeny of plant no. 11) to 92 (progeny of plant no. 112) days with the general mean 84 days (Table 4.2b).

In I<sup>st</sup> method of selection (HY), DFF ranged from 70 (plant no. 170) to 82 days (progeny of plant no. 50) and 74 (progeny of plant no. 170) to 86 days (progeny of plant no. 50) with the general mean 75 and 79 days in the I<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In I<sup>st</sup> date of DS, all progenies had short duration except one plant i.e. progeny of plant no. 50. In 2<sup>nd</sup> date of DS, 42 plants were exhibited short duration and rest of the plant were found to be at par than the plant comprising maximum DFF. In TP, DFF ranged from 80 (progeny of plant no. 170) to 93 days (progeny of plant no. 50) and 85 (progeny of plant no.170 ) to 97 days (progeny of plant no. 50) with the general mean 85 and 90 days in the I<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In I<sup>st</sup> date of TP, 15 plants were exhibited short duration and rest of progenies were at par the plant which recorded maximum DFF. In 2<sup>nd</sup> date of TP, 12 plants were obtained short duration however, rest of progenies were at par with the plant which recorded maximum DFF (Table 4.3b).

In 2<sup>nd</sup> method of selection (LY), DFF ranged from 72 (plant no. 11) to 81 days (progeny of plant no. 187) and 76 (progeny of plant no. 11) to 85 days (progeny of plant no. 645) with the general mean 75 and 79 days in the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS, 45 progenies were found significantly short duration and rest of the plant were at par with the plant comprising maximum DFF. In 2<sup>nd</sup> date of DS 41 plants had short duration and rest of the plant were found to be at par the plant comprising maximum DFF. In TP, DFF ranged from 82 (progeny of plant no. 284) to 91 days (progeny of plant no. 645) and 87 (progeny of plant no. 11) to 96 days (progeny of plant no.187) with the general mean 86 and 90 days in the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, only 20 progenies had short duration and rest of the plant were found to be at par than the plant comprising maximum DFF. In 2<sup>nd</sup> date of TP 41 plants were obtained short duration however, rest of progenies were at par the plant which recorded maximum.

In 3<sup>rd</sup> method of selection (MTL), DFF ranged from 71 (plant no. 645) to 76 days (progeny of plant no. 629) and 82 (progeny of plant no. 11) to 87 days (progeny of plant no. 187) with the general mean 73 and 83 days in the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS 37 progenies were found significantly short duration and rest of the plant were at par with the plant comprising maximum DFF. In 2<sup>nd</sup> date of DS, all plants were exhibited short duration. In 1<sup>st</sup> date of TP, DFF ranged from 73 (progeny of plant no. 645) to 80 days (progeny of plant no. 629) and 86 (progeny of plant no. 645) to 91 days (progeny of plant no. 629) with the general mean 76 and 88 days in 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, all plants were exhibited short DFF. In 2<sup>nd</sup> date of TP, only three progenies viz; 645, 107 and 220 had short duration however, rest of progenies were at par with plant which had maximum DFF.

In 4<sup>th</sup> method of selection (RPS), DFF ranged from 69 (plant no. 122) to 79 days (progeny of plant no.375) and 80 (progeny of plant no. 370) to 90 days (progeny of plant no. 375) with the general mean 73 and 83 days in the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS, 24 progenies were found significantly short duration and rest of the plant were at par with the plant comprising maximum DFF except to four progenies. In 2<sup>nd</sup> date of DS, all progenies had exhibited short duration. In TP, DFF ranged from 80 (progeny of plant no. 122) to 97 days (progeny of plant no. 375) and 89 (progeny of plant no. 122 ) to 106 days (progeny of plant no. 375) with the general mean 80 and 89 days in the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, none of the progenies had shorter than the mean value of DFF. In 2<sup>nd</sup> date of TP, 24 plants were obtained short

duration however, rest of progenies were at par mean value except five progenies (Table 4.3b)

#### **IV.2.2 Plant height (cm)**

The mean PH of 1000 F<sub>2</sub> plants ranged from 68 (progeny of plant no. 1000) to 150 (progeny of plant no. 113) cm with the general mean 115 cm (Table- 4.2b).

The PH was controlled by fewer genes with majority of them exhibiting increasing effect and dominance based duplicate gene interaction as indicated by the leptokurtic (1.58) and negatively skewed (-0.44) distribution in 1000 F<sub>2</sub> population (Fig. 5).

In I<sup>st</sup> method of selection (HY), PH ranged from 103 (progeny of plant no. 821) to 130 cm (progeny of plant no. 814) and 107 (progeny of plant no. 821) to 135 cm (progeny of plant no. 814) cm with the general mean 117 and 116 cm for the I<sup>st</sup> and 2<sup>nd</sup> date DS respectively. In both date of DS, twenty three and twenty one plants respectively were obtained dwarf and semi dwarf nature however, rest of the plants were at par with plants recorded maximum PH. In TP, PH ranged from 108 (progeny of plant no. 165) to 136 cm (progeny of plant no. 814) and cm 104 (progeny of plant no. 821) to 129 cm (progeny of plant no. 11) with the general mean 117 and 117 cm for the I<sup>st</sup> and 2<sup>nd</sup> date TP respectively. In I<sup>st</sup> date of TP, twenty one plants were found significantly dwarf than the plant which had maximum PH. In 2<sup>nd</sup> date of fourteen plants were obtained dwarf and semi dwarf nature however, rest of the plants were at par with plants recorded maximum PH.

In 2<sup>nd</sup> method of selection (LY), PH ranged from 97 (progeny of plant no. 350) to 128 cm (progeny of plant no. 662) and 100 (progeny of plant no. 350) to 131 cm (progeny of plant no. 662) with the general mean 115 and 116 cm for the I<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In I<sup>st</sup> date of out of 50 F<sub>3</sub> progenies only nine plants were found significantly dwarf and rest of progenies were found at par with the plant comprising maximum PH; while in 2<sup>nd</sup> date of DS only eight plants were obtained dwarf and semi dwarf nature however, rest of the plants were at par with plants recorded maximum PH. In TP, PH ranged from 102 (progeny of plant no. 350) to 132 cm (plant no.662) and 103 (progeny of plant no. 378) to 129 cm (progeny of plant no. 141) cm with the general mean 114 and 117 cm for the I<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In both date of TP, eight and fourteen plants respectively had dwarf and semi dwarf nature however, rest of the plants were at par with plants recorded maximum PH.

Under 3<sup>rd</sup> method of selection (MTL), PH ranged from 98 (progeny of plant no. 272) to 121 cm (progeny of plant no. 20) and 80 (plant no. 272) to 103 cm (progeny of plant no. 20) with the general mean 104 and 92 cm for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. Sixteen and twenty plants were showed dwarf nature in 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively however, rest of the plants were at par with plants had maximum PH. In TP, PH ranged from 80 (progeny of plant no. 313 20) to 103 cm (progeny of plant no. 20) and 85 (progeny of plant no. 431) to 10 cm (progeny of plant no. 988) with the general mean 93 and 92 cm for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP out of 49 F<sub>3</sub> progenies thirty two plants were found significantly dwarf and rest of progenies were at par with plant which recorded maximum PH. In 2<sup>nd</sup> date of TP none of plants was obtained dwarf nature however, all of plants were found to be at par with plants showed maximum PH.

Progenies of 4<sup>th</sup> method of selection (RPS), PH varied from 99 (progeny of plant no. 780) to 125 cm (progeny of plant no. 460) and 105 (plant no.780) to 130 cm (progeny of plant no. 460) with the general mean 115 and 114 cm for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS only eight plants were found significantly dwarf and rest of progenies were at par with plant which recorded maximum PH, whereas in 2<sup>nd</sup> date of DS twelve plants showed dwarf and semi dwarf nature however, rest of the plants were at par with plants had maximum PH. In TP, PH ranged from 105 (progeny of plant no. 780) to 131 cm (progeny of plant no. 683) and 104 (progeny of plant no. 772) to 126 cm (progeny of plant no. 96) with the general mean 115 and 114 cm for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of out of 50 F<sub>3</sub> progenies sixteen plants were found significantly dwarf while rest of progenies were at par with plant which recorded maximum PH. In 2<sup>nd</sup> date of TP only five plants were obtained dwarf and semi dwarf nature however, rest of the plants were at par with plants recorded maximum (Table 4.3.1b).

#### **IV.2.3 Panicle per plant**

PPP of 1000 F<sub>2</sub> plants ranged from 1 (progeny of plant no. 802) to 19 (progeny of plant no. 918) with the general mean 7 (Table 4.2b).

The leptokurtic (0.45) and positively skewed (0.79) distribution were found in F<sub>2</sub> population for the trait PPP (Fig. 6).

In 1<sup>st</sup> method of selection (HY), the mean of PPP ranged from 8 (progeny of plant no. 172) to 12 (progeny of plant no. 183) and 6 (progeny of plant no. 172) to 12 (progeny

of plant no. 183) with the general mean 9 and 8 cm for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS, thirty six plants were found significantly superior and rest of progenies were at par with the plant which recorded maximum PPP, whereas in 2<sup>nd</sup> date of DS, forty three plants were recorded highest PPP however, rest of the plants were at par with plants recorded maximum PPP and it found that 2<sup>nd</sup> date of DS was superior with the 1<sup>st</sup> date of DS. In TP, PPP ranged from 8 (plant no.172) to 13 (progeny of plant no. 183) and 6 (progeny of plant no. 246) to 11 (progeny of plant no. 220) with the general mean 10 and 8 for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, out of 50 F<sub>3</sub> progenies forty three progenies were found significantly superior and rest of progenies were at par with the plant which recorded maximum, whereas in 2<sup>nd</sup> date of TP thirty three plants were significantly superior and rest of progenies were at par with the plant which recorded maximum PPP (Table- 4.3.2b).

In 2<sup>nd</sup> method of selection (LY), PPP ranged from 7 (progeny of plant no. 175,135,191,151, 188, 139,141,662,177, 313 and 325) to 11 (progeny of plant no.331) and 6 (progeny of plant no. 151) to 11 (progeny of plant no. 331) with the general mean 8 and 8 for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> as well as 2<sup>nd</sup> date of DS twenty two and twenty six plants were recorded highest PPP however, rest of the plants were at par with plants recorded maximum PPP. In TP, PPP ranged from 6 (progeny of plant no. 168) to 11 (progeny of plant no. 331) and 6 (progeny of plant no. 168) to 11 (progeny of plant no. 331) with the general mean 8 and 8 for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In both date of TP, forty five and thirty eight plants were exhibited maximum PPP rest of the plants were at par with plants recorded maximum PPP.

Under 3<sup>rd</sup> method of selection (MTL), PPP varied from 6 (progeny of plant no. 959) to 12 (progeny of plant no. 87) and 12 (plant no.959) to 20 (progeny of plant no. 87) with the general mean 8 and 15 for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In both date of DS, thirty four and forty three plants were significantly superior and rest of progenies were at par with the plant which recorded maximum PPP. In TP, PPP ranged from 7 (progeny of plant no. 87) to 13 (plant no.959) and 6 (progeny of plant no. 959) to 12 (progeny of plant no. 441) with the general mean 9 and 8 for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP forty two plants were recorded maximum PPP, whereas in 2<sup>nd</sup> date of TP thirty four plants were obtained lowest PPP however, rest of the plants were at par with plants recorded maximum PPP.

In 4<sup>th</sup> method of selection (RPS), PPP obtained 6 (progeny of plant no. 445) to 9 (progeny of plant no. 683) and 5 (progeny of plant no. 445) to 10 (progeny of plant no.

497) with the general mean 8 and 9 for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In both date of DS ten and fourteen progenies each were recorded maximum PPP and rest of progenies were found to be at par with the plant which recorded maximum PPP. In TP, PPP ranged from 7 (progeny of plant no. 445) to 10 (progeny of plant no. 497) and 7 to 11 with the general mean 9 and 9 for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, twenty seven and twenty two plants respectively were superior and rest of progenies were at par with the plant which recorded maximum PPP.

#### **IV.2.4 Grains per panicle**

GPP of 1000 F<sub>2</sub> plants ranged from 12 (progeny of plant no. 25) to 150 (progeny of plant no. 262) with the general mean 70 (Table- 4.2b).

The negatively platykurtic (-0.28) and positively skewed (0.45) distribution had shown in F<sub>2</sub> population for the trait GPP (Fig. 7).

1<sup>st</sup> method of selection (HY), the mean of GPP ranged from 61 (progeny of plant no. 286) to 116 (plant no. 788) and 52 (progeny of plant no. 286) to 108 (progeny of plant no. 246) with the general mean 80 and 71 for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> both date of forty three and forty two plants were recorded highest GPP however, rest of the plants were at par with plants recorded maximum GPP. In TP, GPP ranged from 59 (progeny of plant no. 814) to 108 (progeny of plant no. 246) and 57 (progeny of plant no. 696) to 98 (progeny of plant no. 183) with the general mean 74 and 73 for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> both date forty four plants were found obtained highest GPP and rest of progenies were at par with the plant which recorded maximum GPP, while in 2<sup>nd</sup> date of TP thirty nine plants were obtained maximum GPP and rest of the plants were at par with plants recorded maximum GPP.

GPP ranged from 61 (progeny of plant no. 371) to 104 (progeny of plant no. 350) and 56 (progeny of plant no. 371) to 98 (progeny of plant no. 167) with the general mean 80 and 73 for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively in 2<sup>nd</sup> method of selection (LY). In both date of DS twenty four and twenty seven plants respectively were exhibited highest GPP however, rest of the plants were at par with plants recorded maximum GPP. In TP, GPP ranged from 59 (progeny of plant no. 393) to 102 (progeny of plant no. 350) and 57 (progeny of plant no. 371) to 98 (progeny of plant no. 167) with the general mean 75 and 73 for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, forty one and twenty nine plants respectively were exhibited maximum GPP rest of the plants were at par with plants recorded maximum.

Under 3<sup>rd</sup> method of selection (MTL), GPP varied from 65 (plant no.468) to 108 (progeny of plant no. 35) and 50 (progeny of plant no. 210) to 94 (progeny of plant no. 786) with the general mean 80 and 71 for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS forty one and thirty six plants respectively were recorded highest GPP and rest of the plants were at par with plants recorded maximum GPP. In TP, GPP ranged from 52 (progeny of plant no. 724) to 92 (progeny of plant no. 532) and 53 (progeny of plant no. 986) to 94 (progeny of plant no. 786) with the general mean 71 and 72 for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, thirty three plants were found significantly superior and rest of progenies were at par with the plant which recorded maximum GPP. In 2<sup>nd</sup> date of twenty eight plants were obtained lowest GPP however, rest of the plants were at par with plants recorded maximum GPP.

4<sup>th</sup> method of selection (RPS), PPP ranged from 57 (progeny of plant no. 420) to 135 (progeny of plant no. 479) and 58 (progeny of plant no. 31) to 135 (progeny of plant no. 479) with the general mean 73 and 73 for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In both date of DS all 50 F<sub>3</sub> progenies were recorded highest GPP except one plant. In TP, GPP ranged from 54 (progeny of plant no. 420) to 114 (progeny of plant no. 479) and 54 (progeny of plant no. 31) to 103 (progeny of plant no. 450) with the general mean 72 and 70 for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In both date of TP one and two progenies were recorded maximum GPP respectively (Table- 4.3.3b).

#### **IV.2.5. Test weight (g)**

TW ranged from 21 (progeny of plant no. 170) to 27 g (progeny of plant no. 11) and 19 (progeny of plant no. 170) to 25 g (progeny of plant no. 11) with the general mean 25 and 22 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively in 1<sup>st</sup> method of selection (HY). In 1<sup>st</sup> date of DS thirty and thirty three plants respectively had highest TW however, rest of the plants were at par with plants obtained maximum TW. In TP, TW ranged from 20 (progeny of plant no. 170) to 26g (progeny of plant no. 11) and 17 (progeny of plant no. 375) to 30 g (progeny of plant no. 165) with the general mean 24 and 24 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP out of 50 F<sub>3</sub> progenies thirty three plants were found superior with the plant comprising maximum TW, whereas in 2<sup>nd</sup> date of TP, all plants were obtained maximum TW and exhibited significant superiority with plants which recorded maximum TW.

In 2<sup>nd</sup> method of selection (LY), TW ranged from 17 (progeny of plant no. 131) to 30 (progeny of plant no. 305) and 17 (progeny of plant no. 131) to 30 g (progeny of

plant no. 305) with the general mean 24 and 24 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS out of 50 F<sub>3</sub> progenies forty five plants were found superior with the plant comprising maximum TW, whereas in 2<sup>nd</sup> date of DS all plants were obtained maximum except one plant. In TP, TW ranged from 17 (progeny of plant no. 131) to 30 g (progeny of plant no. 305) and 17 (progeny of plant no. 131) to 30 g (progeny of plant no. 305) with the general mean 24 and 24 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In both date of TP, all plants were obtained maximum TW and exhibited significant superiority with the plants which recorded maximum TW.

TW ranged from 17 (progeny of plant no. 46) to 30 g (progeny of plant no. 720) and 17 (progeny of plant no. 46) to 30 g (progeny of plant no. 720) with the general mean 24 and 24 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively under 3<sup>rd</sup> method of selection (MTL). In both date of DS all were obtained maximum TW except one progeny and exhibited significant superiority with plants which recorded maximum TW. In TP, TW varied from 17 (progeny of plant no. 46) to 30 g (progeny of plant no. 720) and 17 (progeny of plant no. 46) to 30 g (progeny of plant no. 720) with the general mean 24 and 24 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In both date of TP, all were found exhibited significant superiority with the plant which had TW except one plants.

4<sup>th</sup> method of selection (RPS), TW showed 16 (progeny of plant no. 196) to 28g (progeny of plant no. 31) and 16 (plant no.196) to 28 g (progeny of plant no. 31) with the general mean 24 and 24 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In both date of DS forty progenies recorded maximum TW however, rest of the plants were at par with plants exhibited maximum TW. In TP, TW ranged from 16 (progeny of plant no. 196) to 28g (progeny of plant no. 31) and 17 (progeny of plant no. 196) to 28 g (plant no.31) with the general mean 24 and 24 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In both date of TP, five and forty four plants were recorded maximum TW however, rest of the plants were at par with plants had maximum TW (Table- 4.3.4b).

#### **IV.2.6. Grain yield per plant (g)**

GYP plant of 1000 F<sub>2</sub> plants ranged from 0.1 (plant no. 546) to 33 g (plant no. 659) with the general mean 10g (Table- 4.2b).

Leptokurtic (0.46) and positively skewed (0.74) distribution were exhibited in 1000 F<sub>2</sub> populations for the trait GYP plant (Fig. 8).

1<sup>st</sup> method of selection (HY), the mean of GYP plant ranged from 8 (progeny of plant no. 132) to 28 g (progeny of plant no. 659) and 5 (progeny of plant no. 132) to 22 g

(progeny of plant no. 659) with the general mean 18 and 13 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In both date of DS forty eight and forty eight progenies were recorded highest GYP plant however, rest of the plants were at par with plants recorded maximum GYP plant. In TP, GYP ranged from 8 (progeny of plant no. 132) to 28 g (progeny of plant no. 659) and 8 (progeny of plant no. 132) to 27 g (progeny of plant no. 659) with the general mean 19 and 17 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, out of 50 F<sub>3</sub> progenies forty eight plants were significantly superior however, rest of the plants were at par with plants recorded maximum GYP plant. In 2<sup>nd</sup> date of TP forty six plants were obtained maximum GYP plant however, rest of the plants were at par than plants recorded maximum GYP plant.

In 2<sup>nd</sup> method of selection (LY), GYP plant showed 4 (progeny of plant no. 331) to 18 g (progeny of plant no. 191) and 4 (progeny of plant no. 331) to 18 g (progeny of plant no. 191) with the general mean 11 and 11 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS, out of 50 F<sub>3</sub> progenies forty four plants were found superior with the plant comprising maximum GYP plant, while in 2<sup>nd</sup> date of forty four plants were exhibited highest GYP plant however, rest of plants were significantly superior however, rest of the plants were at par with plants recorded maximum GYP plant. In TP, varied from GYP 5 (progeny of plant no. 331) to 19 (progeny of plant no. 191) g and 4 (progeny of plant no. 331) to 17 (plant no.191) g with the general mean 11 and 10g for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, forty eight plants were obtained highest GYP plant with the plant comprising maximum GYP plant. In 2<sup>nd</sup> date of TP, forty six plants were exhibited maximum GYP rest of the plants were at par with plants recorded maximum GYP plant.

Under 3<sup>rd</sup> method of selection (MTL), GYP plant ranged from 4 (progeny of plant no. 57 and 97) to 19 g (progeny of plant no. 27 and 210) and 4 (progeny of plant no. 97) to 17 g (progeny of plant no. 27 and 210) with the general mean 10 and 10g for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In both date of DS, forty seven recorded maximum GYP plant however, rest of the plants were at par with plants recorded maximum GYP plant. In TP, GYP plant ranged from 4 (progeny of plant no. 57) to 20 g (progeny of plant no. 27) and 4 (progeny of plant no. 57) to 20 g (progeny of plant no. 27) with the general mean 8 and 11g for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP forty seven progenies were recorded maximum GYP however, rest of the plants were at par with plants recorded maximum GYP plant.

In 4<sup>th</sup> method of selection (RPS). GYP plant varied from 8 (progeny of plant no. 683) to 16 g (progeny of plant no. 415) and 5 (progeny of plant no. 651) to 18 g (progeny of plant no. 415) with the general mean 11 and 12 g for 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In both date of DS thirty one and eleven plants were recorded highest GYP plant whereas rest of the plants were at par with plants recorded maximum GYP plant. In TP, GYP plant ranged from 8 (progeny of plant no. 683) to 16 g (progeny of plant no. 415) and 7 (progeny of plant no. 683) to 15 g (progeny of plant no. 415) g with the general mean 12 and 10 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP thirty one and thirty four plants were obtained maximum GYP plant however, rest of the plants were at par with plants recorded maximum GYP plant (Table- 4.3.5b).

#### **IV.2.7 Grain yield per plot (g)**

1<sup>st</sup> method of selection (HY), GYP plot ranged from 200 (progeny of plant no. 211) to 301 g (progeny of plant no. 142) and 194 (progeny of plant no. 183) to 299 g (progeny of plant no. 142) with the general mean 227 and 219 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS, eighteen plants were significantly superior however, rest of the plants were at par with plants recorded maximum GYP, while in 2<sup>nd</sup> date of DS all plants were exhibited significant superiority with plants which recorded maximum GYP except one plant. In TP, GYP plot ranged from 197 (progeny of plant no. 183) to 239g (progeny of plant no. 887) g and 180 (progeny of plant no. 132) to 395 g (progeny of plant no. 222) with the general mean 216 and 208 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, nineteen and twenty two plants were obtained maximum GYP plot however, rest of the plants were at par with plants recorded maximum GYP plot.

GYP plot ranged from 196 (progeny of plant no. 157) to 255 g (plant no. 395) and 181 (progeny of plant no. 177) to 241 g (progeny of plant no. 395) with the general mean 222 and 208 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively in 2<sup>nd</sup> method of selection (LY). In 1<sup>st</sup> date of DS, all plants were exhibited significant superiority with plants which recorded maximum GYP except one plant however, in 2<sup>nd</sup> date of DS twenty plants were exhibited superior and rest of the plants were at par with plants had maximum GYP plot. In TP, GYP plot ranged from 184 (progeny of plant no. 177) to 241g (progeny of plant no. 395) and 180 (progeny of plant no. 177) to 241 g (progeny of plant no. 395) with the general mean 211 and 208g for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP all plants were exhibited significant superiority with plants which recorded maximum GYP

except one plant. In 2<sup>nd</sup> date of TP nineteen plants were obtained lowest GYP plot however, rest of the plants were at par with plants recorded maximum GYP plot.

In 3<sup>rd</sup> method of selection (MTL), GYP plot varied from 198 (progeny of plant no. 908) to 252 g (progeny of plant no. 470) and 185 (progeny of plant no. 908) to 238 g (progeny of plant no. 470) with the general mean 225 and 211 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS, none of the plants was obtained maximum GYP plot and rest of the plants exhibited at par to be at par with plants recorded maximum GYP plot. In 2<sup>nd</sup> date of DS, twenty three plants were exhibited superior and rest of the plants were at par with plants recorded maximum GYP plot. In TP, GYP plot ranged from 185 (progeny of plant no. 908) to 241 g (progeny of plant no. 470) and 149 (progeny of plant no. 908) to 238 g (progeny of plant no. 470) with the general mean 214 and 211 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, twenty nine plants were significantly superior however, rest of the plants were at par with plants had maximum GYP plot. In 2<sup>nd</sup> date of TP, all plants were exhibited significant superiority with plants which recorded maximum GYP plot except one plant.

4<sup>th</sup> method of selection (RPS), GYP plot ranged from 202 (progeny of plant no. 196) to 242 g (plant no.435) and 189 (plant no.196) to 228 g (progeny of plant no. 435) with the general mean 216 and 202g for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS, twenty nine and thirty six plants were recorded highest GYP plot however, rest of the plants were at par with plants exhibited maximum GYP plot. In TP, GYP ranged from 192 (progeny of plant no. 196) to 231 g (progeny of plant no. 435) and 189 (progeny of plant no. 196) to 228g (progeny of plant no. 435) with the general mean 205 and 202 g respectively. For the 1<sup>st</sup> date of TP, nineteen and thirty two plants were obtained maximum GYP plot however, rest of the plants were at par with plants recorded maximum GYP plot (Table- 4. 3.6b).

### **IV.3 Genetic variability**

Genetic variability for all seven characters under present investigation was studied in two methods of planting as well as on two dates of sowing with the help of different genetic parameters *viz*; genotypic coefficient of variation (GCV), phenotypic coefficient of variation (PCV), heritability in broad sense ( $h^2$ ), genetic advance (GA) and GA as percent of mean. All these parameters presented in (Table- 4.4b).

### IV.3.1 Genotypic and phenotypic co efficient of variation

In 50F<sub>3</sub> progenies all most all methods and two date of sowing followed by four methods of selection, low GCV were observed for the characters, DFF, PH and PPP except for PPP in 2<sup>nd</sup> date of TP under MTL group which was found to be moderate genotypic variability. Moderate genotypic variability were observed for TW under MTL as well as RPS selection methods whereas low GCV was observed for GYP plant in I<sup>st</sup> date of DS as well as TP and 2<sup>nd</sup> date of TP only. High GCV was exhibited for the trait GYP plant in I<sup>st</sup> date of TP as well as 2<sup>nd</sup> date of TP under LY and MTL selection method in 2<sup>nd</sup> date of DS only.

50F<sub>3</sub> progenies based on methods of selection, low heritability ( $h^2$ ) was exhibited for the trait *viz*; PH and PPP in all method of sowing as well as two date of sowing except in 2<sup>nd</sup> date of TP under MTL and 2<sup>nd</sup> date of TP under LY as well as MTL selection method respectively. Moderate heritability ( $h^2$ ) were recorded for the trait TP *viz*; DFF, GPP and GYP plant under RPS, LY as well as RPS and MTL group. High heritability ( $h^2$ ) have been recorded for the characters *viz*; DFF and Tw in all selection group except for DFF in 2<sup>nd</sup> date of DS under HY selection method.

Genetic advance was estimated both in terms of absolute figure and genetic advance as per cent or mean for all the characters *viz*; DFF, PH, GPP, TW and GYP plot under study had shown low genetic advance in all the method of planting as well as on both date of sowing.

Low GA was obtained for the characters *viz*; DFF and PH in all selection methods except in 2<sup>nd</sup> date of TP under MTL and RPS respectively. Moderate genetic advance was recorded for trait PPP in all most all the selection methods as well as two method of sowing except for HY and RPS selection method while for GPP in HY group only. High GA was recorded for trait TP *viz*; GYP plant and GYP plot under MTL selection method.

### IV.4 Character association

Genotypic as well as phenotypic correlation were worked out for all character combination as shown in (Table 4.5b 4.5.1b and 4.5.2b).

Among 1000F<sub>2</sub> population of Cross II exhibited significant and positive correlation between PPP/GYP plant (0.361) while GPP had showed positive and significant correlation with GYP plant (0.307). Positive and significant correlation was observed among TW/GYP plant (0.168).

The results observed with regards to correlation of different traits between F<sub>2</sub> and F<sub>3</sub> generation was highly significant and positive in different methods of planting on different dates of sowing with all methods of selection viz; LY, LY, MTL and RPS for all the studied traits like DFF, PH, PPP, GPP, TW and GYP plant (Table 4.5.1b)

In I<sup>st</sup> date of DS, in 4<sup>th</sup> method of selection for RPS, DFF had shown positive and significant correlation with PPP (0.280) and Tw (0.397); while in same method of selection for RPS under TP positive and significant correlation was observed between DFF/PPP (0.284) and PH/PPP (0.294). In 2<sup>nd</sup> date of TP; DFF exhibited positive and significant correlation with TW (0.379), PH/PPP (0.312) (Table 4.5.2b).

#### **IV.5 Direct and indirect effect**

The direct and indirect effect of component characters on yield in different selection groups have been presented in the (Table 4.6b) evident that under HY group of I<sup>st</sup> date DS, GPP exhibited high positive direct effect on GYP plant. PH had high negative direct effect on GYP plant and negative indirect effect., whereas in I<sup>st</sup> date TP, PH having high negative direct effect on GYP plant followed by GPP and positive indirect effect via GPP. In 2<sup>nd</sup> date DS, under same situation GPP had high positive direct effect on GYP plant followed PPP and positive indirect effect via PPP whereas in 2<sup>nd</sup> date of TP, GPP exhibited high positive direct effect on GYP plant followed by DFF.

On the basis of LY selection method of I<sup>st</sup> date of sowing under DS, GPP and DFF had high positive direct effect on GYP plant, whereas in I<sup>st</sup> date of TP, GPP had high positive direct effect on GYP plant. Under same selection method and 2<sup>nd</sup> date of sowing under DS, DFF showed high and positive direct effect on GYP plant. In case of TP, PPP exhibited high and positive direct effect on GYP plant and high and positive indirect effect via DFF. PH had high and positive direct effect on GYP plant under 2<sup>nd</sup> date of TP.

On the basis of MTL group in I<sup>st</sup> date DS, DFF showed high and negative direct effect on GYP plant while GPP and PPP had high positive direct effect on GYP plant. In the same situation under TP; PPP, GPP, TW and PH had positive direct effect on GYP plant.

In 2<sup>nd</sup> date of DS under same selection method all studied traits exhibited high and positive direct effect on GYP plant; whereas in TP, PPP showed high and positive direct effect on GYP plant and meagre positive indirect effect via DFF.

Under RPS group of 1<sup>st</sup> date DS; DFF had high and negative direct effect on GYP plant and meagre and positive indirect effect via PH. PH showed high and negative direct effect on GYP plant and meagre and positive indirect effect via DFF. GPP exhibited high and positive direct effect on GYP plant and high positive indirect effect via PH; whereas in TP, DFF had high and negative direct effect on GYP plant and high positive indirect effect via PH. PPP, GPP and TW exhibited very high and positive direct effect on GYP plant and high and negative indirect effect via DFF.

In 2<sup>nd</sup> date of DS under same selection method DFF had high and negative direct effect on GYP plant. PPP as well as TW exhibited high and positive direct effect on GYP plant having their high and negative indirect effect via PH. GPP showed high and positive direct effect on GYP plant and high negative indirect effect via PH; whereas in TP; DFF also exhibited high and negative direct effect on GYP plant and meagre positive indirect effect via TW. GPP as well as TW also exhibited high and positive direct effect on GYP plant.

#### **IV.6 Selection response**

From the perusal of Table 4.7b revealed that at 5% selection intensity, standardized selection differential were recorded highest for PH 78.56 and GPP 68.71 in LY group, whereas PPP 7.14 and GYP plant 21.17 exhibited highest under HY group. Maximum standardized selection response were obtained for PH 77.45 and GPP 68.12 in 1<sup>st</sup> date of DS under HY group followed by 1<sup>st</sup> date of DS under HY and MTL respectively. PPP as well as GYP Plant had shown lowest standardized selection response in 1<sup>st</sup> date of DS under HY group. However average selection response for the studied traits *viz*; PH, PPP and GYP plant had exhibited maximum in HY method of selection followed by LY for PH and RPS for last two traits while, GPP was recorded maximum selection response in HY selection method and followed by RPS.

The realized heritability for all most all characters exhibited high in all selection method as well as both methods of sowing and two date sowing except for GYP Plant in 2<sup>nd</sup> date of DS under HY group while, with all realized heritability were recorded maximum for the traits PH in HY method of selection and followed by RPS whereas PPP and GPP had maximum realized heritability in RPS and followed by HY as well LY but PPP followed HY method of selection only. GYP plant recorded maximum realized heritability in RPS and followed by MTL.

### **Cross-III**

#### **IV.1 Analysis of variance**

Analysis of variance for DF, PH (cm), PPP, GPP, TW (g), GYP plant (g), and GYP plot (g) have been presented in (Table 4.1c). In the design of experiment mean sum of square due to 50F<sub>3</sub> progeny were found to be highly significant for all the characters in all methods of planting, of both date of sowing as well as different methods of selection except for GPP in I<sup>st</sup> date of TP under HY group.

#### **IV.2 Ranged and mean**

##### **IV. 2.1. Days to 50 % flowering**

The mean DFF of 1000 F<sub>2</sub> plants ranged from 82 to 100 (progeny of plant no. 711, 263, 387, 304, 773, 507 and 453) days with the general mean 89.06 days. 36 plant were found to be earlier out of 1000F<sub>2</sub> plants (Table 4.2c).

In I<sup>st</sup> method of selection (HY), DFF ranged from 74 (plant no. 638) to 90 days (progeny of plant no.462) and 79 (progeny of plant no. 638) to 95 days (progeny of plant no. 462) with the general mean 81 and 87 days in the I<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In I<sup>st</sup> date of DS, 24 progenies were found significantly short duration and rest of the plant were at par than the plant comprising maximum DFF. In 2<sup>nd</sup> date of DS, 25 plants had short duration and rest of the plant were found to be at par with the plant comprising maximum DFF. In TP, DFF ranged from 84 (progeny of plant no. 638) to 100 days (progeny of plant no. 462) and 90 (progeny of plant no. 638) to 106 days (progeny of plant no.462) with the general mean 91 and 97 days in the I<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In I<sup>st</sup> date of TP, 25 plants were significantly superior and rest of progenies were at par with the plant which recorded maximum DFF. In 2<sup>nd</sup> date of TP 25 plants were obtained short duration however, rest of progenies were at par with the plant which recorded maximum.

In 2<sup>nd</sup> method of selection (LY), DFF ranged from 73 (plant no. 546) to 87 days (progeny of plant no. 430) and 78 (progeny of plant no. 536) to 93 days (progeny of plant no. 638) with the general mean 77 and 83 days in the I<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In both date of DS, 35 progenies each were found significantly short duration and rest of the plant were at par with the plant comprising maximum DFF. In TP, DFF ranged from 82 (progeny of plant no. 378) to 97 days (progeny of plant no. 439) and 88 (progeny of plant no. 378 ) to 104 days (progeny of plant no. 663) with the general mean 87 and 93 days in the I<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In I<sup>st</sup> date of TP, 35 plants were

significantly superior and rest of progenies were at par with the plant which recorded maximum DFF. In 2<sup>nd</sup> date of TP, 36 plants were obtained short duration however, rest of progenies were at par than the plant which recorded maximum DFF.

In 3<sup>rd</sup> method of selection (MTL), DFF ranged from 72 (plant no. 962) to 90 days (progeny of plant no. 176) and 78 (progeny of plant no. 962) to 95 days (progeny of plant no. 313) with the general mean 81 and 86 days in the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS, 23 progenies had short duration and rest of the plant were at par with the plant comprising maximum DFF. In 2<sup>nd</sup> date of DS, 22 plants were short duration and rest of the plant were found to be at par with the plant comprising maximum DFF. In TP, DFF ranged from 82 (progeny of plant no. 962) to 100 days (progeny of plant no. 176) and 88 (progeny of plant no. 400) to 106 days (progeny of plant no. 456) with the general mean 91 and 97 days in the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, 23 plants were significantly superior and rest of progenies were at par with the plant which recorded maximum DFF. In 2<sup>nd</sup> date of TP, 24 plants were obtained short duration however, rest of progenies were at par than the plant which recorded maximum DFF.

In 4<sup>th</sup> method of selection (RPS), DFF ranged from 72 (plant no.64) to 90 days (progeny of plant no. 392) and 77 (progeny of plant no. 981) to 95 days (progeny of plant no. 364) with the general mean 79 and 84 days in the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In both date of DS, 30 progenies each were found significantly short duration and rest of the plant were at par than the plant comprising maximum DFF. In TP, DFF ranged from 82 (progeny of plant no. 64) to 100 days (progeny of plant no. 392) and 88 (progeny of plant no. 981) to 105 days (progeny of plant no. 364) with the general mean 89 and 95 days in the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In both date of TP, 30 plants each were significantly superior and rest of progenies were at par with the plant which recorded maximum DFF (Table 4.3c).

#### **IV.2.2. Plant height (cm)**

The mean PH of 1000 F<sub>2</sub> plants showed 82 (plant no.778) to 195 (plant no.269) cm. with the general mean 115.22 cm (Table 4.2c).

Leptokurtic (4.21) and positively skewed (0.61) distribution were exhibited in F<sub>2</sub>' populations for the trait PH (Fig. 9).

1<sup>st</sup> method of selection (HY), PH ranged from 51 (progeny of plant no. 359) to 95cm (plant no.703) and 67 (progeny of plant no. 414) to 97 cm (plant no.703) with the general mean 80 and 82 cm for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS

out of 50 F<sub>3</sub> progenies twenty six plants were found significantly dwarf than the plant which had maximum PH. In 2<sup>nd</sup> date of fourteen plants were obtained dwarf and semi dwarf nature however, rest of the plants were at par with plants recorded maximum PH. In TP, PH ranged from 72 (progeny of plant no. 359) to 103 cm (plant no.703) and 104 (progeny of plant no. 637) to 138 cm (progeny of plant no. 391) with the general mean 90 and 117 cm for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, out of 50 F<sub>3</sub> progenies only twenty plants were found significantly dwarf than the plant which had maximum PH; while in 2<sup>nd</sup> date of TP sixteen plants were obtained dwarf and semi dwarf nature however, rest of the plants were at par with plants recorded maximum PH.

In 2<sup>nd</sup> method of selection (LY), PH varied from 53 (progeny of plant no. 663) to 103 cm (progeny of plant no. 524) and 54 (progeny of plant no. 663) to 103 cm (plant no.524) with the general mean 81 and 81 cm for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS, out of 50 F<sub>3</sub> progenies thirty seven plants were found significantly dwarf than the plant which had maximum PH, while in 2<sup>nd</sup> date of DS, thirty three plants were obtained dwarf nature however, rest of the plants were at par with plants recorded maximum PH. In TP, PH ranged from 68 (progeny of plant no. 877) to 109 cm (progeny of plant no. 524) and 65 (plant no.877) to 106 cm (plant no.524) with the general mean 92 and 89 cm for the 1<sup>st</sup> date of TP, nineteen progenies were found significantly dwarf nature than the plant comprising maximum PH. In 2<sup>nd</sup> date of TP, twenty one plants were obtained dwarf nature however, rest of the plants were at par with plants had maximum PH.

In 3<sup>rd</sup> method of selection (MTL), PH ranged from 59 (plant no.917) to 109 cm (progeny of plant no. 286) cm and 60 (plant no.917) to 110 cm (plant no.286) with the general mean 83 and 83 cm for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS, out of 42 F<sub>3</sub> progenies thirty seven plants were found significantly dwarf than the plant which had maximum PH. In 2<sup>nd</sup> date of DS, thirty five plants were obtained dwarf nature however, rest of the plants were at par with plants exhibited maximum PH. In TP, PH ranged from 69 (plant no.917) to 110 cm (plant no.286) and 66 (plant no.917) to 107 cm (plant no.286) with the general mean 91 and 88 cm for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, out of 42 F<sub>3</sub> progenies only twelve two plants were found significantly dwarf than the plant which had maximum PH, however, in 2<sup>nd</sup> date of TP, twenty eight plants were obtained dwarf however, rest of the plants were at par with plants had maximum PH.

4<sup>th</sup> method of selection (RPS), PH showed 59 (plant no.93) to 109 cm (plant no.153) and 60 (plant no. 917) to 110 cm (plant no.286) with the general mean 83 and 83 cm for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS, out of 50 F<sub>3</sub> progenies only thirty seven plants were found significantly dwarf than the plant which had highest PH, whereas in 2<sup>nd</sup> date of DS, forty three plants exhibited dwarf nature however, rest of the plants were at par with plants had maximum PH. In TP, PH ranged from 69 (plant no.93) to 128 (plant no.93) (plant no.230) and 66 (plant no. 93) to 125 cm (plant no. 230) with the general mean 91 and 88 cm for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, out of 50 F<sub>3</sub> progenies forty five plants had dwarf and semi dwarf nature. In 2<sup>nd</sup> date of TP forty six plants were obtained dwarf and semi dwarf nature however, rest of the plants were at par with plants recorded maximum PH (Table 4.3.1c).

#### **IV.2.3 Panicle per plant**

The mean PPP of 1000 F<sub>2</sub> plants ranged from 2 (plant no. 317) to 19 (plant no. 229) with the general mean 6.82. The PPP of selected 200 F<sub>2</sub> ranged from 3 to 17 with the general mean 8.01.

The leptokurtic (1.02) and positively skewed (0.85) distribution were recorded in F<sub>2</sub> population of PPP (Fig. 10).

1<sup>st</sup> method of selection (HY), the mean of PPP ranged from 6 (plant no.27) to 11 (plant no.637) and 6 (plant no.27) to 10 (plant no.637) with the general mean 8 and 8 for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS, out of 50 F<sub>3</sub> progenies only thirty one plants were found exhibited significant superiority with the plant comprising maximum PPP, while in 2<sup>nd</sup> date of DS twenty eight plants were recorded highest PPP however, rest of the plants were at par with plants recorded maximum PPP. In TP, PPP ranged from 6 (plant no.121) to 11 (plant no.783) and 7 (plant no.121) to 16 (plant no.783) with the general mean 8 and 8 for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, out of 50 F<sub>3</sub> progenies only thirty seven plants were found superior with the plant comprising maximum PPP. In 2<sup>nd</sup> date of TP progeny of plant no. 121 exhibited lowest PPP 9, whereas progeny of plant no. 783 was exhibited highest 16.

In 2<sup>nd</sup> method of selection (LY), PPP varied from 7 (plant no.810) to 13 (plant no.418) and 4 (plant no.810) to 10 (plant no.418) with the general mean 8 and 7 for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS, out of 50 F<sub>3</sub> progenies only forty three plants were found superior with the plant comprising maximum PPP, whereas in 2<sup>nd</sup> date of DS thirty seven plants were exhibited highest PPP 10 however, rest of the plants were

at par with plants recorded maximum PPP. In TP, PPP ranged from 5 (plant no.810) to 10 (plant no.418) and 4 (plant no.810) to 10 (plant no. 418) with the general mean 7 and 7 for the I<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In I<sup>st</sup> date of TP, out of 50 F<sub>3</sub> progenies forty three plants were obtained highest PPP with the plant comprising maximum PPP. In 2<sup>nd</sup> date of TP forty three plants were had maximum PPP and rest of the plants were at par with plants recorded maximum PPP.

In 3<sup>rd</sup> method of selection (MTL), PPP ranged from 5.16 (plant no.79) to 9 (progeny of plant no. 281) and 4 (plant no.79) to 9 (plant no. 281) with the general mean 7 and 7 for the I<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In I<sup>st</sup> date of DS, out of 42 F<sub>3</sub> progenies only two plants were found superior with those plant which recorded maximum PPP and rest of plants were found to be at par. In 2<sup>nd</sup> date of DS only two plants was recorded maximum PPP and rest of the plants were at par with plants recorded maximum PPP. In TP, PPP ranged from 4.91 (plant no.79) to 9 (plant no.4) and 5 (plant no.79) to 9 (plant no.4) with the general mean 7 and 7 for the I<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In I<sup>st</sup> date of TP, out of 42 F<sub>3</sub> progenies none of the plants were found superior with the plant comprising maximum PPP. In 2<sup>nd</sup> date of TP plant no.79 recorded lowest PPP 5, whereas plant no.4 was exhibited highest 9. Nine plants were obtained lowest PPP however, rest of the plants were at par with plants recorded maximum PPP.

In 4<sup>th</sup> method of selection (RPS), PPP ranged from 5 (plant no.103) to 12 (plant no.116) and 5 (plant no.103) to 11 (plant no.116) with the general mean 7 and 7 for the I<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In I<sup>st</sup> date of DS all F<sub>3</sub> progenies were recorded maximum PPP, whereas in 2<sup>nd</sup> date of DS thirty six plants were obtained recorded highest PPP and rest of the plants were at par with plants had maximum PPP. In TP, PPP ranged from 5 (plant no.103) to 11 (plant no.116) and 5 (plant no.103) to 11 (plant no.116) with the general mean 7 and 6.90 for the I<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In I<sup>st</sup> date of TP forty eight plants were found superior with the plant comprising maximum PPP. In 2<sup>nd</sup> date of TP, forty six plants were obtained lowest PPP however, rest of the plants were at par with plants recorded maximum PPP (Table 4.3.2c).

#### **IV.2.4 Grain per panicle**

The mean number of GPP of 1000 F<sub>2</sub> plants ranged from 16 (progeny of plant no. 953) to 150 (plant no.192) with the general mean 80.21.

The negatively platykurtic (-0.79) and positively skewed (0.01) distribution was found in F<sub>2</sub> population for the trait GPP (Fig. 11).

I<sup>st</sup> method of selection (HY), the mean of GPP ranged from 56 (plant no.388) to 107 (plant no. 313) and 57 (plant no.388) to 108 (plant no. 140) with the general mean 81 and 82 for the I<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In I<sup>st</sup> date of DS out of 50 F<sub>3</sub> progenies forty four plants were exhibited superior than the plant comprising maximum GPP, while in 2<sup>nd</sup> date of DS forty five plants were recorded highest GPP and rest of the plants were at par with plants had maximum GPP. In TP, GPP ranged from 64 (plant no.637) to 102 (plant no.414) and 18 (plant no.637) to 118 (plant no.464) with the general mean 80 and 88 for the I<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In I<sup>st</sup> date of TP out of 50 F<sub>3</sub> progenies only thirty one plants were found superior than the plant comprising maximum GPP. In 2<sup>nd</sup> date of TP all plants were obtained maximum GPP except one plants i.e. 464.

In 2<sup>nd</sup> method of selection (LY), GPP ranged from 63 (plant no. 409) to 116 (plant no.520) and 63 (plant no.409) to 116 (plant no.520) with the general mean 82 and 81 for the I<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In I<sup>st</sup> date of DS out of 50 F<sub>3</sub> progenies forty eight plants were found superior than the plant comprising maximum GPP; however in 2<sup>nd</sup> date of DS all plants were had maximum GPP except one plants no. i.e. 520. In TP, GPP ranged from 60 (plant no. 451) to 101 (plant no. 536) and 60 (plant no.451) to 101 (plant no.536) with the general mean 78 and 78 for the I<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In I<sup>st</sup> date of TP out of 50 F<sub>3</sub> progenies forty three plants were obtained highest GPP than the plant comprising maximum GPP. In 2<sup>nd</sup> date of TP forty five plants were exhibited maximum GPP and rest of the plants were at par with plants had maximum GPP.

In 3<sup>rd</sup> method of selection (MTL), GPP showed 60 (progeny of plant no. 880) to 129 (plant no.91) and 62 (progeny of plant no. 880) to 130 (plant no.91) with the general mean 85 and 85.12 for the I<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In I<sup>st</sup> date of DS all F<sub>3</sub> progenies were recorded maximum GPP, while in 2<sup>nd</sup> date of DS out of 42 F<sub>3</sub> progenies 41 plants had recorded highest GPP. In TP, GPP ranged from 65 (plant no.777) to 103 (plant no.172) and 64 (plant no.777) to 102 (plant no.172) with the general mean 80 and 79.50 for the I<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In I<sup>st</sup> date of TP, thirty eight plants were found superior than the plant comprising maximum GPP. In 2<sup>nd</sup> date of TP thirty eight plants were obtained lowest GPP however, rest of the plants were at par with plants had maximum GPP.

In 4<sup>th</sup> method of selection (RPS), GPP varied from 42 (plant no. 363) to 114 (plant no. 232) and 58 (plant no. 130) to 117 (progeny of plant no. 232) with the general mean 84.56 and 86.10 for the I<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In I<sup>st</sup> date of DS, thirty

two plants were recorded highest GPP than the plant comprising maximum GPP, while in 2<sup>nd</sup> date of DS, thirty four plants were exhibited highest GPP however, rest of the plants were at par with plants had maximum GPP. In TP, GPP ranged from 66 (plant no.132) to 95 (plant no.188) and 67 (plant no.132) to 95 (plant no.188) with the general mean 81 and 81 for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, twenty plants were recorded maximum GPP, while in 2<sup>nd</sup> date of TP twenty four plants were recorded maximum GPP however, rest of the plants were at par with plants recorded maximum GPP (Table 4.3.3c).

#### **IV.2.5 Test wt (g)**

1<sup>st</sup> method of selection (HY), the mean of TW varied from 16.7 (progeny of plant no. 672) to 31g (plant no.648) and 17 (progeny of plant no. 672) to 31 (progeny of plant no. 648) with the general mean 25 and 25g for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS out of 50 F<sub>3</sub> progenies forty one plants were exhibited superior than the plant comprising maximum TW. In 2<sup>nd</sup> date of DS forty two plants had highest Tw however, rest of the plants were at par with plants recorded maximum TW. In TP, Tw showed 18.21 (progeny of plant no. 672) to 31g (progeny of plant no. 253) and 17.95 (progeny of plant no. 624) to 26g (progeny of plant no. 559) with the general mean 26 and 20 g in the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, only forty five plants were found superior than the plant comprising maximum TW, whereas in 2<sup>nd</sup> date of TP forty one plants were obtained maximum Tw however, rest of the plants were at par with plants recorded maximum TW.

In 2<sup>nd</sup> method of selection (LY), TW varied from 17.9 (progeny of plant no. 786) to 32.4 g (progeny of plant no. 745) and 16 (progeny of plant no. 786) to 31g (progeny of plant no. 745) with the general mean 26 and 24 for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS out of 50 F<sub>3</sub> progenies forty four plants were found superior than the plant comprising maximum TW. In 2<sup>nd</sup> date of DS forty four plants were exhibited highest TW however, rest of the plants were at par with plants showed maximum TW. In TP, TW ranged from 16.89 (progeny of plant no. 786) to 31g (plant no.745) and 18 (progeny of plant no. 786) to 31g (progeny of plant no. 745) with the general mean 25 and 24 g in the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP out of 50 F<sub>3</sub> progenies forty five plants had highest Tw than the plant recorded maximum TW. In 2<sup>nd</sup> date of TP out of 50 F<sub>3</sub> progenies forty seven plants were obtained highest TW with the plant comprising maximum TW.

In 3<sup>rd</sup> method of selection (MTL), TW ranged from 21 (progeny of plant no. 859) to 31 g (progeny of plant no. 991) and 21 (progeny of plant no. 859) to 31 g (progeny of plant no. 991) with the general mean 25 and 25 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS all F<sub>3</sub> progenies were obtained maximum TW except one plants however, in 2<sup>nd</sup> date of DS thirty seven plants were exhibited superior and rest of the plants were at par with the plants recorded maximum TW. In TP, TW ranged from 20 (progeny of plant no. 859) to 30 g (plant no.880) and 20 (progeny of plant no. 401) to 32 g (progeny of plant no. 747) with the general mean 24.77 and 24.81 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP out of 42 F<sub>3</sub> progenies thirty seven plants were found superior with the plant comprising maximum TW, whereas in 2<sup>nd</sup> date of TP all F<sub>3</sub> progenies were obtained maximum TW except one plants and exhibited superior with general mean.

4<sup>th</sup> method of selection (RPS), TW showed 20 (progeny of plant no. 31) to 31 g (progeny of plant no. 132) and 20 (progeny of plant no. 192) to 31g (progeny of plant no. 132) with the general mean 26 and 26 g in the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS out of 50 F<sub>3</sub> progenies forty plants had recorded highest TW however, rest of the plants were at par with plants recorded maximum TW, while in 2<sup>nd</sup> date of DS forty six plants exhibited highest TW however, rest of the plants were at par with plants had maximum TW. In TP, TW ranged from 20 (progeny of plant no. 192) to 31 g (progeny of plant no. 132) and 19 (progeny of plant no. 2) to 32 g (progeny of plant no. 132) with the general mean 26 and 25g for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP out of 50 F<sub>3</sub> progenies forty four plants were recorded maximum TW, however, in 2<sup>nd</sup> date of TP forty seven plants were obtained maximum TW however, rest of the plants were at par with plants had maximum TW (Table 4.3.4c).

#### **IV.2.6 Grain yield per plant (g)**

The mean GYP plant of 1000 F<sub>2</sub> plants ranged from 0.5(plant no.317) to 31.5 (progeny of plant no. 379) with the general mean 9.40 (Table 4.2c).

The GYP plant was indicated by the leptokurtic (2.41) and positively skewed (0.89) distribution in 1000 F<sub>2</sub> population (Fig. 12).

1<sup>st</sup> method of selection (HY), the mean of GYP plant ranged from 12 (progeny of plant no. 703) to 31 g (progeny of plant no. 379) and 9 (progeny of plant no. 703) to 28 g (progeny of plant no. 379) with the general mean 19 and 17 g in the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS, forty eight plants were exhibited superior with the plant

comprising maximum GYP plant while in 2<sup>nd</sup> date of DS forty eight plants were recorded highest GYP plant however, rest of the plants were at par with plants had maximum GYP plant. In TP, GYP plant ranged from 13 (progeny of plant no. 637) to 28 g (progeny of plant no. 379) and 9 (progeny of plant no. 434) to 26 g (progeny of plant no. 783) with the general mean 17 and 18 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, only forty eight plants were found superior than the plant comprising maximum GYP plant. In 2<sup>nd</sup> date of TP thirty eight plants were obtained maximum GYP plant however, rest of the plants were at par with plants recorded maximum GYP plant.

In 2<sup>nd</sup> method of selection (LY), GYP plant showed 5 (progeny of plant no. 877) to 14 g (progeny of plant no. 496) and 4 (progeny of plant no. 461) to 14 (progeny of plant no. 496) with the general mean 11 and 10 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS, sixteen plants were found superior than the plant comprising maximum GYP plant however, rest of the plants were at par with plants recorded maximum. In 2<sup>nd</sup> date of DS twenty nine plants were exhibited highest GYP plant however, rest of the plants were at par with plants recorded maximum GYP plant. In TP, varied from GYP 6 (progeny of plant no. 418) to 18 g (plant no.825) and 3 (progeny of plant no. 524) to 19 g (progeny of plant no. 451) with the general mean 10 and 11g in 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, only one plants was obtained highest GYP plant however, rest of the plants were at par with plants recorded maximum GYP plant however, in 2<sup>nd</sup> date of TP forty eight plants were exhibited maximum GYP plant and rest of the plants were at par with plants had maximum GYP plant.

In 3<sup>rd</sup> method of selection (MTL), GYP plant ranged from 2 (progeny of plant no. 944) to 16 g (progeny of plant no. 711) and 4.69 (plant no.777) to 15.25 g (progeny of plant no. 711) with the general mean 10 and 10 g in 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS, twenty five plants were obtained maximum GYP and rest of the plants exhibited at par with plants recorded maximum GYP plant. , whereas in 2<sup>nd</sup> date of DS twenty plants were exhibited superior and rest of the plants were at par with plants recorded maximum GYP plant. In TP, GYP plant varied from 5 (progeny of plant no. 315) to 14 g (progeny of plant no. 455) and 3 (progeny of plant no. 447) to 16 g (progeny of plant no. 223) with the general mean 10 and 10 g in 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, nineteen plants were found superior than comprising maximum GYP plant. In 2<sup>nd</sup> date of TP twenty nine plants were obtained lowest GYP however, rest of the plants were at par with plants recorded maximum GYP plant.

4<sup>th</sup> method of selection (RPS), GYP plant ranged from 1 (progeny of plant no. 169) to 17 g (progeny of plant no. 81) and 2 (progeny of plant no. 162) to 17 g (progeny of plant no. 81) with the general mean 11 and 10 g in 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS, thirty two plants were recorded highest GYP plant than comprising maximum GYP plant. In 2<sup>nd</sup> date of DS forty plants were recorded highest GYP plant however, rest of the plants were at par with plants recorded maximum GYP plant. In TP, GYP plant ranged from 3 (progeny of plant no. 706) to 18 g (progeny of plant no. 50) and 1.92 (progeny of plant no. 706) to 15 g (progeny of plant no. 81) with the general mean 10 and 9 g in 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, forty five plants were recorded maximum GYP plant, while in 2<sup>nd</sup> date of TP forty plants were obtained maximum GYP plant however, rest of the plants were at par with plants had maximum GYP plant (Table 4.3.5c).

## 2.5 Grain yield per plot (g)

1<sup>st</sup> method of selection (HY), the mean of GYP plot varied from 342 (progeny of plant no. 703) to 987 g (progeny of plant no. 379) and 314 (progeny of plant no. 703) to 960 g (progeny of plant no. 379) with the general mean 631 and 603 g for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date DS, forty eight plants were exhibited superior with the plant had maximum GYP however, in 2<sup>nd</sup> date of DS forty eight plants were recorded highest GYP while, rest of the plants were at par with plants had maximum GYP. In TP, GYP ranged from 294 (progeny of plant no. 703) to 982 g (progeny of plant no. 379) and 151 (progeny of plant no. 384) to 319 g (progeny of plant no. 253) with the general mean 587 and 218 g in 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, forty eight plants were found superior with the plant comprising maximum GYP, whereas in 2<sup>nd</sup> date of TP thirty nine plants were obtained maximum GYP however, rest of the plants were at par with plants had GYP.

In 2<sup>nd</sup> method of selection (LY), GYP plot ranged from 120 (progeny of plant no. 461) to 479 g (progeny of plant no. 496) and 93 (progeny of plant no. 461) to 452 (progeny of plant no. 496) with the general mean 323 and 295 g in 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS, forty eight plants had maximum GYP and rest of the plants exhibited at par to be at par with plants recorded maximum GYP plot. In 2<sup>nd</sup> date of DS, forty eight plants were exhibited superior and rest of the plants were at par with plants recorded maximum GYP plot. In TP, GYP plot ranged from 34 (progeny of plant no. 461) to 443 (progeny of plant no. 496) and 34 (plant no. 461) to 443 g (plant no. 496) with

the general mean 268 and 268 g in 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP out of 50 F<sub>3</sub> progenies forty eight plants were found superior with the plant comprising maximum GYP plot, however, in 2<sup>nd</sup> date of TP forty one plants were obtained lowest GYP plot however, rest of the plants were at par with plants recorded maximum GYP plot.

In 3<sup>rd</sup> method of selection (MTL), GYP plot ranged from 128 (progeny of plant no. 223) to 469 g (progeny of plant no. 176) and 100 (progeny of plant no. 223) to 441 g (progeny of plant no. 455) with the general mean 291 and 264g for the 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS, twenty seven plants were obtained maximum GYP plot and rest of the plants exhibited at par to be at par with plants recorded maximum GYP, while in 2<sup>nd</sup> date DS, forty plants were exhibited superior and rest of the plants were at par with plants recorded maximum GYP plot. In TP, GYP plot ranged from 40 (progeny of plant no. 777) to 496 g (progeny of plant no. 455) and 39 (plant no.777) to 458 g (progeny of plant no. 455) with the general mean 256 and 236 g in 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, forty plants were found superior than the plant comprising maximum GYP plot. In 2<sup>nd</sup> date of TP thirty six plants were obtained lowest GYP plot however, rest of the plants were at par with plants recorded maximum GYP plot.

In 4<sup>th</sup> method of selection (RPS), GYP plot ranged from 58 (progeny of plant no. 162) to 658 g (progeny of plant no. 130) and 31 (progeny of plant no. 162) to 630 g (progeny of plant no. 130) with the general mean 359 and 331 g in 1<sup>st</sup> and 2<sup>nd</sup> date of DS respectively. In 1<sup>st</sup> date of DS, forty seven plants were recorded highest GYP plot than the plant comprising maximum GYP plot, while in 2<sup>nd</sup> date of DS forty seven plants had highest GYP plot however, rest of the plants were at par with plants recorded maximum GYP plot. In TP, GYP ranged from 53 (progeny of plant no. 169) to 552 g (plant no.81) and 61 (progeny of plant no. 392) to 655 g (plant no. 154) with the general mean 311 and 328 g in 1<sup>st</sup> and 2<sup>nd</sup> date of TP respectively. In 1<sup>st</sup> date of TP, forty three plants were recorded maximum GYP plot. In 2<sup>nd</sup> date of TP forty four plants given maximum GYP plot however, rest of the plants were at par with plants recorded maximum GYP plot (Table 4.3.6c).

### **IV.3 Genetic variability**

Genetic variability for all seven characters under present investigation was studied in two method of planting as well as on two date of sowing with the help of different genetic parameters *viz*; genotypic coefficient of variation (GCV), phenotypic

coefficient of variation (PCV), heritability in broad sense ( $h^2$ ), genetic advance (GA) and GA as percent of mean. All these parameters presented in (Table 4.4c).

#### **IV.3.1 Genotypic and phenotypic coefficient of variation**

In all methods of planting and different date of sowing as well as four methods of selection, low GCV were observed for the characters, DFF and PH under HY as well as LY selection methods except for PH in 1<sup>st</sup> date of DS under HY and 2<sup>nd</sup> date of DS under LY selection methods. Moderate genotypic variability were observed for PPP and GYP plot only under LY and HY selection methods, whereas Tw and GYP plant under HY as well as LY group. High GCV were exhibited for all the studied traits viz; DFF, PH, PPP, GPP, TW, GYP plant and GYP plot in MTL as well as RPS groups.

Based on methods of selection, all most all the traits were exhibited low to moderate heritability ( $h^2$ ) under HY as well as LY group, whereas all the traits were exhibited high heritability under MTL and RPS group.

In 50F<sub>3</sub> progenies based on methods of selection, all most all the traits were exhibited low to moderate genetic advance under HY as well as LY selection methods, whereas all the traits were exhibited high genetic advance under MTL and RPS methods of selection.

#### **IV.4 Character association**

Genotypic as well as phenotypic correlation were worked out for all character combination as shown in (Table 4.5c, 4.5.1c and 4.5.2c).

The results observed with regards to correlation of different traits between F<sub>2</sub> and F<sub>3</sub> generation was highly significant and positive in different methods of planting on different date of sowing with most of the methods of selection viz; LY, LY, MTL and RPS for all the studied traits like PPP, GPP, TW and GYP plant except for DFF and PH.

In 1<sup>st</sup> date of TP, first method of selection for HY positive and significant correlation was observed between TW/GYP plant (0.245), while in 2<sup>nd</sup> date of TP, first method of selection for HY positive and significant correlation was observed between DFF/PPP (0.595), PH/PPP (0.326) and PPP/GYP plant (0.383).

In 1<sup>st</sup> date of TP, first method of selection for LY positive and significant correlation was observed between PH and GYP plant (0.999).

In 1<sup>st</sup> date of DS method of selection for RPS, DFF, exhibited positive and significant correlation with PH (0.717), PPP (0.549), GPP (0.699) and TW (0.726),

whereas in 2<sup>nd</sup> date of DS for RPS, positive and significant correlation was exhibited between DFF/PH (0.717), PPP (0.549), GPP (0.699) and TW(0.726).

#### **IV.5 Direct and indirect effect**

In 1<sup>st</sup> date of TP, 50F<sub>3</sub> progenies 1<sup>nd</sup> and 2<sup>nd</sup> method of selection for HY and LY, TW exhibited positive and significant correlation with GYP plant comprising its positive and direct effect while for LY, PH was recorded positive and significant correlation with GYP plant having high and positive direct effect.

In 1<sup>st</sup> date of DS, 4<sup>th</sup> method of selection for MTL, DFF exhibited negative and significant correlation with GYP having its negative and high direct effect, whereas PH was recorded positive and significant correlation with GYP plant comprising its high and positive direct effect.

In 2<sup>nd</sup> date of TP, first method of selection for HY, PPP exhibited positive and significant correlation with GYP plant having their high and positive direct effect.

In 2<sup>nd</sup> date of DS, third method of selection for RPS, DFF, PH and GPP had shown positive and significant correlation with GYP plant having its high and positive direct effect.

#### **IV.6 Selection response**

The result (Table 4.7c) revealed that at 5% selection intensity, standardized selection differential was obtained highest for PH 109 in RPS followed by 108.85 under HY. Maximum no. of PPP (6.47) and GYP (17.46) was exhibited in HY selection group, whereas highest no. of GPP (100.75) was recorded under RPS. Maximum standardized selection response was obtained for PH (106.93) in 2<sup>nd</sup> date of TP under HY followed by 1<sup>st</sup> date of TP (82.21) under LY selection method. PPP as well as GYP plant recorded maximum standardized selection response in all the method of sowing in HY followed by LY selection method however, in RPS, GPP (83.14) had shown maximum in 2<sup>nd</sup> date of DS. However average selection response for the studied traits *viz*; PH, PPP and GYP plant had exhibited maximum in HY method of selection followed by LY while, GPP was recorded maximum selection response in RPS selection method and followed by HY.

The realized heritability for all most all characters exhibited high in all selection method as well as all methods of sowing and two date sowing. The realized heritability for traits *viz*; PH, PPP and GPP exhibited high in MTL, RPS and LY followed by HY respectively while the trait GYP Plant had maximum realized heritability followed by LY.

Variation is one of the most important criteria for selection and it is also responsible for evolution. In reality, man controls evolution of crop plant and depends in toto upon available genetic variability with a few exception, where variability is to be created either by hybridization or by mutagenic treatments. Thus, assessment of variability and formulation of selection indices having paramount importance for any crop improvement programme.

Yield is a complex character which is influence by the environment as well as by number of quantitative characters. The comprehensive study of the genetic architecture of quantitative characters of economic value is essential to improve the yield potential. Successful breeding programme of any crop plant has to be based on the sound understanding of the genetic architecture of the yield and its component. The present study was undertaken to select productive progeny from F<sub>2</sub> and subsequent generation.

The experimental material consisted of three crosses viz; BG102/BPT5204, BG102/Naveen and BG102/Reshmi (Commercial Pvt. hybrid Victory seeds) of rice (*Oryza sativa* L.). Each of the crosses represented a separate experiment. All the materials come under single cross, except, BG102/Reshmi (Commercial Pvt. hybrid Victory seeds) which is a three way cross. The F<sub>2</sub> materials were grown in nursery on 6<sup>th</sup> June, 2013. Thirty (30) days old seedlings were transplanted in the puddled field. Out of total 5000 F<sub>2</sub> established population, 1000 F<sub>2</sub> were tagged randomly after flowering of each cross viz; BG102/BPT5204, BG102/Naveen and BG102/Reshmi (Commercial Pvt. hybrid Victory seeds) respectively and it was represented as Cross- I, Cross- II and Cross- III. These F<sub>2</sub> selected plants were grown during *kharif*, 2014 in RBD with two replication and two methods of sowing, such as, direct seeded and transplanted at twenty days interval; each plot was of 2.7 x 0.4 meter size. The row to row distance was 20 cm while plant to plant distance was maintained at 15 cm.

The segregating populations contained individuals with various permutation and combinations of characters. From segregating population, the genotype with desired combinations were looked for. However, most of the economic traits are quantitative in nature and influenced by environmental factors. Hence, their phenotype differ variedly from their genotype. The aim of plant breeder is to select genetically superior individuals. Therefore, there is great deal of problem in identifying the desired genotype

because of its changed phenotype. Besides environmental factors other genetic factors, such as, dominance, epistasis, undesired pleiotropy, and tight linkage also influence the phenotypic expression which are not liable to fixation in desired combination in succeeding generations. Hence, a particular phenotype with these genetic structure segregate the succeeding genotype and phenotype changes. Because of these environmental and genetic reasons, the plants/individuals selected from segregating population fail to establish their superiority in next generation and many times it show poor performance. This is real dilemma of breeders and is in fact slowing down the efficiency of breeders and selection programmes. As a result thereof, the response of selection from segregating generations are very low and slow when compared to expected ones. Keeping in view these problems the selection based on single trait criteria and only on the basis of phenotypic performance is being discouraged. Now the multiple selection criteria which ensures the compromise of optimum value for essential traits, are being preferred, besides, the genotypic constitution in selection is also being given due weightage. In the present investigation effort has been made to evaluate the effectiveness of the selection technique. For measuring selection response and its effectiveness, several statistics have been used.

## **Cross- I (BG102/BPT5204)**

### **V.1. Analysis of variance**

The analysis of variance revealed that mean sum of square due to progeny of crosses i.e. Cross-I hybrids of  $F_3$  under different selection group followed by two dates of sowing for all most all traits were highly significant except for traits PH and GYP plot indicating the presence of ample amount of genetic variability among progenies for all characters under study. This finding is corroborated with Huang, *et al.* (2013) and Lingaih (2015).

### **V.2. Mean performance**

On the basis of mean performance some of plants/progenies can be identified as superior in  $F_2$  and  $F_3$  generation under respectively different methods of selection viz; HY, LY, MTL and RPS. Variability is the genetic measure that provide the material resources to breeders for restructuring the plant genotype and is an indicator of plant dynamism. In the present study mean value was computed with regard to 1000  $F_2$  (base population) of three crosses individually viz; BG102/BPT5204, BG102/Naveen and

BG102/Reshmi (Commercial Pvt. hybrid Victory seeds) of different methods of selection each methods comprising 50 plants except for MTL which contains 48, 49, and 42 plants in previous sequence followed by two date of sowing.

Under RPS 50F<sub>3</sub> progenies exhibited minimum mean value for DFF in all methods of planting and both dates sowing than 50F<sub>2</sub> mean value it might be due to increasing homozygosity of negative favourable alleles.

The trait for PH was recorded lowest mean value in 50F<sub>2</sub> for MTL than 50F<sub>3</sub> mean of all groups of selection as well as both dates of sowing manifestation of dwarf plant stature may be due to positive heterotic response

In 50F<sub>2</sub> selected plants for traits viz; PPP, GPP and GYP plant were recorded maximum mean value as compared to 50F<sub>3</sub> progenies among all methods of sowing as well as both dates of planting it might be due to higher heterotic response of a gene/s.

### **V.2.1 Skewness and kurtosis**

Leptokurtic and positively skewed distribution suggested the involvement of dominance based complementary gene interaction and involving fewer number of genes having increasing effect in the inheritance of PPP, GPP and GYP plant similar finding were reported by Kiran *et al.* (2013) and Banu and Jagadeesh (2014). Maximizing the genetic gain in respect of these traits with positively skewed distribution requires intense selection from the existing variability.

The leptokurtic and negatively skewed distribution in 1000 F<sub>2</sub> populations for PH suggested the inheritance of this trait under the control of fewer number of segregating genes with majority of them having decreasing effect and duplicate interaction. To achieve maximum genetic gain in respect of these traits, mild selection would be required and earlier similar finding were reported by Thirugnanakumar *et al.* (2011) and Kiran *et al.* (2013).

## **V.3 Genetic variability**

### **V.3.1 Phenotypic and genotypic co efficient of variation**

Variability is the genetic treasure that provide the material resources to breeder for restructuring the plant genotype and is an indicator of plant dynamism. Co efficient of variation along with variances give a better picture of genetic variability. In general PCV was bit higher than GCV which indicates additive effect of environment on the expression of the trait. Similar finding have been reported earlier by Mohan and Chauhan

(2011), Praveen *et al.* (2010), Chakraborty and Chakraborty (2010) and Gala *et al.* (2016).

In 50F<sub>3</sub> progenies of both dates of sowing and different methods of selection followed by two methods of sowing of same cross, DFF, PH and TW recorded very small differences between GCV and PCV indicating the very small degree of environmental influence on manifestation of these characters governed by additive genes, similar finding have been reported earlier by Praveen *et al.* (2010), Seyoum *et al.* (2012). High GCV and PCV had been observed in MTL group for traits PPP and GYP plant in I<sup>st</sup> of TP and I<sup>st</sup> date of TP as well as DS respectively indicated that existence of wide spectrum of variability for this trait and offer greater opportunities for desired trait through genotypic as well as phenotypic selection by Devi (2006), Raut *et al.* (2009), Nandeshwar, *et al.* (2010), Devi *et al.* (2016) and Gala *et al.* (2016).

### V.3.2 Heritability and genetic advance

In the crop improvement programme selection is practiced directly/indirectly. It provides useful biometrical concept and has been widely used to estimate the degree to which a character may be transmitted from parent to offspring. It helps to partition the total variation to hereditary and environmental effects. Heritability in broad sense is the measure for the overall performance of hereditary determination of a character. It may be defined as the proportion of observed variability which is due to heredity and the remainder due to environmental cause (Allard, 1960)

Genetic advance, though not an independent entity, has an added advantage over heritability, where the character is to be improved through segregating generations. Johnson *et al.* (1955) reported the importance of both heritability and genetic advance.

According to Kung (1977), genetic advances would be over estimated in either of the following situation-

- (i) Low selection proportion with high heritability.
- (ii) High selection proportion with low heritability.

Genetic gain would be under estimated where both selection proportion and heritability are high/low.

In 50F<sub>3</sub> progenies, high  $h^2$  coupled with moderate genetic advance as per cent of mean has been recorded for TW in all selection methods as well as different methods and date of sowing except in HY group of I<sup>st</sup> date TP; LY group of I<sup>st</sup> date DS; and MTL

group of 2<sup>nd</sup> date TP indicating the preponderance of additive gene action as well as non-additive gene action. For trait GPP recorded high  $h^2$  coupled with high GA as per cent of mean in 1<sup>st</sup> and 2<sup>nd</sup> date of DS under HY group whereas high GA along with moderate  $h^2$  was obtained in both date of sowing under same selection method indicating the preponderance of additive gene action. Similar finding earlier have been reported by Singh *et al.* (2013), Dutta *et al.* (2013), Rajendra *et al.* (2013), Tuhina *et al.* (2015) and Lingaiah (2015), whereas for most of characters have been recorded high  $h^2$  coupled with low to moderate genetic advance as per cent of mean in HY and LY group which is might be due to preponderance of additive and non-additive gene action Similar finding earlier have been reported by Chakraborty and Chakraborty (2010) and Sanghera *et al.* (2013).

#### V.4 Character association and path analysis

The indirect selection is more effective than direct selection procedure, when the attribute in question has low heritability and/or is not easily and precisely measurable. The aim of correlation studies is primarily to know the suitability of various characters responsible for survival of other traits (Searle, 1965).

In 1<sup>st</sup> date of DS, in 1<sup>st</sup> method of selection for HY, GPP shown positive and significant correlation with GYP plant comprising high and positive direct effect. Indicating that under normal DS in 1<sup>st</sup> method of selection for higher yield GPP trait may be given basic importance as reported by Raut *et al.* (2009), Roy (2010) and Huang, Dahui *et al.* (2013) and Choudhary *et al.* (2009).

In 2<sup>nd</sup> date of TP, 1<sup>st</sup> method of selection for HY, PH, PPP, and Tw exhibited positive and significant correlation with GYP plant having their high and positive direct effect, suggesting that under late TP condition in 1<sup>st</sup> method of selection for HY, PH, PPP and Tw may be considered as a prime trait for improving the yield potential of rice, similar findings given by Raut *et al.* (2009), Senapati *et al.* (2009) Ratnakar *et al.* (2012), Kiani and Nematzadeh (2012),

In 2<sup>nd</sup> date DS, 3<sup>rd</sup> method of selection for MTL, PPP exhibited positive and significant correlation with GYP plant comprising its high and positive direct effect. Indicating that under late DS condition may be given more importance for enhancing the yield this finding corroborated with Raut *et al.* (2009) and Senapati *et al.* (2009).

In 2<sup>nd</sup> date DS, 4<sup>th</sup> method of selection for RPS, PPP and TW exhibited positive and significant correlation with GYP plant comprising their high and positive direct

effect. Under late sown DS, PPP and TW may be considered as an important character during course of selection for enhancing the yield of rice, similar results were also obtained by Senapati *et al.* (2009), Nandeshwar, *et al.* (2010), Kohnaki *et al.* (2013) and Venkanna *et al.* (2014)

In 2<sup>nd</sup> date of TP, 4<sup>th</sup> method of selection for RPS, PH had sown positive and significant correlation with GYP plant comprising their high and positive indirect effect of Tw. Under late sown TP condition for RPS, PH and Tw may be taken as an important trait for improving in yield of rice as also reported by Senapati *et al.* (2009) and Roy (2010).

## V.5 Selection response

Average selection response for all the studied traits had exhibited maximum in LY followed by HY and RPS selection method. It might be probable that delaying selection reduces the frequency of high yielding genotypes resulting in a greater frequency of low yielding genotypes. Although the results indicate that the improvement obtained by selecting in late generation is just as effective as in early generations, a strong argument for selecting for yield in early generations is to permit testing in many sites and years at an early stage. The results of selection for low yield supported by earlier findings (Whan *et al.* 1982). The highest standardized selection differential was recorded based on HY selection followed by LY selection and RPS. High realized  $h^2$  was observed for all characters under different methods of planting in both dates of sowing except in TP in 2<sup>nd</sup> date of sowing for GPP and GYP plant it might be due to environmental variation. Under selection based on HY, high realised  $h^2$  was recorded for all the traits in different methods of planting on both dates of sowing suggesting that early generation of selection may be effective. High level of  $h^2$  was also recorded under RPS for all the traits in different methods of planting on different dates of sowing barring for the trait PH under DS condition while for PPP and GPP under TP condition in I<sup>st</sup> date of planting which were comprising the low realized  $h^2$  it might be due to influence of environment, while under MTL for PH and PPP low  $h^2$  was recorded in different methods of planting as well as on different date of sowing except in DS condition on 2<sup>nd</sup> date of sowing in PPP, whereas high realized  $h^2$  was recorded in GPP and GYP plant in different methods of planting on both dates of sowing except TP on I<sup>st</sup> DS of sowing for trait GPP.

Based on the above mentioned results it may concluded that in general high realized  $h^2$  was recorded under LY and HY selection method. These findings are corroborated with the finding of Whan *et al.* (1982), Fasoules (1981), Eshghi *et al.* (2011), Barmana and Borah (2012) and Ahmad *et al.* (2017) while under MTL and RPS variable levels of realized  $h^2$  was recorded it might be due to under MTL, some superior plants might have ignored during the selection in  $F_2$  population and under RPS some inferior plants might have carried over in  $F_3$  population from  $F_2$ .

## **Cross-II (BG102/Naveen)**

### **V.1. Analysis of variance**

The analysis of variance revealed that mean sum of square due to progeny of crosses i.e. Cross-II hybrids of  $F_3$  under different selection group followed by two dates of sowing for traits GPP and TW were highly significant indicating the presence of ample amount of genetic variability among progenies for all characters under study. This finding is corroborated with Huang, *et al.* (2013) and Lingaih (2015).

### **V.2. Mean performance**

Fifty  $F_3$  progenies exhibited minimum mean value for DFF in MTL among all methods of planting and both dates sowing than  $50F_2$  mean value which might be due to hybrid vigour expressing these character.

Under MTL,  $50F_2$  plants for PH exhibited lowest mean value in I<sup>st</sup> date of TP than  $50F_3$  mean of all groups of selection as well as both dates of sowing, manifestation of dwarf plant stature may be due to negative heterotic response of the favourable of a gene.

In  $50F_2$  selected plants for traits *viz*; PPP, GPP and GYP plant were recorded maximum mean value as compared to  $50F_3$  progenies among all methods as well as dates of planting it might be due to cumulative of heterotic response of the gene.

#### **V.2.1 Skewness and kurtosis**

Leptokurtic and positively skewed distribution suggested the involvement of dominance based complementary gene interaction and involving fewer number of genes having increasing effect in the inheritance of PPP and GYP plant, whereas in GPP any type of gene interaction was not found due to negative kurtosis. Similar finding were reported by Kiran *et al.* (2013) and Banu and Jagadeesh (2014). Maximizing the genetic

gain in respect of these traits with positively skewed distribution requires intense selection from the existing variability.

The leptokurtic and negatively skewed distribution in 1000 F<sub>2</sub> populations for PH suggested the inheritance of this trait under the control of fewer number of segregating genes with majority of them having decreasing effect and duplicate gene interaction. To achieve maximum genetic gain in respect of these traits, mild selection would be required earlier finding were reported by Thirugnanakumar *et al.* (2011) and Kiran *et al.* (2013).

### **V.3 Genetic variability**

#### **V.3.1 Phenotypic and genotypic co efficient of variation:**

In 50F<sub>3</sub> progenies of two dates of sowing and different methods of selection followed by two methods of sowing of same cross, DFF, PH and Tw recorded very small differences between GCV and PCV indicating the very small degree of environmental influence on manifestation of these characters governed by additive genes, similar finding earlier reported by Praveen *et al.* (2010), Seyoum *et al.* (2012), Devi *et al.* (2016). Large differences between GCV and PCV were sown for traits *viz*; PPP, GYP plant and GYP plot it indicating the very large degree of environmental influence on manifestation of these characters governed by non-additive genes, similar findings have been reported earlier Kumar *et al.* (2001).

#### **V.3.2 Heritability and Genetic advance**

In 50F<sub>2</sub> progenies high h<sup>2</sup> coupled with high GA as per cent of mean has been recorded for TW in LY group of I<sup>st</sup> date TP and 2<sup>nd</sup> date TP along with MTL and RPS. GYP plant had also exhibited high h<sup>2</sup> coupled with high genetic advance as per cent of mean in all most all the selection methods except in HY group of I<sup>st</sup> date DS and TP indicating the preponderance of additive gene action. This finding is corroborated with Lokprakash *et al.* (1992) and Lingaiah (2015). The high heritability of characters indicated selection for these characters should be fairly easy and could be used as a selection criterion for future hybridisation programme. Heritability estimates along with genetic gain are normally more helpful in predicting the gain under selection than heritability estimates alone (Johanson *et al.* 1955).

#### V.4 Character association and path analysis

In 1<sup>st</sup> date of DS, in 4<sup>th</sup> method of selection for RPS, DFF had shown positive and significant correlation with PPP and Tw comprising high and positive direct effect on GYP plant. In 2<sup>nd</sup> date of TP; DFF exhibited positive and significant correlation with TW having their high and positive direct effect. Suggesting that during course of selection DFF, PPP and Tw may be considered as a prime trait to enhance the GYP plant under normal DS as well as late sown TP condition; PPP may also be considered as one of the important trait to enhance the yield. Similar finding have given by Senapati *et al.* (2009), Nandeshwar *et al.* (2010), Roy (2010), Roy (2010), Kohnaki *et al.* (2013), Huang, Dahui *et al.* (2013) and Venkanna *et al.* (2014).

#### V.5 Selection response

The results observed correlation of different traits between F<sub>2</sub> and F<sub>3</sub> generation was highly significant and positive in different methods of planting on different dates of sowing over all methods of selection *viz*; HY, LY, MTL and RPS for all the studied traits like DFF, PH, PPP, GPP, Tw and GYP plant indicating that best on these characters selection in F<sub>2</sub> would be fruitful and similar finding given by Vir and Singh (2005), Verma and Mani (1999).

Maximum standardized selection response was observed under HY selection method followed by LY selection method, RPS and MTL while high magnitude of standardized selection differential was recorded under HY selection method followed by RPS, LY and MTL. While average selection response for the studied traits *viz*; PH, PPP and GYP plant had exhibited maximum in HY followed by LY selection method, it might be due to the frequency of best genotypes rapidly decreases with advancing generation similar finding earlier reported by Shebeshki L. H. 1967, Verma and Mani (2000), and Ahmad *et al.* (2017).

High realized  $h^2$  was observed in different methods of planting under different methods of sowing for all the characters under all methods of selection however as revealed by the table based on the HY selection method would be more effective to obtain the Cross-II. This finding is corroborated with Vir and Singh (2005) and Kumar *et al.* (2009)

## **Cross-III (BG102/Reshmi (Commercial Pvt. hybrid victory seeds)**

### **V.1. Analysis of variance**

Analysis of variance for traits *viz*; DFF, PH, PPP, GPP, TW, GYP plant and GYP plot were found to be highly significant in all the methods of planting as well as both dates and methods of selection and similar finding was obtained by Nandeshwar *et al.* (2010).

### **V.2. Mean performance**

Fifty F<sub>3</sub> progenies exhibited minimum mean value for DFF in LY among all methods of planting and both dates sowing than 50F<sub>2</sub> mean value which might be due to hybrid vigour expressing these character.

Under HY, 50F<sub>3</sub> plants for PH had exhibited lowest mean value in I<sup>st</sup> date of DS than 50F<sub>2</sub> mean of all groups of selection as well as both dates of sowing, manifestation of dwarf plant stature may be due to positive heterotic response.

In 50F<sub>2</sub> selected plants for traits *viz*; PPP, GPP and GYP plant were recorded maximum mean value as compared to 50F<sub>3</sub> progenies among all methods as well as dates of planting it might be due to accumulation of negative heterotic response of a gene.

#### **V.2.1 Skewness and kurtosis**

Leptokurtic and positively skewed distribution suggested the involvement of dominance based complementary gene interaction and involving fewer number of genes having increasing effect in the inheritance of traits *viz*; PH, PPP and GYP plant whereas in GPP any type of gene interaction was not found due to negative kurtosis. similar finding were reported by Thirugnanakumar *et al.* (2011), Kiran *et al.* (2013), Banu and Jagadeesh (2014) and Lestari *et al.* (2015). Maximizing the genetic gain in respect of these traits with positively skewed distribution requires intense selection from the existing variability. To achieve maximum genetic gain in respect of these traits.

### **V.3 Genetic variability**

#### **V.3.1 Phenotypic and genotypic co efficient of variation:**

In 50F<sub>3</sub> progenies of two dates of sowing and different methods of selection followed by two methods of sowing, high GCV and PCV were observed in MTL and RPS groups for all studied characters in both methods and dates of planting it indicates existence of wide spectrum of variability for this trait and offer greater opportunities for

desired trait through phenotypic selection by Raut *et al.* (2009), Nandeshwar, *et al.* (2010), Devi *et al.* (2016) and Gala *et al.* (2016).

### **V.3.2 Heritability and genetic advance**

In 50F<sub>3</sub> progenies, recorded high  $h^2$  coupled with high GA as per cent of mean of all most all studied traits *viz*; DFF, PH, PPP, GPP, GYP plant and GYP plot for MTL and RPS selection methods as well as both dates of planting whereas TW exhibited high  $h^2$  coupled with high GA as per cent of mean in all methods and both date of planting indicating the preponderance of additive gene action suggesting that selection may be effective for these characters in early generation similar findings earlier have been reported by Singh *et al.* (2013), Tuhina *et al.* (2015) and Lingaiah (2015) and concluded that MTL and RPS selection methods may be effective for early generation selection while in rest of the traits shown high  $h^2$  coupled with low to moderate GA was recoded the expression of gene may be influence due to genotypic as well environmental effects.

### **V.4 Character association and path analysis**

In I<sup>st</sup> date of TP, 50F<sub>3</sub> progenies I<sup>nd</sup> and 2<sup>nd</sup> method of selection for HY and LY, Tw exhibited positive and significant correlation with GYP plant comprising it positive and direct effect while for LY, PH was recorded positive and significant correlation with GYP plant having high and positive direct effect. Suggesting that under normal TP condition in I<sup>st</sup> and 2<sup>nd</sup> method of selection for HY and LY, both traits may be considered as an important trait for improving the yield potential of rice similar finding given by Raut *et al* (2009), Senapati *et al.* (2009), Ratnakar *et al.* (2012), Kiani and Nematzadeh (2012),

In I<sup>st</sup> date of DS, forth method of selection for MTL, DFF exhibited negative and significant correlation with GYP having its negative and high direct effect whereas PH was recorded positive and significant correlation with GYP plant comprising its high and positive direct effect. Indicating that under normal DS condition in I<sup>st</sup> date of RPS selection method DFF may be considered as an important trait for improving the yield potential of rice as earlier reported by Ratnakar *et al.* (2012).

In 2<sup>nd</sup> date of TP, first method of selection for HY, PPP exhibited positive and significant correlation with GYP plant having their high and positive direct effect. Suggesting that under late TP condition in I<sup>st</sup> method of selection for HY, PPP may be considered as an important trait for improving the yield potential of rice similar finding

given by Raut *et al* (2009), Senapati *et al.* (2009) Ratnakar *et al.* (2012), Kiani and Nematzadeh (2012)

In 2<sup>nd</sup> date of DS, third method of selection for RPS, DFF, PH and GPP had shown positive and significant correlation with GYP plant having its high and positive direct effect. Under late sown DS, DFF, PH and GPP may be considered as an important character during the course of selection for enhancing the yield of rice. Senapati *et al.* (2009), Nandeshwar, *et al.* (2010), Kohnaki *et al.* (2013) and Venkanna *et al.* (2014).

## V.5 Selection response

The results observed to correlation of different traits between F<sub>2</sub> and F<sub>3</sub> generation was highly significant and positive in different methods of planting on different date of sowing over all methods of selection *viz*; HY, LY, MTL and RPS for all the studied traits like PPP, GPP, TW and GYP except for DFF as well as PH indicating that based on these characters selection in F<sub>2</sub> would be fruitful. Similar findings given by Vir and Singh (2005), Verma and Mani (1999).

Highest standardized selection response was obtained based on HY followed by LY, RPS and MTL methods of selection might be due to the frequency of best genotypes rapidly decreases with advancing generation similar finding earlier reported by Shebeshki L. H. 1967, Verma and Mani (2000). However, high magnitude of standardized selection differential was recorded under HY selection method followed by RPS, MTL and LY. High realized h<sup>2</sup> was observed for all character under different methods of planting in both dates of sowing. Selection based on HY as well as high realised h<sup>2</sup> was recorded for all the traits in different methods of planting on both dates of sowing suggesting that early generation of selection may be effective as earlier reported by Verma and Mani (2000) and Ahmad *et al.* (2017).

Cross-I as well as Cross-II of F<sub>3</sub> progenies recorded very small differences between GCV and PCV for traits *viz*; DFF, PH and Tw indicating the very small degree of environmental influence on manifestation of these characters governed by additive genes similar finding earlier reported by Praveen *et al.* (2010), Seyoum *et al.* (2012), Devi *et al.* (2016).

The analysis of variance revealed that mean sum of square due to progeny of three crosses *viz*; Cross-I, Cross-II and Cross-III hybrids of F<sub>3</sub> under different selection group followed by two dates of sowing for characters *viz*; DFF, GPP, GYP plant and GYP plot were highly significant indicating the presence of ample amount of genetic

variability among progenies for all characters under study. This finding is corroborated with Huang, *et al.* (2013) and Lingaih (2015).

In all three crosses of 50F<sub>2</sub> selected plants for traits viz; PPP, GPP and GYP plant were recorded maximum mean value as compared to 50F<sub>3</sub> progenies among all methods of sowing as well as both dates of planting it might be due to higher heterotic response of a gene.

Leptokurtic and positively skewed distribution were involved in Cross-I and Cross-II for traits of viz; PPP, GPP and GYP plant suggested that the involvement of dominance based complementary gene interaction and involving fewer number of genes having increasing effect in the inheritance these traits similar finding were reported by Kiran *et al.* (20013) and Banu and Jagadeesh (2014). Maximizing the genetic gain in respect of these traits with positively skewed distribution requires intense selection from the existing variability.

In Cross-III high GCV and PCV had been observed in MTL and RPS for all studied characters whereas in Cross- I, it was exhibited only for traits PPP, GYP plant and GYP plot it indicates the existence of wide spectrum of variability for this trait and offer greater opportunities for desired trait through phenotypic selection similar findings were reported by Raut *et al* (2009), Nandeshwar *et al.* (2010), Devi *et al.* (2016) and Gala *et al.* (2016).

In 50F<sub>2</sub> progenies recorded high  $h^2$  coupled with high GA as per cent of mean for trait TW under MTL selection methods in Cross-II as well as Cross-III indicating the preponderance of additive gene action. The high heritability of characters indicated selection for these characters should be fairly easy and could be used as a selection criterion for future hybridization programme earlier reported by Praveen *et al.* (2010), Seyoum *et al.* (2012), Singh *et al.* (2013), Tuhina *et al.* (2015) and Lingaiah (2015) and Devi *et al.* (2016).

Average standardized selection response was obtained maximum based on HY followed by LY, RPS and MTL selection methods in Cross-II as well as Cross-III while in Cross-I it was found maximum based on LY followed by HY, RPS and MTL selection method. It might be probable that delaying selection reduces the frequency of high yielding genotypes resulting in a greater frequency of low yielding genotypes. Although the results indicate that the improvement obtained by selecting in late generation is just as effective as in early generations, a strong argument for selecting for yield in early generations is to permit testing in many sites and years at an early stage.

The results of selection for low yield supported by earlier findings Shebeshki L. H. (1967), Whan *et al.* (1982), Verma and Mani (1999), and Vir and Singh (2005). Finally in brief salient feature of all three crosses are being presented in (Table 5).

The analysis of variance revealed that mean sum of square due to progeny of crosses *viz*; Cross-I, Cross-II of F<sub>3</sub> under different selection group followed by two dates of sowing for all most all traits were highly significant except for traits PH and GYP plot while in Cross-III, all characters were found highly significant except GPP in I<sup>st</sup> date of TP under HY group indicating the presence of ample amount of genetic variability among progenies for all characters under study.

On the basis of mean performance of plants those plants/progenies can be identified as superior in F<sub>2</sub> as well as F<sub>3</sub> generation under different methods of selection *viz*; HY, LY, MTL and RPS. Variability is the genetic measure that provide the material resources to breeders for restructuring the plant genotype and is an indicator of plant dynamism. In the present study mean value was computed with regard to 1000 F<sub>2</sub> (base population) of three crosses individually *viz*; Cross-I, Cross- II and Cross-III by different methods of selection each methods comprising 50 plants except for MTL which having 48, 49, and 42 plants in previous sequence followed by two date of sowing.

### **Cross-I**

Under RPS, 50F<sub>3</sub> progenies exhibited minimum mean value for DFF in all methods of planting and both dates sowing than 50F<sub>2</sub> mean value it might be due to increasing homozygosity of negative favourable alleles.

The trait for PH was recorded lowest mean value in 50F<sub>2</sub> for MTL than 50F<sub>3</sub> mean of all groups of selection as well as both dates of sowing manifestation of dwarf plant stature may be due to positive heterotic response

In 50F<sub>2</sub> selected plants for traits *viz*; PPP, GPP and GYP plant were recorded maximum mean value as compared to 50F<sub>3</sub> progenies among all methods of sowing as well as both dates of planting it might be due to higher heterotic response of a gene/s.

The distribution pattern of 1000 F<sub>2</sub> populations based on skewness and kurtosis indicated dominance based complementary gene interaction and involving fewer number of genes having increasing effect in the inheritance of traits *viz*; PPP, GPP and GYP plant. However, for the trait PH having decreasing effect and duplicate gene interaction.

In 50F<sub>3</sub> progenies of two date of sowing and different methods of selection followed by two methods of sowing of same cross, DFF, PH and TW recorded very

small differences between GCV and PCV indicating the very small degree of environmental influence on manifestation of these characters governed by additive genes. High GCV and PCV had been observed in MTL group for traits PPP and GYP plant in I<sup>st</sup> of TP and I<sup>st</sup> date of TP as well as DS respectively indicated that existence of wide spectrum of variability for this trait and offer greater opportunities for desired trait through phenotypic selection.

In 50F<sub>3</sub> progenies recorded high  $h^2$  coupled with moderate genetic advance as per cent of mean has been recorded for Tw in all selection methods as well as different methods and date of sowing except in HY group of I<sup>st</sup> date TP; LY group of I<sup>st</sup> date DS; and MTL group of 2<sup>nd</sup> date TP indicating the preponderance of additive gene action as well as non-additive gene action. For trait GPP recorded high  $h^2$  coupled with high GA as per cent of mean in I<sup>st</sup> and 2<sup>nd</sup> date of DS as well as TP respectively under HY group whereas high GA along with moderate  $h^2$  was obtained in both date of sowing under same selection method indicating the preponderance of additive gene action.

Under DS condition during the course of selection PPP, GPP and Tw may be considered as a prime trait to enhance the GYP plant. Under TP condition PPP and PH may be considered as important trait to enhance the GYP plant.

Average selection response for all the studied traits had exhibited maximum in LY followed by HY and RPS selection method. In early generation of selection based on the LY criteria as well as high realized  $h^2$  would be most effective.

## **CROSS-II**

50F<sub>3</sub> progenies exhibited minimum mean value for DFF in MTL among all methods of planting and both dates sowing than 50F<sub>2</sub> mean value it might be due to hybrid vigour expressing these character.

Under MTL, 50F<sub>2</sub> plants for PH had exhibited lowest mean value in I<sup>st</sup> date of TP than 50F<sub>3</sub> mean of all groups of selection as well as both dates of sowing, manifestation of dwarf plant stature may be due to negative heterotic response of the favourable allelic of a gene.

In 50F<sub>2</sub> selected plants for traits *viz*; PPP, GPP and GYP plant were recorded maximum mean value as compared to 50F<sub>3</sub> progenies among all methods as well as dates of planting it might be due to cumulative of heterotic response of the genes.

The distribution pattern of 1000 F<sub>2</sub> populations based on skewness and kurtosis indicated dominance based complementary gene interaction and involving fewer number

of genes having increasing effect in the inheritance of traits *viz*; PPP and GYP plant whereas in GPP any type of gene interaction was not found due to negative kurtosis. However, for the trait PH having decreasing effect and duplicate gene interaction.

In 50F<sub>3</sub> progenies of two date of sowing and different methods of selection followed by two methods of sowing of same cross, DFF, PH and TW recorded very small differences between GCV and PCV indicating the very small degree of environmental influence on manifestation of these characters governed by additive genes.

Large differences between GCV and PCV were sown for traits *viz*; PPP, GYP plant and GYP plot. It indicates the very large degree of environmental influence on manifestation of these characters governed by non-additive genes.

In 50F<sub>2</sub> progenies high  $h^2$  coupled with high GA as per cent of mean has been recorded for TW in LY group of I<sup>st</sup> date TP and 2<sup>nd</sup> date TP along with MTL and RPS. GYP plant had also exhibited high  $h^2$  coupled with high genetic advance as per cent of mean in all most all the selection methods except in HY group and I<sup>st</sup> date DS and TP indicating the preponderance of additive gene action. The high heritability of characters indicated selection for these characters should be fairly easy and could be used as a selection criterion for future hybridization programme.

During course of selection DFF, PH and PPP may be considered as a prime trait to enhance the GYP plant under late DS condition as well as TP condition.

The results observed in regards to correlation of different traits between F<sub>2</sub> and F<sub>3</sub> generation was highly significant and positive in different methods of planting on both date of sowing over all methods of selection *viz*; HY, LY, and MTL for all the studied traits like DFF, PH, PPP, GPP, Tw and GYP plant found to be best so, selection for these characters in F<sub>2</sub> would be fruitful.

Maximum standardized selection response was observed under HY selection method followed by LY selection method, RPS and MTL, while high magnitude of standardized selection differential was recorded under HY selection method followed by RPS, LY and MTL.

High realized  $h^2$  was observed in different methods of planting under different methods of sowing for all the characters under all methods of selection however as revealed by the table based on the HY selection method would be more effective to obtain the cross-II.

### CROSS- III

50F<sub>3</sub> progenies exhibited minimum mean value for DFF in all methods of planting and both dates sowing as compared to 50F<sub>2</sub> mean value it might be due to hybrid vigour expressing these character.

Under HY, 50F<sub>3</sub> plants for PH had exhibited lowest mean value in I<sup>st</sup> date of DS than 50F<sub>2</sub> mean of all groups of selection as well as both dates of sowing. Manifestation of dwarf plant stature may be due to positive heterotic response.

In 50F<sub>2</sub> selected plants for traits *viz*; PPP, GPP and GYP plant were recorded maximum mean value as compared to 50F<sub>3</sub> progenies among all methods as well as dates of planting. It might be due to accumulation of negative heterotic response of a gene.

The distribution pattern of 1000 F<sub>2</sub> populations based on skewness and kurtosis indicated dominance based complementary gene interaction and involving fewer number of genes having increasing effect in the inheritance of traits *viz*; PH, PPP and GYP plant whereas in GPP any type of gene interaction was not found due to negative kurtosis.

In 50F<sub>3</sub> progenies of two dates of sowing and different methods of selection followed by two methods of sowing low to moderate GCV and PCV estimates for different quantitative traits in rice. High GCV and PCV had been observed in MTL and RPS for all studied characters which indicated existence of wide spectrum of variability for these traits and offer greater opportunities for desired trait through phenotypic selection.

In 50F<sub>3</sub> progenies, recorded high  $h^2$  coupled with high GA as per cent of mean of all most all studied traits *viz*; DFF, PH, PPP, GPP, GYP plant and GYP plot only in MTL and RPS selection methods as well as both dates of planting whereas TW exhibited high  $h^2$  coupled with high GA as per cent of mean in all methods and both dates of planting indicating the preponderance of additive gene action suggesting that selection may be effective for these characters in early generation.

Suggesting that under normal TP condition in I<sup>st</sup> and 2<sup>nd</sup> method of selection for HY and LY both traits i.e. TW and PH may be considered as important traits for improving the yield potential of rice.

Under normal DS condition in I<sup>st</sup> date of RPS selection method DFF may be considered as an important trait for improving the yield potential of rice. Under late TP condition in I<sup>st</sup> method of selection for HY, PPP may be considered as an important trait for improving the yield potential of rice.

Under late sown DS, DFF, PH and GPP may be considered as an important character during the course of selection for enhancing the yield of rice.

Over all methods of selection *viz*; HY, LY, MTL and RPS might be effective for selection of all studied traits like PPP, GPP, TW and GYP plant except for DFF as well as PH would be fruitful in early segregating generation.

Highest standardized selection response was obtained based on HY followed by LY, RPS and MTL methods of selection, while high magnitude of standardized selection differential was recorded under HY selection method followed by RPS, MTL and LY.

The analysis of variance revealed that mean sum of square due to progeny of three crosses *viz*; Cross-I, Cross-II and Cross-III hybrids of F<sub>3</sub> under different selection group followed by two dates of sowing for characters *viz*; DFF, GPP, GYP plant and GYP plot were highly significant indicating the presence of ample amount of genetic variability among progenies for all characters under study.

In all three crosses of 50F<sub>2</sub> selected plants for traits *viz*; PPP, GPP and GYP plant were recorded maximum mean value as compared to 50F<sub>3</sub> progenies among all methods of sowing as well as both dates of planting it might be due to higher heterotic response of a gene.

Leptokurtic and positively skewed distribution were involved in Cross-I and Cross-II for traits of *viz*; PPP and GYP plant suggested that the involvement of dominance based complementary gene interaction and involving fewer number of genes having increasing effect in the inheritance these traits.

In Cross-III high GCV and PCV had been observed in MTL and RPS for all the studied characters whereas in Cross-I, it was exhibited only for traits PPP, GYP plant and GYP plot it indicates the existence of wide spectrum of variability for this trait and offer greater opportunities for desired trait through phenotypic selection.

In 50F<sub>2</sub> progenies recorded high  $h^2$  coupled with high GA as per cent of mean for trait TW under MTL selection methods in Cross-II as well as Cross-III indicating the preponderance of additive gene action. The high heritability of characters indicated selection for these characters should be fairly easy and could be used as a selection criterion for future hybridization programme.

Average standardized selection response was obtained maximum based on HY followed by LY, RPS and MTL selection methods in Cross-II as well as Cross-III while in Cross-I, it was found maximum based on LY followed by HY, RPS and MTL

selection method. It might be probable that delaying selection reduces the frequency of high yielding genotypes resulting in a greater frequency of low yielding genotypes.

In the present investigation it can be concluded that among different methods of selection HY followed by LY, RPS and MTL methods of selection may be effective in early segregating generations for Cross-II and Cross-III, whereas for Cross-I; selection may be more effective in LY followed by HY, RPS and MTL in respective sequences. However, on the other hand judicious selection causes increase in mean of the population for certain traits. Since, breeder is concerned with the enhancing the mean for the traits; he may get an improved population at the onset of homozygosity at  $F_8$  and onward stages (Table 6).

## CONCLUSION

- By MTL as well as RPS methods Cross-III recorded high  $h^2$  coupled with high genetic advance as per cent of mean for all the studied traits except under I<sup>st</sup> date of TP whereas, Cross-II exhibited high  $h^2$  coupled with high genetic advance as per cent of mean for trait TW except I<sup>st</sup> date of DS indicating the preponderance of additive gene action. These characters, should be fairly easy and could be used as a selection criterion for future hybridization programme.
- In Cross-II as well as Cross-III average standardized selection response was obtained maximum based on HY followed by LY, RPS and MTL selection methods while in Cross-I it was found maximum based on LY followed by HY, RPS and MTL selection methods. It might be probable that delaying selection reduces the frequency of high yielding genotypes resulting in a greater frequency of low yielding genotypes. Although the results indicate that the improvement obtained by selecting in late generation is just as effective as in early generations, a strong argument for selecting for yield in early generations is to permit testing in many sites and years at an early stage.

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**PPP Frequency Table of F<sub>2</sub> plants of cross BG102/BPT5204**

Class No.	Class No. Range	Total plants	PPP	PPP Frequency Table of F <sub>2</sub> plants of cross BG102/BPT5204																											
1	2	32	2.8	66	81	145	152	173	228	312	350	361	388	394	408	444	460	501	504	528	619	643	646	722							
				763	775	803	822	827	843	878	902	905	977	981																	
				12	25	27	32	38	68	69	82	96	106	122	124	128	128	131	133	136	137	147	153	154	158						
				164	167	168	171	186	192	193	195	198	199	201	211	220	224	231	233	239	241	244	254	255							
				260	261	267	279	280	285	300	309	310	311	313	315	323	328	349	383	393	396	399	404	407							
				412	417	420	425	428	431	435	452	463	469	470	474	477	482	485	492	512	513	522	526	534							
				546	549	568	574	579	580	606	613	617	623	632	636	644	645	649	651	656	659	660	663	666							
				669	673	681	686	690	713	718	721	725	726	730	739	749	750	757	760	762	766	770	771	779							
				780	782	794	795	801	808	810	812	815	817	829	850	858	869	870	884	899	912	913	916	928							
				942	944	951	958	959	965	970	973	975	976	983	987	988	989														
				3	6	7	288	6.51	8	9	10	17	20	24	29	37	44	45	50	51	52	55	56	59	64	67	77	78	80		
									85	88	94	99	104	110	112	115	116	119	125	127	135	135	138	139	141	150	160	161	163	169	
180	183	185	191						194	197	204	205	206	209	210	214	222	226	230	232	234	236	243	245	247						
249	250	252	256						265	268	269	273	278	283	299	302	314	316	317	326	329	331	332	336	337						
341	342	344	345						346	353	355	356	359	362	367	371	373	376	377	378	395	395	400	401	403	418					
419	424	426	432						433	434	435	437	445	447	448	450	453	458	461	464	466	473	478	483	493						
495	496	499	502						505	506	507	508	511	515	517	520	521	523	525	527	529	530	531	535	536						
539	541	553	555						557	558	563	569	571	577	578	581	584	585	586	596	598	601	604	607	608						
609	611	612	615						618	620	622	625	626	627	635	637	639	641	650	652	654	657	661	662	664						
665	667	671	674						676	677	679	683	684	688	692	693	699	701	703	712	715	716	719	723	733						
735	743	751	752						754	755	758	761	772	773	774	776	778	784	789	793	797	800	809	813	820						
821	824	825	826						836	837	840	842	847	851	860	861	863	866	867	873	874	875	881	882	883						
885	888	889	891	892	893	894	897	898	901	904	906	907	910	911	915	918	919	923	927	929											
933	935	936	940	946	948	949	952	955	969	971	979	984	992	995																	
4	8	9	244	8.48	2	3	5	19	22	36	41	42	48	49	57	65	70	71	73	74	75	76	79	84	87						
					89	91	100	102	103	109	111	114	118	121	123	134	143	144	146	149	155	157	162	170	172						
					177	178	187	188	196	200	202	203	208	212	216	218	235	238	242	246	248	262	263	264	271						
					272	274	276	277	287	289	292	297	301	304	308	318	321	322	330	333	334	348	357	358	360						
					364	365	366	368	374	379	380	381	382	384	385	386	390	391	392	402	405	410	413	414	416						
					421	423	436	438	440	449	456	457	459	462	467	471	472	481	488	489	490	503	516	518	519						
					540	543	544	547	548	551	552	556	559	560	561	562	564	565	567	570	573	587	588	592	599						
					600	602	610	616	621	634	640	642	647	648	653	670	678	680	689	694	697	698	700	702	704						
					705	707	708	710	717	720	738	740	742	744	745	746	747	748	753	759	764	765	767	768	769						

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						783	791	796	802	804	805	807	814	818	819	823	828	830	832	841	844	845	854	855	857	859
						862	864	865	868	872	879	880	886	887	890	895	896	900	903	914	917	937	938	941	943	950
						954	956	961	962	963	964	968	972	978	982	985	998	999								
5	10	11	146	10.41	4	6	14	21	26	28	30	31	31	33	35	40	43	46	47	58	61	63	72	83	86	92
					97	98	101	107	108	113	120	126	129	132	142	148	151	156	165	166	174	175	179	184	189	
					190	213	215	217	223	225	227	240	266	270	275	281	286	290	291	293	294	295	298	303	319	
					320	324	325	338	352	354	363	411	427	429	442	454	455	479	480	484	486	487	494	498	509	
					510	532	538	542	545	550	566	582	583	589	590	591	593	594	595	597	603	614	628	630	633	
					658	668	672	675	682	685	687	724	727	731	732	741	756	781	790	792	799	806	816	831	834	
					835	838	846	849	856	871	920	930	932	934	947	957	960	980	986	990	991	994	997	1000		
6	12	13	79	12.53	11	16	34	39	60	62	95	117	159	207	219	221	257	258	259	282	284	284	288	296	306	
					307	327	335	340	351	369	370	372	375	387	389	397	406	409	415	430	439	443	446	451	465	
					475	497	500	524	533	605	624	631	638	706	709	711	714	728	734	736	737	777	785	788	811	
					833	853	876	877	908	909	921	922	924	925	945	953	967	974	993	996						
						1	7	13	18	23	53	54	90	176	237	253	347	398	422	441	468	476	491	514	554	572
7	14	15	33	14.45	576	655	729	786	787	798	839	848	852	931	939	966										
8	16	17	9	16.11	93	130	140	181	182	537	575	691	926													
9	18	19	7	18.14	15	105	229	251	629	695	696															
10	20	21	2	20	339	343																				
11	22	23	0	0																						
					Sum/Mean																					
					1000																					
					10.37																					

Class No.	Class No. Range	Total plants	Panicle length	Panicle length (cm) Frequency Table of F <sub>2</sub> plants of cross BG102/BPT5204																							
				634	724	525	746	901	613	24	255	754	511	838	45	30	890	100	738	348	80	661	350	17			
1	12	13.5	5	12.5	634	724	525	746	901	613	24	255	754	511	838	45	30	890	100	738	348	80	661	350	17		
2	13.6	15	23	14.67	549	83	681	522	730																		
					515	573																					
3	15.1	16.5	49	16.06	116	236	272	421	429	434	495	507	528	614	647	731	735	799	802	847	874	876	877	959	979		
					388	766	789	950	382	716	794	568	912	84	581	919	41	263	258	20	934	349	266	87	953		
					602	280	837	973	896	844	722																
4	16.6	18	143	12.1	303	786	587	306	759	745	217	684	978	706	221	48	9	230	75	321	835	240	804	253	246		
					379	625	50	686	393	326	652	256	884	204	215	815	426	860	467	521	134	891	902	750	920		
					85	558	645	717	121	866	941	56	455	529	219	274	278	909	509	670	386	409	260	115	639		
					13	296	438	508	678	610	135	99	555	532	54	51	369	931	538	691	427	593	846	777	58		
					105	318	861	732	885	12	141	903	948	207	251	990	148	768	621	46	47	139	851	726	936		
					939	304	551	662	11	399	872	40	64	910	797	960	128	520	556	683	781	812	172	456	895		
					657	301	816	355	659	414	212	571	752	787	935	14	822	632	618	795	760						
5	18.1	19.5	183	17.8	496	140	864	392	422	333	341	682	354	488	868	79	276	952	271	982	119	949	202	743	29		
					983	687	751	923	841	970	114	127	403	800	523	758	482	94	195	557	803	560	988	906	727		
					744	197	984	2	964	273	446	98	704	376	340	43	229	493	440	563	776	814	790	857	401		
					108	810	346	897	937	854	112	137	651	842	329	689	696	630	395	462	611	19	37	517	190		
					345	771	938	437	286	817	344	660	424	502	733	676	192	826	133	965	976	451	685	944	101		
					653	642	443	958	574	780	448	801	975	309	42	394	883	124	16	617	669	553	765	843	89		
					849	554	833	130	806	594	465	848	146	347	302	871	880	363	187	381	162	34	566	423	175		
					968	761	985	478	830	44	161	702	840	179	546	994	550	476	57	961	471	911	8	185	942		
					261	956	413	793	335	383	791	232	873	239	38	77	534	501	693								
6	19.6	21	284	19.03	237	372	572	582	966	742	252	597	107	480	589	405	947	397	23	432	709	32	993	996	845		
					995	102	257	436	200	772	631	543	378	353	433	707	698	22	247	61	957	384	494	28	160		
					598	269	293	492	865	131	503	118	473	191	206	373	688	110	710	820	291	824	248	828	453		
					216	881	946	96	262	933	322	74	774	870	180	913	770	167	925	951	425	442	93	664	211		
					544	755	250	147	78	76	648	10	27	400	428	444	150	470	665	36	535	439	441	894	168		
					905	154	402	483	921	420	656	603	580	371	406	339	737	834	157	310	277	352	86	454	888		
					784	464	71	225	757	904	243	886	564	675	55	283	701	201	472	989	282	762	878	5	703		
					725	926	769	396	764	233	489	829	431	125	412	285	149	541	267	699	186	924	228	600	721		
					929	145	174	504	821	120	728	729	95	275	1	377	491	590	855	898	60	294	97	117	654		
					875	479	867	533	986	327	389	91	177	176	608	807	559	380	547	298	680	81	203	477	151		
					325	25	773	869	578	307	916	540	430	249	599	270	486	569	667	863	132	385	235	317	164		

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					796	136	510	214	705	753	223	899	126	747	113	798	173	887	123	474	104	169	915	63	281
					749	213	300	485	295	342	524	615	583	181	268	351	595	677	637	818	998	7	337	514	858
					723	312	932	445	690	320	889	88	1000	82	584										
7	21.1	22.5	179	20.48	629	624	714	398	370	290	672	537	734	292	170	129	741	450	70	475	943	254	666	570	220
					311	552	671	418	927	356	622	999	245	658	673	997	163	779	623	646	783	644	506	153	332
					224	338	649	567	839	449	655	788	991	832	736	740	387	519	605	184	490	945	862	457	92
					358	111	907	785	299	831	362	52	914	4	697	447	238	539	189	122	778	859	103	158	241
					792	21	35	62	626	700	908	3	719	601	972	612	73	596	674	850	586	718	33	331	315
					836	692	940	955	411	499	782	171	459	199	198	244	367	505	231	967	971	205	679	49	305
					234	415	67	513	918	69	809	775	663	152	917	319	853	542	242	527	26	289	196	879	357
					487	640	404	981	628	68	481	954	565	588	218	366	992	805	516	823	900	18	767	144	209
					641	72	620	416	609	452	264	893	526	210	361										
8	22.6	24	86	22	6	31	39	65	66	106	109	143	155	156	159	166	178	182	188	193	208	226	227	259	265
					279	284	287	288	297	308	313	314	316	323	324	328	336	343	359	360	364	374	375	390	407
					410	417	458	460	461	463	466	484	500	512	518	530	531	536	545	548	562	575	576	585	592
					604	606	607	616	633	635	636	694	713	720	739	748	756	763	808	813	819	827	882	892	922
					974	980																			
9	24.1	25.5	35	23.44	15	53	90	138	142	165	183	194	222	334	365	408	435	468	469	497	498	561	579	591	619
					627	638	650	668	695	708	711	712	852	928	930	962	963	987							
10	25.6	27	8	25	59	368	391	643	715	856	969	977													
11	27.1	28.5	5	26.25	330	419	577	811	825																
	Sum/Mean		1000	25.9																					

Class No.	Class No. Range	Total plants	GPP	GPP Frequency Table of F <sub>2</sub> plants of cross BG102/BPT5204																																					
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30								
1	12	27	12	20.9	170	350	495	515	525	549	576	634	724	730	869	901																									
2	28	42	54	38.16	236	511	348	80	661	874	657	498	30	906	896	754	581	414	255	134	17	27	221	923																	
					613	950	844	742	56	79	890	11	877	64	205	625	746	721	815	860	681	467	902	558	988																
					645	919	204	24	632	731	74	253	733	49	758	135																									
3	43	57	189	51.22	2	8	9	13	14	16	19	20	22	23	38	40	45	46	47	48	48	75	78	83	84	87															
					99	101	104	110	115	116	119	125	130	133	139	141	168	169	185	187	202	207	212	215	217																
					219	220	230	232	237	245	246	254	256	257	258	266	272	286	301	306	320	321	326	341	349																
					355	371	379	382	384	386	388	393	400	402	403	405	409	413	421	422	425	427	429	432	434																
					438	440	441	448	455	485	489	492	501	503	504	507	508	509	524	528	532	534	541	550	553																
					555	557	566	571	573	587	602	610	614	617	620	639	647	649	652	656	659	665	669	678	679																
					686	688	690	693	696	716	717	722	727	738	745	752	762	765	766	776	780	781	789	795	797																
					800	802	804	812	816	818	822	825	837	838	840	842	843	854	857	864	864	868	870	876	884	891															
					898	899	903	909	910	912	924	934	937	944	949	953	957	959	964	965	970	978	979	982	990																
4	58	72	196	65.69	4	5	7	29	34	36	41	42	50	55	58	61	63	85	89	100	105	112	120	121																	
					127	128	132	140	145	148	152	153	174	176	181	189	192	200	210	213	216	223	229	239	248																
					251	260	261	263	270	271	280	281	282	283	289	293	304	305	309	312	327	329	331	335	345																
					346	347	351	354	357	361	367	376	381	383	385	394	396	411	418	420	424	431	437	439	442																
					444	446	451	453	456	462	465	466	471	478	482	488	502	505	517	520	521	523	529	533	546																
					554	556	563	568	572	583	595	600	603	605	608	611	615	629	630	644	651	653	654	658	664																
					670	672	676	684	685	687	689	698	705	706	718	726	735	743	750	755	759	760	764	771	777																
					786	787	790	791	794	799	801	803	809	814	824	830	833	835	841	845	846	847	850	866	871																
					880	886	889	893	895	904	911	915	920	925	926	931	935	936	938	939	941	942	946	952	956																
					958	960	966	967	968	975	976	994																													
5	73	87	228	80.31	1	6	10	12	18	25	31	37	54	57	60	62	65	69	70	71	76	81	82	88	92																
					93	94	96	98	103	106	108	111	113	117	124	126	137	143	147	149	163	172	173	175	177																

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					178	179	186	195	197	201	206	209	211	214	218	225	226	228	234	235	238	240	241	243	247	
					249	250	259	262	264	267	274	276	277	278	284	288	291	295	299	302	303	307	317	318	325	
					338	339	340	344	352	353	370	373	378	389	392	395	399	401	406	412	415	419	423	426	428	
					430	433	436	443	445	450	454	457	458	473	476	479	483	486	490	491	493	494	499	500	506	
					510	514	516	526	527	531	540	544	547	551	552	559	560	574	575	578	580	584	588	593	594	
					618	621	622	631	637	642	650	662	666	667	671	673	674	675	682	683	691	694	699	701	702	
					703	704	709	719	723	732	734	741	747	749	751	753	756	757	761	768	770	773	774	779	782	
					783	785	793	796	798	806	807	808	817	823	826	828	831	834	848	849	851	858	859	862	863	
					865	867	873	878	883	885	894	897	905	913	921	929	932	948	983	985	996	1000				
6	88	102	118	118	92.99	21	26	28	35	43	44	66	67	72	77	91	95	97	102	122	131	136	144	146	157	161
					180	198	203	208	224	233	242	268	269	273	285	287	292	294	296	298	300	310	310	311	313	328
					332	333	337	342	356	363	391	407	410	416	447	452	459	468	469	470	474	480	487	497	519	
					535	536	537	545	548	564	569	582	589	590	596	597	604	607	619	623	633	641	668	677	680	
					692	707	710	712	729	737	740	769	772	775	788	813	820	821	861	872	875	879	881	887	888	
					907	916	917	927	943	945	951	986	989	993	997	998	999									
7	103	117	112	112	109.19	3	32	33	52	59	86	107	109	118	123	129	138	150	154	159	160	162	171	190	193	222
					227	244	252	275	279	297	314	316	322	324	334	336	358	359	360	364	366	368	372	374	375	
					377	387	397	417	460	461	475	477	481	513	518	530	538	539	542	543	570	577	585	598	599	
					601	609	612	616	627	635	636	638	646	648	660	700	708	713	720	725	728	736	739	744	748	
					767	778	784	792	805	810	829	836	839	855	882	892	900	908	914	918	928	947	961	971	972	
					980	981	984	987	991	992	995															
8	118	132	53	53	123.69	53	73	90	142	151	155	156	158	164	166	167	183	188	191	194	231	265	290	308	315	
					323	343	362	369	404	408	449	463	464	484	512	579	586	591	592	606	624	628	640	663	697	
					711	715	763	819	827	832	856	922	933	955	969	974										
9	133	157	31	31	141.67	15	39	114	165	182	184	196	199	330	365	380	398	435	472	496	561	562	565	567	626	643
					655	695	714	852	853	930	954	962	973	977												
10	158	172	6	6	143.57	68	319	390	811	940	963															
11	173	187	1	1	86.739	51																				
					Sumn/Mean		1000	87																		

Class No.	Class No. Range	Total plants	GYP plant (g)	GYP plant (g) Frequency Table of F <sub>2</sub> plants of cross BG102/BPT5204																																																																																																																																																																																																																																																													
				14	16	17	38	42	77	80	82	84	85	88	89	99	116	120	124	134	135	152	224	332	338	350	371	394	406	420	467	483	501	504	511	515	521	522	525	534	553	554	555	558	560	573	580	581	584	603	610	617	618	619	632	645	647	649	656	661	663	669	693	722	724	730	750	754	760	765	775	795	803	808	821	822	843	844	849	874	883	889	891	901	902	917	920	921	988	1000																																																																																																																																																																							
1	0.5 - 3.8	87	2.51	14	16	17	38	42	77	80	82	84	85	88	89	99	116	120	124	134	135	152	224	332	338	350	371	394	406	420	467	483	501	504	511	515	521	522	525	534	553	554	555	558	560	573	580	581	584	603	610	617	618	619	632	645	647	649	656	661	663	669	693	722	724	730	750	754	760	765	775	795	803	808	821	822	843	844	849	874	883	889	891	901	902	917	920	921	988	1000																																																																																																																																																																							
2	3.9 - 7.1	252	5.62	7	10	13	24	27	36	49	50	53	59	59	66	67	69	76	78	83	87	93	94	101	106	114	115	125	127	128	133	145	147	149	150	153	154	163	167	168	172	174	180	181	186	192	195	198	204	205	208	210	211	212	215	228	231	232	234	236	239	244	246	250	253	255	256	260	261	264	265	266	267	268	272	280	285	296	301	305	309	312	314	320	323	326	328	335	336	337	348	351	355	361	367	379	382	383	393	400	402	403	408	410	412	413	414	415	424	425	426	428	431	438	439	441	442	443	444	445	448	451	452	456	460	466	470	482	502	505	506	508	513	514	518	520	523	526	530	535	541	544	549	556	557	568	571	574	595	600	602	623	625	634	635	637	639	642	643	644	646	648	650	652	653	657	658	659	664	665	673	676	677	678	679	681	683	685	686	690	694	699	715	716	721	723	733	738	746	752	755	758	763	766	770	779	780	781	783	787	789	791	793	794	797	800	801	809	812	815	816	818	825	826	829	837	858	860	870	873	884	892	893	894	895	896	905	906	912	913	918	924	925	929	932	935	942	944	950	951	953	956	958	959	960	965	967	971	973	975	976	977	979	987	997	998	999
3	7.2 - 10.4	274	8.78	3	5	8	9	11	19	20	28	29	30	33	37	40	44	45	46	47	48	55	57	63	64	65	72	73	74	75	79	96	100	104	108	110	112	113	118	119	123	126	131	136	137	139	143	144	148	160	161	166	169	171	173	179	183	185	190	191	193	199	201	202	206	209	213	214	216	219	220	221	223	230	233	240	245	248	251	258	262	263	269	271	274	276	278	281	282	283	286	291	293	295	300	304	308	311	313	315	321	322	329	330	331	342	344	345	346	349	356	373	386	388	395	396	399	401	409	411	416	417	418	419	421	434	437	453	459	462	463	469	471	472	473	474	476	485	489	492	495	499																																																																																																																			
4	10.5 - 13.7	169	11.8	418	419	421	434	437	453	459	462	463	469	471	472	473	474	476	485	489	492	495																																																																																																																																																																																																																																											

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					503	509	510	512	517	524	546	550	551	552	564	570	579	583	585	586	596	598	601	606
					607	609	611	612	613	615	616	620	621	622	627	630	641	651	660	662	666	670	671	674
					675	687	688	689	692	696	701	702	703	705	706	710	713	718	719	725	726	735	739	743
					747	749	751	753	762	764	768	769	771	774	782	790	796	798	802	804	810	813	817	820
					824	827	828	830	835	836	840	841	842	847	850	851	854	857	865	868	872	876	877	878
					881	887	890	897	899	909	910	911	915	923	926	927	928	933	934	936	937	938	939	940
					946	949	952	955	961	969	970	972	978	982	983	989	990	994	999					
5	13.8	18	120	15.48	2	6	23	26	32	39	58	68	81	86	91	92	98	105	111	129	146	157	159	170
					176	177	194	196	197	203	222	226	237	273	277	284	287	288	289	290	292	298	299	302
					306	310	318	327	347	352	357	358	360	362	380	389	390	397	404	405	422	427	432	446
					457	461	468	477	479	484	487	490	527	531	532	533	536	537	538	545	547	559	562	576
					587	589	593	604	608	628	640	672	680	691	708	709	731	734	741	756	777	785	786	799
					807	831	838	846	861	862	867	871	879	907	931	945	947	962	964	981	984	986	993	996
6	18.1	21.3	55	19.77	1	15	60	97	107	109	117	140	155	156	184	188	242	252	279	294	303	364	369	
					370	377	387	392	449	465	480	491	519	590	594	597	605	654	655	711	720	736	740	742
					744	788	832	834	839	848	855	864	875	898	963	966	974	980	991					
7	21.4	24.7	20	23.14	51	95	130	275	343	372	374	375	398	542	567	572	582	592	729	806	833	856	922	930
8	24.8	28	12	26.21	54	90	142	165	435	496	497	561	714	727	811	853								
9	28.1	31.3	6	29.6	319	498	624	629	695	737														
10	31.4	34.7	3	32.73	575	728	852																	
11	34.8	38	2	36.15	182	339																		
	Sum/Mean		1000	19.2536																				



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					499	500	507	509	511	514	518	520	521	526	527	529	534	535	538	539	541	546	553
					556	557	560	562	564	567	568	573	575	586	589	595	596	597	599	613	614	621	623
					625	626	637	641	646	650	653	654	660	661	662	666	667	668	670	672	675	676	677
					689	691	694	698	699	700	703	704	711	713	714	715	725	729	739	741	749	752	754
					756	758	763	765	767	771	773	777	778	779	781	785	790	793	797	800	808	811	814
					822	823	824	825	828	829	832	833	834	836	837	841	847	849	850	853	855	861	872
					873	877	887	889	894	896	900	901	903	907	914	916	920	924	926	929	930	933	934
					942	945	955	957	960	962	963	966	967	982	983	984	985	987	990				
8	120.6	128	215	124	4	17	22	25	32	38	39	40	50	53	54	55	71	74	86	88	89	91	96
					99	101	102	103	104	112	114	115	119	123	131	133	134	135	138	140	154	157	162
					165	170	171	174	179	182	183	185	203	204	208	209	211	212	225	233	243	244	255
					257	267	270	273	275	284	286	288	291	294	297	299	304	305	309	311	312	314	319
					321	323	324	327	328	329	331	337	341	345	346	351	358	364	365	366	377	380	383
					388	392	393	397	400	428	438	443	455	456	469	476	480	490	502	505	506	508	512
					516	533	536	542	544	545	552	559	571	576	577	579	580	593	594	600	606	607	609
					611	618	619	628	635	638	639	640	645	649	657	664	665	669	673	674	678	680	681
					684	687	692	693	697	718	723	728	734	742	750	757	759	764	772	774	780	787	791
					792	798	801	803	805	806	810	812	820	826	827	831	835	839	843	846	851	854	857
					862	864	866	869	870	878	880	888	893	895	902	908	911	912	915	918	927	931	936
					943	946	951	970	981	993													
9	128.1	135.5	61	131.5	8	28	31	41	68	75	83	90	111	132	151	189	202	216	251	254	269	276	283
					301	322	332	339	349	352	374	387	394	432	439	488	515	531	547	574	584	608	617
					630	631	633	679	721	732	743	745	747	761	770	783	804	813	817	819	858	860	871
					906	954	961	1000															
10	135.6	143	15	138.9	94	100	150	155	178	237	277	292	357	717	740	746	809	842	941				
11	143.1	150.5	2	149.5	113	632																	
	Sum/Mean		1000	104.29																			

Class No.	Class No. Range		Total plants	PPP	PPP Frequency Table of F <sub>2</sub> plants of cross BG102/Navveen																																				
	1.0	2.0			232	433	802	838	875	43	44	74	81	144	152	154	159	172	192	193	205	215	84	86	88	92	97	101	105	107	111	113	114	119	122	124	140	142	147	155	
1	1.0	2.0	5	1.8	232	433	802	838	875	43	44	74	81	144	152	154	159	172	192	193	205	215	84	86	88	92	97	101	105	107	111	113	114	119	122	124	140	142	147	155	
2	3.0	4.0	107	3.63	217	220	221	294	298	306	307	315	332	362	372	378	394	398	402	418	425	426	216	222	224	228	230	233	238	239	240	243	245	247	249	251	252	257	262	281	
					428	429	434	457	510	546	548	555	558	562	565	570	574	585	586	587	588	598	282	289	308	313	316	317	323	324	328	329	336	337	341	344	345	347	356	358	
					600	601	606	608	641	644	647	685	702	706	707	708	728	738	747	755	759	760	360	363	368	377	380	381	382	383	385	392	395	397	400	403	404	405	410	411	
					774	775	793	795	796	801	806	808	812	813	823	826	832	834	834	837	841	844	897	412	414	417	421	422	424	430	435	436	437	440	442	444	445	448	455	459	461
					898	911	925	930	935	938	947	965	966	969	970	971	973	974	974	975	977	981	995	469	471	472	474	477	478	479	485	487	488	490	491	492	496	499	501	502	506
3	5.0	6.0	297	5.5	10	17	24	26	28	32	35	39	40	46	47	55	57	59	60	66	68	69	525	526	530	531	533	535	537	538	543	547	549	551	553	556	557	560	563	572	
					71	73	80	85	87	89	90	91	95	98	100	103	106	108	112	115	116	117	589	591	595	602	603	604	610	611	612	613	615	616	617	618	619	620	624	634	
					120	125	126	127	130	134	135	137	138	139	143	145	146	148	157	162	170	171	638	639	646	650	651	652	653	654	655	659	661	665	669	670	672	673	675	676	
					173	174	175	178	179	181	186	188	194	196	197	202	203	210	211	213	223	231	677	679	682	686	689	691	693	696	698	699	705	712	714	731	732	734	735	736	
					237	242	250	255	259	261	266	267	269	271	273	274	276	277	279	280	284	290	737	739	742	743	746	749	753	758	764	765	768	770	779	780	785	790	794	807	
					291	292	293	296	300	301	304	309	311	312	320	322	326	331	333	334	335	338	810	811	822	824	825	827	830	835	843	847	848	849	854	856	859	860	861	863	
					342	343	350	353	354	355	357	359	364	365	367	369	371	373	373	379	386	387	864	866	867	868	869	871	881	888	889	892	893	894	899	903	904	909	915	916	
					391	401	406	408	409	413	419	431	432	439	441	443	446	449	451	452	454	460	919	921	926	932	943	946	950	951	952	953	955	957	959	962	964	972	976	978	
					463	464	466	483	484	493	498	509	511	513	515	516	518	519	520	521	523	524	979	980	982	983	984	987	989	992	997	999									
4	7.0	8.0	271	7.42	10	17	24	26	28	32	35	39	40	46	47	55	57	59	60	66	68	69																			

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					528	534	544	550	554	554	559	566	567	584	592	596	597	599	605	621	623	626	628
					632	633	635	649	656	660	662	663	664	666	671	674	678	681	687	690	695	697	
					700	704	709	710	711	717	718	724	725	726	727	730	733	745	748	751	756	762	
					763	771	773	777	778	782	784	789	792	798	805	816	817	818	819	820	831	839	
					840	842	850	852	853	857	858	862	865	870	879	884	885	890	901	902	907	910	
					912	913	914	917	924	929	933	934	937	940	941	944	960	967	985	988	991	998	
					1000																		
5	9.0	10.0	158	9.38																			
					128	131	136	151	153	158	161	165	167	182	185	189	190	200	206	219	229	236	
					246	248	253	258	263	268	272	285	286	287	288	295	297	299	302	305	310	319	
					321	327	330	339	340	346	349	361	366	370	376	393	416	420	423	438	453	462	
					465	467	475	489	497	500	503	505	508	512	517	529	532	536	539	540	541	542	
					545	552	561	564	568	571	578	580	594	607	614	622	627	630	636	648	657	683	
					688	692	694	701	703	713	715	716	719	720	721	741	744	752	757	766	767	769	
					772	783	786	787	791	804	809	815	828	829	833	845	851	855	872	873	876	891	
					895	905	906	908	922	923	931	942	948	949	958	961	990	993	996				
6	11.0	12.0	91	11.4	2	11	13	18	21	31	42	61	67	78	82	83	93	94	99	102	123	133	
					141	180	191	218	235	241	254	265	270	278	283	314	318	351	352	375	388	407	
					415	427	450	456	468	470	473	476	481	481	482	486	495	522	575	577	579	582	
					583	590	593	625	631	643	658	668	680	684	722	729	750	754	761	776	781	788	
					797	799	803	814	836	877	880	882	883	887	896	900	920	928	939	945	956	986	
					994																		
7	13.0	14.0	47	13.43	16	19	23	25	27	50	56	77	96	110	129	132	149	150	166	187	208	225	
					227	244	303	348	374	384	389	396	494	504	507	514	527	569	576	581	609	629	
					637	642	667	723	878	886	927	936	954	963	968								
8	15.0	16.0	20	15.35	38	65	79	183	226	234	264	275	325	399	458	480	573	640	645	740	800	821	
					846	874																	
9	17.0	18.0	3	17.67	53	256	260																
10	19.0	20.0	1	19	918																		
	Sum/Mean	1000	10.458																				



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					393	395	396	397	398	403	404	407	411	412	413	415	420	422	424	431	432
					433	435	445	446	448	450	453	463	473	475	476	479	484	486	493	496	499
					501	504	508	513	519	521	522	525	527	533	534	535	536	539	541	545	550
					552	558	560	561	562	567	572	576	578	579	580	586	589	591	596	598	606
					607	613	621	631	633	636	638	639	642	643	646	649	653	655	664	667	669
					674	680	690	697	705	715	716	718	720	721	732	733	734	735	740	741	743
					744	747	758	780	781	788	796	799	800	809	811	816	818	831	833	841	847
					851	852	857	864	866	868	871	872	877	882	884	892	893	898	903	905	908
					909	914	922	926	927	941	943	946	948	956	959	964	968	975	976	978	984
					985	986	988	989	991	993	996	999	1000								
7	22.1	23.5	153	22.91	5	9	12	18	21	23	31	37	40	49	53	63	76	77	96	99	106
					109	124	132	142	143	153	165	180	181	187	192	194	201	203	204	212	214
					218	237	247	256	257	271	277	307	316	321	325	326	328	329	336	338	341
					345	358	370	372	374	383	385	402	414	416	417	436	438	442	443	456	457
					468	471	487	488	490	492	495	500	502	511	523	532	538	543	556	573	575
					582	584	585	593	594	595	599	601	602	610	615	626	645	663	665	682	688
					700	703	711	723	724	736	737	742	748	749	761	769	778	782	783	797	805
					810	812	814	815	819	820	821	822	826	827	837	844	846	848	855	856	861
					863	865	867	880	891	902	923	924	929	938	945	951	962	966	967	971	998
8	23.6	25	97	24.49	20	25	27	38	39	42	46	48	57	97	100	102	139	147	156	161	167
					168	174	183	185	188	191	196	210	217	221	226	229	266	273	284	292	294
					296	297	299	303	318	322	327	335	356	377	380	387	400	428	430	440	441
					451	462	466	482	526	528	577	583	608	627	637	657	671	676	679	687	689
					692	693	694	699	713	746	776	779	786	793	803	804	825	835	842	854	874
					876	878	879	890	899	907	911	912	920	953	970	973					
9	25.1	26.5	40	25.96	22	73	80	89	91	151	152	155	193	209	283	293	384	399	461	470	478
					531	537	559	587	609	641	696	728	730	762	772	774	785	789	792	798	801
					813	858	931	954	982	990											
10	26.6	28	20	27.18		41	64	122	144	166	262	275	301	320	349	350	390	469	505	597	618
					625	670	729	928													
11	28.1	29.5	2	29	222	246															
	Sum/Mean		1000	21.22																	

Class No.	Class No. Range	Total plants	GPP	GPP Frequency Table of F <sub>2</sub> plants of cross BG102/Navreen																																					
				25	59	178	231	248	546	574	596	757	935	207	235	265	278	298	343	344	357	361	363	405	418	421	458	459	461	472	483	489	494	507	516						
1	12	23.5	18.50	25	1	3	15	39	100	113	134	137	189	207	235	265	278	298	343																						
2	23.6	36	31.05	60																																					
				344	357	361	363	405	418	421	458	459	461	472	483	489	494	507	516																						
				549	597	604	622	624	626	628	635	666	677	678	710	717	722	745	751																						
				754	763	775	787	914	916	940	963	974	983	992	997	999																									
3	37	48.5	42.67	144	7	14	16	21	32	34	41	70	82	83	84	88	120	122	128	135																					
				136	138	146	148	150	204	208	215	216	228	232	238	242	245	251	258																						
				300	302	306	309	311	312	315	323	324	330	332	346	347	359	379	386																						
				391	409	416	419	420	425	426	427	433	434	437	444	454	464	465	467																						
				474	477	480	497	503	506	510	517	522	524	527	551	553	554	565	566																						
				590	600	603	605	611	612	614	616	629	640	644	646	647	648	651	652																						
				681	685	686	702	703	714	727	738	752	755	765	767	795	799	800	806																						
				817	828	838	839	845	850	853	856	859	873	881	883	888	891	894	904																						
				908	913	917	919	921	930	933	934	937	939	944	947	949	950	979	995																						
4	48.6	61	55.43	219	4	8	13	18	28	29	30	50	52	55	62	66	72	92	93	94																					
				95	103	107	111	116	118	119	121	125	127	131	141	145	154	158	159																						
				163	164	171	176	177	179	181	182	192	194	195	197	200	206	213	221																						
				222	224	227	236	239	243	249	250	252	254	259	260	276	279	281	282																						
				285	289	314	317	326	328	333	334	342	348	351	352	355	360	367	369																						
				373	388	394	398	401	404	406	408	411	412	423	429	450	452	455	463																						
				481	481	496	512	523	525	533	534	540	542	544	547	548	552	555	560																						
				564	567	569	582	583	588	591	592	594	598	606	615	619	623	634	636																						
				654	658	659	660	664	667	672	673	675	680	683	684	687	691	693	695																						
				697	701	704	705	707	708	709	712	715	719	723	726	730	731	739	741																						
				753	760	761	766	771	781	784	790	791	794	802	818	821	823	832	834																						
				840	844	848	851	855	857	862	869	870	872	875	878	879	886	892	897																						
				900	903	909	910	915	925	932	936	943	945	946	948	957	958	960	961																						
				962	969	972	977	978	980	987	989	994	996	998																											
5	62	73.5	67.83	160	5	6	9	11	12	19	24	36	51	53	54	67	74	79	81																						
				86	101	105	108	114	132	133	165	169	170	175	183	184	198	199	205																						
				211	214	219	220	223	225	234	244	253	255	264	269	270	290	291	307																						
				310	321	336	337	339	340	341	353	362	364	365	368	375	376	378	385																						
				392	407	415	417	422	436	457	473	475	476	479	484	485	498	501	508																						

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					509	514	518	519	520	521	526	529	530	535	539	543	550	557	561	563
					568	572	584	585	607	610	613	630	632	649	650	653	655	656	661	663
					668	671	718	721	725	735	737	744	747	750	756	758	759	764	768	769
					770	777	796	807	808	809	811	816	820	836	841	843	847	849	852	865
					866	882	884	885	889	895	906	920	922	926	927	942	951	953	955	985
					991															
6	73.6	86	162	79.38	2	17	20	23	26	35	42	45	47	56	57	58	61	63	65	69
					71	77	87	90	104	109	112	123	126	129	130	140	142	149	155	161
					162	172	173	180	186	188	190	196	217	218	230	233	237	240	261	263
					267	268	271	272	288	295	297	301	303	304	305	308	313	316	319	338
					354	356	372	374	380	381	383	393	395	396	399	410	413	414	424	431
					432	439	445	446	449	456	486	493	499	504	505	515	536	538	545	556
					558	562	570	571	575	576	578	580	589	593	601	617	620	621	637	643
					645	669	688	689	700	706	711	713	716	720	736	740	748	749	773	776
					778	783	803	814	824	827	829	830	831	837	858	860	887	896	899	905
					907	912	918	923	938	941	956	965	966	967	968	970	971	973	975	984
					986	1000														
7	87	98.5	97	91.57	22	33	46	60	75	78	80	85	96	115	143	147	153	156	157	160
					187	191	202	203	229	241	247	257	266	273	274	280	286	287	292	296
					325	377	382	389	397	402	403	435	440	448	451	460	471	482	487	490
					491	500	513	528	532	541	573	581	586	595	599	633	641	662	665	674
					676	682	690	699	724	728	734	742	762	779	792	810	812	819	825	835
					861	863	864	868	871	877	898	901	902	911	924	929	931	952	976	988
					993															
8	98.6	111	77	105.9	27	37	38	43	49	64	73	76	97	98	106	110	139	152	167	174
					185	193	210	212	256	275	277	293	327	329	331	335	349	366	370	371
					384	387	390	428	430	441	442	443	469	470	478	488	492	495	511	537
					579	587	608	631	638	639	657	670	679	692	694	733	743	746	780	782
					785	786	804	805	813	815	833	846	890	893	959	964	981			
9	112	123.5	49	116.02	10	31	40	48	89	91	99	102	151	166	168	201	209	226	284	294
					299	318	320	322	345	358	400	438	453	462	466	468	502	559	577	602
					609	618	627	642	696	698	729	732	788	793	797	822	826	867	880	928
					954															
10	123.6	136	16	128.8	117	124	144	283	350	772	774	789	798	801	842	854	874	876	982	990
11	137	148.5	3	142.3	246	531	625													
	Sum/Mean		1000	79.95																

Class No.	Class No. Range	Total plants	GYP plant (g)	GYP plant (g) Frequency Table of F <sub>2</sub> plants of cross BG102/Navveen																																									
				3	22	59	64	88	100	105	113	137	143	150	155	200	202	207	227	230	231	232	235	245	248	251	274	278	294	306	315	317	336	341	342	344	363								
1	0.2 - 3.2	83	2.09	231	232	235	245	248	251	274	278	294	306	315	317	336	341	342	344	363	397	402	421	426	433	452	461	503	506	507	526	546	547	549	555	570	574								
				580	601	614	622	626	644	646	653	702	714	747	748	749	754	754	770	771	808	823	828	851	872	875	886	898	900	930	935	943	947	965	971	983									
				101	405	615	688	347	362	413	558	517	838	163	243	850	893	332	346	444																									
				853	972	1	193	198	221	751	70	241	925	318	658	818	977	253	373	706																									
				970	343	429	824	861	98	111	112	454	600	707	708	868	117	205	356	540																									
				554	561	913	995	127	192	215	764	866	134	140	832	924	934	944	951	1000																									
				334	458	566	914	915	551	769	858	926	6	67	228	379	765	66	81	58																									
				355	457	589	606	648	774	854	997	290	394	428	678	722	12	425	484	616																									
				831	865	911	27	79	159	304	333	361	439	483	633	737	745	793	806	302																									
				451	544	603	892	932	962	300	817	114	276	465	496	562	623	860	922	90																									
330	564	591	731	813	952	975	218	240	280	307	491	666	672	728	848	870																													
921	84	587	610	628	37	118	147	223	423	563	730	919	969																																
3	6.3 - 9.2	252	7.81	2	4	7	8	13	15	16	17	24	25	29	39	44	45	47	48	62	63	68	71	77	80	83	86	87	92	99	103	104	108	109	116	119	123								
				124	125	128	136	138	149	154	158	174	178	180	182	184	190	195	197	201																									
				204	210	211	213	214	216	217	222	224	226	229	238	239	244	249	257	265																									
				267	281	289	291	292	293	298	308	309	319	324	328	335	337	338	339	340																									
				345	348	349	352	359	360	364	365	367	368	369	374	377	387	388	392	398																									
				404	411	412	416	417	419	434	436	442	449	469	471	474	478	485	487	489																									
				490	492	494	498	502	508	510	513	515	516	518	528	530	535	541	542	545																									
				548	553	556	557	567	571	579	582	583	586	590	592	594	598	604	608	609																									
				612	613	617	624	630	634	635	636	639	640	650	656	657	661	664	665	669																									
				673	675	685	686	689	691	693	695	697	698	699	701	703	704	705	709	712																									
715	717	723	725	726	734	736	738	742	752	753	758	759	760	763	766	777																													
783	786	789	792	795	801	805	807	811	812	816	820	825	836	839	840	841																													
842	843	844	849	859	867	881	888	891	894	897	901	902	903	904	916	923																													
928	939	940	942	946	950	953	964	966	967	973	974	985	992																																
4	9.3 - 12.2	208	10.65	5	26	28	30	35	36	41	46	49	51	53	54	56	57	65	69	73	76	82	85	97	102	115	120	126	129	130	141	142	144	145	146	148	156								
				160	162	169	173	176	179	186	188	189	196	199	208	209	219	225	234	236																									

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						250	252	254	258	259	268	269	271	272	273	275	279	282	285	288	299	301
						313	325	329	351	353	357	358	366	371	380	381	382	385	389	390	401	406
						409	414	418	422	424	430	431	437	441	443	453	459	460	463	464	468	472
						475	477	479	480	481	481	488	493	499	501	509	511	519	521	522	523	524
						529	533	537	543	550	565	569	577	578	581	584	593	595	605	611	619	620
						627	637	651	652	655	668	670	677	681	682	684	690	710	719	727	733	735
						739	744	746	755	757	761	762	773	776	779	784	787	790	791	794	798	819
						822	826	827	829	830	833	852	857	862	864	873	879	883	885	889	890	896
						899	905	907	908	909	910	912	917	933	948	949	955	957	959	979	980	987
						993	996	998	999													
5	12.3	15.2	133	13.67	10	14	18	23	31	32	34	40	43	52	55	60	72	75	78	95	106	
					131	135	152	164	168	171	175	177	194	203	206	212	237	242	255	260	261	
					262	266	296	297	303	305	310	311	323	326	331	372	376	378	383	386	391	
					395	400	427	438	455	467	473	476	482	512	520	532	534	536	538	539	552	
					559	568	572	575	588	596	599	618	625	632	638	643	647	649	654	660	662	
					667	674	680	683	687	694	700	711	720	721	724	729	741	750	767	768	772	
					775	778	781	782	785	800	802	803	804	809	835	837	845	847	855	856	863	
					869	871	884	938	958	960	961	963	968	981	988	989	990	991				
6	15.3	18.2	73	16:72	9	19	21	33	42	61	89	91	93	94	133	139	157	167	181	185	233	
					263	264	283	287	314	316	320	321	350	354	399	407	408	410	420	432	435	
					440	445	446	448	450	462	470	486	497	500	504	505	514	525	531	576	585	
					602	631	671	676	679	732	756	780	796	799	810	815	834	874	906	918	920	
					931	945	978	986	994													
7	18.3	21.2	45	19.55	20	38	96	107	122	151	161	170	172	183	191	247	270	277	295	312	327	
					375	384	393	403	415	527	573	597	607	641	663	692	713	716	743	797	876	
					877	878	880	895	936	937	941	954	956	982	984							
8	21.3	24.2	26	22.64	110	121	132	165	166	220	246	256	284	286	322	396	456	466	495	645	718	
					788	814	821	882	887	927	929	976										
9	24.3	27.2	11	25.11	11	153	187	370	560	621	629	642	696	740	846							
10	27.3	30.2	1	28.1	50																	
11	30.3	34.2	1	33.7	659																	
	Sum/Mean	1000	16.82																			





Class No.	Class No. Range	Total plants	PPP	PPP Frequency Table of F <sub>2</sub> plants of cross BG102/Reshmi (Commercial Pvt. hybrid Victory seeds)																																		
				29	30	52	63	69	70	85	97	98	106	124	128	133	146	150	169	208	210	212	219	227	231	258	259	261	267	295	310	316	317					
1	2.00 - 3.50	80	2.73	169	208	325	352	355	358	410	412	417	440	442	465	468	472	476	480	319	326	539	550	566	569	584	588	606	612	620	644	681	719	730				
				482	526	526	539	550	566	569	584	588	606	612	620	644	681	719	730	736	769	775	781	789	791	801	809	825	826	838	847	856	882	940				
				950	959	964	966	969																														
				2	3.60 - 5.00	283	4.67	3	7	9	13	19	20	21	24	25	27	28	31	32	34	35	38	40	42	43	44	45	47	51	55	59	60	61	72	74	76	
								78	88	93	96	105	108	111	114	117	123	127	129	131	136	137	140	142	143	144	145	162	181	184	190	195	197	201	202	205	206	
								207	209	213	215	216	218	220	224	225	226	230	235	236	239	241	243	247	249	252	266	268	269	271	272	273	275	276	278	285	289	
								297	299	309	322	324	327	329	332	336	338	340	342	343	346	347	348	349	351	354	356	357	363	365	366	367	368	376	383	388	393	
								396	402	403	404	411	413	415	422	423	423	430	431	432	439	441	447	449	451	453	457	459	463	471	473	474	478	481	484	487	488	
								494	496	497	499	501	506	511	512	514	529	532	542	545	546	549	554	555	557	565	567	572	573	576	579	582	590	592	597	599	601	
								602	604	605	607	618	623	627	629	635	638	652	655	657	658	666	673	677	687	688	700	706	710	715	716	723	727	728	734	739		
				741	743	746	750	751	754	756	757	761	762	763	771	778	779	782	787	788	793	795	796	797	798	799	808	810	813	815	822	827	829					
				832	839	840	844	845	849	855	858	860	861	862	863	865	868	879	881	883	885	886	888	889	893	900	901	902	904	905	913	923	928					
				929	930	935	941	942	948	951	955	967	973	983	992	997	998	3	5.10 - 6.50	146	6	12	16	16	50	53	65	75	79	80	87	99	101	102	112	113		
				122	148	152	156	164	165	166	172	178	185	187	191	194	196	203																				
				204	221	228	244	246	264	270	287	293	323	330	333	335	341	344																				
				353	364	373	374	377	386	397	414	420	427	437	448	455	462	469																				
				470	477	489	504	534	535	543	548	551	552	556	559	561	564	568																				
				570	571	577	581	585	587	611	619	621	625	631	640	643	661	665																				
				672	679	694	695	701	703	709	711	712	718	721	731	740	742	744																				
				745	747	752	755	765	767	770	774	776	780	785	800	804	806	824																				
				828	830	835	842	843	848	851	853	866	877	909	910	911	917	920																				
				922	936	947	953	957	962	963	972	976	984	994	1000				4	6.60 - 8.00	252	7.42	6	8	10	14	14	22	23	33	36	37	41	46	48	56	57	62
				66	67	82	91	92	103	104	109	115	118	121	126	134	138	153																				
				154	155	161	163	170	173	175	176	177	179	183	186	193	199																					
				200	211	214	217	222	233	237	238	240	245	248	250	260	280	284																				

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					288	291	292	298	300	302	303	304	312	320	326	328	331	334	345
					350	360	369	371	372	380	382	385	387	389	391	392	394	395	398
					399	405	406	408	409	416	418	419	421	424	426	433	434	436	438
					443	444	445	452	454	456	460	461	466	475	479	483	485	490	491
					492	493	495	498	502	507	509	515	518	521	523	524	525	530	533
					536	537	538	540	553	562	563	580	586	593	595	596	600	603	608
					610	614	615	622	626	633	634	639	641	650	651	653	654	660	662
					667	668	669	675	676	680	682	683	686	690	692	697	698	699	702
					704	705	708	713	714	717	720	722	724	725	726	729	737	738	749
					753	758	759	760	764	768	772	773	777	792	794	802	803	814	816
					820	837	846	850	852	854	857	859	864	867	871	873	880	891	892
					897	898	899	903	914	916	918	921	926	927	937	939	944	954	956
					960	961	965	975	977	980	982	986	989	990	995	996			
5	8.10	9.50	86	9	5	17	26	58	68	83	86	90	107	141	147	149	180	182	188
					234	251	255	257	263	265	282	283	286	294	306	307	311	314	315
					321	339	370	381	384	401	407	446	458	500	508	513	517	520	527
					528	541	547	560	578	591	598	609	613	617	632	636	642	646	659
					663	674	684	696	786	790	807	811	817	819	823	869	870	874	875
					895	919	925	933	934	938	949	970	974	993	999				
6	9.60	11.00	87	10.25	15	18	39	54	64	71	73	77	81	84	89	94	95	100	110
					125	130	132	135	189	192	223	232	242	253	262	274	279	290	308
					318	337	359	362	375	378	390	400	425	428	429	435	464	503	516
					519	531	574	575	583	589	594	616	624	630	648	649	656	670	678
					689	691	733	748	766	805	812	821	836	841	876	878	887	890	907
					908	915	924	932	945	946	952	958	978	987	988	991			
7	11.10	12.50	27	12	1	2	119	151	157	158	174	256	296	301	450	467	544	628	685
					783	831	833	834	872	894	896	906	912	968	971	979			
8	12.60	14.00	29	13.44	4	11	116	120	139	160	167	168	171	254	277	305	313	379	505
					522	558	637	645	647	664	671	707	732	735	784				
9	14.10	15.50	5	15	361	510	884	981											
10	15.60	17.00	3	16.33	159	281	931												
11	17	19.5	2	19	229	693													
	Sum/Mean		1000	10.531															

Class No.	Class No. Range	Total plants	Panicke length	Panicke length Frequency Table of F <sub>2</sub> plants of cross BGI02/Reshmi (Commercial Pvt. hybrid Victory seeds)																																			
				539	676	721	769	977	515	565	570	602	626	648	678	689	712	505	506	510	511	512	535	545	553	554	555	556	564	577									
1	11	13.0	5	11.9	539	676	721	769	977	515	565	570	602	626	648	678	689	712	505	506	510	511	512	535	545	553	554	555	556	564	577								
					225	346	446	482	515	565	570	602	626	648	678	689	712	225	346	446	482	515	565	570	602	626	648	678	689	712	225	346	446	482	515	565	570	602	626
2	13.1	15.0	32	14.64	716	744	746	749	754	795	817	843	852	854	864	874	875	888	913	923	953	956	985	148	151	282	283	323	419	504	577								
					716	744	746	749	754	795	817	843	852	854	864	874	875	716	744	746	749	754	795	817	843	852	854	864	874	875	888	913	923	953	956	985	148	151	282
3	15.1	17.0	85	16.45	3	42	66	70	116	125	148	151	282	283	323	419	504	577	505	506	510	511	512	535	545	553	554	555	556	564	577								
					3	42	66	70	116	125	148	151	282	283	323	419	504	577	505	506	510	511	512	535	545	553	554	555	556	564	577	505	506	510	511	512	535	545	553
4	17.1	19.0	186	18.4	14	19	23	34	43	44	45	95	100	113	118	128	132	142	147	170	187	204	207	252	256	269	277	285	289	290									
					14	19	23	34	43	44	45	95	100	113	118	128	132	142	147	170	187	204	207	252	256	269	277	285	289	290	142	147	170	187	204	207	252	256	269
5	19.1	21.0	278	20.37	1	2	6	10	11	12	15	18	20	21	22	25	26	295	309	314	318	319	339	350	354	358	373	387	389	395									
					1	2	6	10	11	12	15	18	20	21	22	25	26	295	309	314	318	319	339	350	354	358	373	387	389	395	295	309	314	318	319	339	350	354	358

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					638	640	646	650	659	662	669	675	677	679	690	692	696
					697	703	710	711	718	719	720	729	730	732	733	735	736
					737	745	750	752	753	755	758	759	762	763	764	773	774
					783	793	808	815	823	825	827	828	834	837	840	844	849
					853	855	856	858	863	865	866	870	871	873	877	885	896
					900	902	904	905	909	911	914	915	916	917	924	925	928
					933	934	937	938	940	941	944	954	958	961	964	965	966
					973	975	983	991	994								
6	21.1	23.0	231	22.3	4	5	7	8	9	24	27	29	30	33	36	37	39
					40	46	49	50	54	55	60	65	69	71	72	75	76
					77	78	80	81	94	97	102	105	107	109	110	115	117
					119	127	138	140	143	144	156	158	161	162	164	167	171
					174	177	179	181	182	184	188	190	194	195	198	200	201
					202	206	208	209	221	229	230	237	241	245	247	251	258
					266	270	274	276	278	279	284	288	297	308	312	316	321
					324	325	328	332	333	334	337	342	343	347	349	352	357
					359	360	363	364	366	369	372	380	381	386	391	392	400
					402	413	422	423	431	434	435	447	452	453	456	459	463
					468	471	472	473	474	483	484	488	489	490	491	492	494
					496	497	502	509	521	522	528	534	537	557	562	568	569
					572	573	581	586	591	594	597	599	605	615	627	630	651
					653	655	661	663	684	698	704	709	722	724	747	751	756
					761	766	767	768	775	777	786	791	796	805	811	814	818
					819	824	826	830	845	859	860	878	880	884	887	893	894
					898	899	906	907	912	918	919	920	921	922	926	936	942
					950	955	962	963	974	976	979	992	995	998			
7	23.1	25.0	130	24.19	13	16	28	32	38	51	53	56	62	68	73	74	83
					84	85	90	98	101	106	111	121	122	124	129	131	135
					136	137	139	141	145	146	150	155	157	166	172	175	176
					178	185	191	196	197	205	210	211	217	222	227	239	246
					248	250	253	255	257	261	262	263	264	271	272	275	293
					296	299	300	301	302	305	307	313	315	317	326	327	353
					362	375	378	382	396	407	408	410	412	416	418	426	432
					436	445	449	455	457	461	469	480	485	493	499	500	501
					507	520	524	536	593	601	606	635	643	649	657	664	670
					681	725	782	810	833	836	879	883	931	932	970	971	997
8	25.1	27.0	41	26.3	17	31	47	48	57	61	64	92	96	103	112	114	134
					152	154	160	165	192	193	231	238	249	254	259	260	280
					303	304	344	406	427	428	444	454	464	481	804	889	910
					981	993											
9	27.1	29.0	9	28.33	86	189	218	243	365	458	498	530	531				
10	29.1	31.0	3	29.5	98	107	118										
	Sum/Mean		1000	21.238													

Class No.	Class No. Range		Total plants	GPP		GPP Frequency Table of F <sub>2</sub> plants of cross BG102/Reshmi (Commercial Pvt. hybrid Victory seeds)																
	1	2		14	23	151	346	515	539	671	676	678	769	795	798	953	977	985				
1	16	28	14	23	151	346	515	539	671	676	678	769	795	798	953	977	985					
2	28.1	40.0	75	36.98	11	14	132	214	225	282	295	355	511	514	517	527	533					
					543	545	553	554	556	563	564	565	566	582	626	634	637					
					644	645	665	680	689	693	697	708	714	721	727	738	740					
					744	746	749	754	760	771	785	789	790	802	807	817	846					
					851	852	855	864	865	874	913	923	939	943	946	947	951					
					956	959	960	967	968	978	980	984	986									
3	40.1	52.0	101	47.3	70	125	126	170	174	195	199	216	262	301	305	323	381					
					396	419	448	460	505	510	512	513	516	529	555	560	575					
					587	589	596	598	608	611	614	615	616	617	619	620	622					
					624	625	636	639	641	668	677	687	688	694	695	702	705					
					706	707	712	717	726	728	731	732	739	743	763	770	778					
					780	784	788	792	803	808	812	813	832	840	841	844	848					
					850	862	867	868	875	876	882	888	897	908	930	934	935					
					938	948	949	952	957	969	989	996	577									
4	52.1	64	120	58.41	18	23	30	58	104	127	142	153	169	187	207	220	226					
					251	256	260	269	272	273	285	289	306	309	311	319	331					
					345	350	351	361	380	388	395	397	398	417	440	462	503					
					504	506	508	519	523	526	532	538	546	548	549	558	570					
					583	592	595	618	623	627	628	631	640	646	647	654	656					
					658	660	661	672	682	685	715	716	720	723	734	735	742					
					762	764	772	774	776	779	787	794	799	800	801	806	815					
					816	819	821	842	854	856	857	861	870	873	881	885	886					
					890	891	895	902	905	907	924	941	945	972	976	983	988					
					990	994	999															
5	64.1	76	142	69.89	3	6	21	24	35	60	77	87	93	100	101	102	107					
					108	123	128	133	140	152	159	163	173	179	181	182	204					
					208	212	215	224	228	241	252	258	267	268	283	284	288					
					291	292	296	298	299	308	310	320	324	326	339	341	348					
					349	358	360	368	370	373	374	377	379	387	390	394	409					
					420	424	425	443	486	487	491	494	502	518	531	540	541					
					544	551	552	559	561	573	580	581	585	586	588	603	621					
					629	630	632	642	657	674	675	686	690	691	692	701	710					
					719	733	745	752	755	756	759	765	768	782	793	797	829					
					831	836	838	839	845	847	863	877	892	893	901	903	904					
					919	925	927	929	937	954	973	987	992	995	998	1000	718					
6	76.1	88	134	82.51	1	9	15	19	26	29	33	34	40	41	52	59	67					
					75	80	82	88	95	97	113	116	120	121	124	129	130					
					135	137	148	156	161	166	183	197	201	202	206	209	210					
					213	219	221	232	234	237	242	244	248	261	266	270	276					

Cont....

				277	287	290	294	314	317	318	327	328	335	337	338	347
				354	357	367	372	376	383	384	389	403	404	410	421	423
				433	439	446	466	477	501	525	528	547	576	584	594	597
				605	609	638	648	650	652	666	667	683	699	700	711	713
				730	736	741	748	751	751	757	809	810	814	820	822	825
				828	833	834	849	853	858	871	872	887	898	909	914	917
				940	958	962	997									
7	88.1	100	148	4	5	10	17	22	25	28	36	42	43	44	56	62
				63	76	78	79	81	83	85	86	89	91	92	99	106
				109	119	136	138	139	143	147	149	157	158	164	165	171
				175	177	184	186	205	218	223	230	231	235	236	240	257
				263	264	265	271	275	278	315	316	321	322	330	332	336
				340	343	359	363	364	366	371	382	385	414	415	422	429
				442	447	451	470	475	476	479	493	496	509	521	522	542
				550	557	562	567	568	571	572	574	578	590	591	593	599
				600	604	607	610	612	613	633	662	663	669	679	698	703
				729	737	747	753	758	761	773	777	781	783	786	811	823
				827	835	837	869	878	884	896	900	911	916	918	926	942
				950	964	979	982									
8	100	112	145	2	12	16	20	37	45	46	55	64	69	73	74	90
				94	96	98	105	115	117	131	134	141	144	145	146	155
				162	167	185	190	203	211	227	229	233	243	247	249	253
				254	259	274	279	280	281	297	300	303	304	307	312	325
				334	342	352	353	356	369	375	391	393	402	406	407	408
				411	412	413	416	430	431	432	435	437	438	441	445	450
				461	471	472	474	478	480	485	488	489	490	495	497	500
				507	536	537	569	579	635	649	651	653	655	659	670	673
				681	684	696	704	709	722	724	766	775	791	796	805	818
				824	830	859	866	879	880	883	894	899	906	912	920	921
				922	928	931	933	936	944	963	965	966	971	974	975	981
				991	993											
9	112	124	82	7	8	13	27	32	38	39	47	49	50	53	54	65
				68	71	72	111	112	114	122	150	154	160	168	172	176
				178	180	188	191	194	200	222	245	246	250	255	293	302
				329	333	344	362	378	386	392	399	401	405	418	428	436
				449	452	453	454	455	463	465	467	468	469	473	483	484
				492	499	520	534	601	643	664	725	767	804	860	915	932
				955	961	970										
10	124	136	31	31	51	57	61	84	110	118	189	198	217	238	239	286
				313	365	400	426	427	434	444	456	457	458	459	481	482
				498	602	826	889									
11	136	150	4	66	103	192	606									
	Sum/Mean		1000	80.775												



Cont....

					883	887	891	892	895	902	904	907	909	911	913	918	919	924
					926	927	935	936	937	938	939	940	941	942	943	946	949	950
					951	952	956	959	961	964	966	967	968	969	976	977	983	986
					987	991	997	998										
4	9.6	12.5	269	10.95	7	17	21	22	45	51	53	64	72	78	79	80	83	84
					85	87	90	93	111	112	113	114	116	117	120	122	123	133
					134	136	157	160	165	166	174	180	181	182	188	191	193	194
					197	198	202	206	207	209	211	217	218	226	227	229	230	232
					233	234	236	237	245	247	251	256	259	266	271	274	275	278
					281	286	287	290	291	296	304	306	312	318	320	324	326	329
					330	335	337	348	350	362	366	369	370	371	372	377	385	386
					387	394	396	397	401	402	405	407	408	409	411	430	436	437
					445	447	448	455	459	467	469	473	488	490	492	493	494	495
					497	503	508	509	510	512	513	514	517	520	522	524	531	534
					535	536	539	540	544	546	548	561	562	563	567	568	571	581
					586	589	592	598	603	609	616	623	625	628	629	630	634	645
					647	649	652	654	655	660	663	665	667	671	686	696	697	698
					700	701	703	709	713	717	723	726	728	729	730	732	738	749
					753	755	757	758	766	768	773	782	784	786	790	794	802	807
					808	810	811	814	817	818	820	821	828	830	831	838	844	846
					850	855	865	867	870	871	878	879	880	888	889	890	893	894
					896	898	899	900	905	908	914	915	922	923	929	932	933	934
					948	955	958	963	965	971	972	973	978	979	980	985	988	989
					992	999	1000											
5	12.6	15.5	96	13.65	4	6	15	18	33	47	49	54	65	71	82	89	92	103
					107	110	118	132	135	140	153	158	176	184	185	189	196	239
					240	249	250	257	263	264	301	303	305	321	332	333	334	339
					341	375	383	416	428	435	438	456	484	496	498	505	516	547
					553	575	580	584	606	626	631	664	670	677	684	702	704	707
					724	725	735	745	751	775	796	816	825	837	841	885	901	903
					906	910	916	917	921	925	928	962	974	993	994	995		
6	15.6	18.5	47	16.86	8	11	50	57	81	94	121	125	149	154	159	171	192	200
					203	238	242	254	262	270	277	280	300	307	365	414	434	449
					450	475	483	530	622	635	637	638	651	672	711	733	737	783
					869	872	884	912	960									
7	18.6	21.5	13	20.41	68	99	253	378	382	384	391	400	462	464	506	648	981	
8	21.6	24.5	10	23.05	26	27	168	279	313	359	364	388	454	500				
9	24.6	27.5	0	0	0	0												
10	27.6	30.5	0	0	0													
11	30.6	33.5	1	31.5	458													
	Sum/Mean		1000	12.04														

**Appendix II.1a**  
**BG102/BPT5204**  
**Salient feature of 50 F<sub>2</sub> selected plant based on HY**

SI No.	Plant no.	Traits						
		GYP plant (g)	DF	PH (cm)	PPP	PL	GPP	TW (g)
1	339	36	93	121	20	21	77	2.3
2	54	25	82	111	14	18	75	2.0
3	806	22	82	127	10	20	81	2.0
4	130	24	82	100	16	20	56	2.3
5	496	26	84	115	7	19	146	2.0
6	398	24	81	121	15	22	136	2.1
7	963	21	89	136	9	25	160	2.0
8	140	21	84	113	16	19	71	2.0
9	275	22	82	128	11	21	115	1.6
10	856	22	82	120	10	26	130	2.3
11	279	21	84	115	4	23	116	2.1
12	343	24	79	131	20	24	118	1.9
13	833	25	81	132	13	20	66	2.5
14	853	26	84	114	13	23	135	2.1
15	377	21	80	110	7	21	106	1.8
16	744	21	81	135	8	19	110	1.8
17	728	34	88	142	13	21	110	2.0
18	922	24	80	132	13	24	120	2.2
19	695	29	96	123	18	26	140	1.8
20	561	26	80	132	9	25	152	1.8
21	374	23	82	136	9	24	105	1.8
22	624	29	83	123	12	22	121	2.0
23	95	23	83	119	13	21	88	2.0
24	572	23	82	106	15	20	68	1.8
25	90	28	80	120	15	25	120	1.9
26	629	31	81	131	19	22	60	2.0
27	142	27	88	125	10	25	120	2.2
28	375	24	89	118	13	24	105	1.9
29	572	23	82	106	15	20	68	1.7
30	319	29	78	115	10	23	160	1.6
31	737	31	78	129	12	21	90	1.9
32	435	26	80	100	6	25	140	1.9
33	497	25	87	122	12	25	90	2.0
34	852	33	78	118	15	25	150	2.5
35	51	24	81	111	6	18	176	1.7
36	372	25	79	131	13	20	106	2.0
37	182	36	86	117	16	23	146	2.2
38	714	26	86	119	13	22	140	1.7
39	567	23	83	122	9	22	138	2.6
40	582	22	81	128	11	20	95	2.1
41	729	24	83	132	15	21	100	2.0
42	930	23	80	104	11	25	139	1.9
43	237	15	79	122	14	20	54	2.4
44	498	30	96	149	10	25	35	2.2
45	811	26	81	120	13	28	170	2.1
46	542	22	83	121	11	23	115	2.0
47	727	26	93	118	11	19	55	2.2
48	1	21	90	130	15	21	75	1.9
49	165	27	81	127	10	25	140	2.1
50	575	32	88	129	16	23	85	2.1
<b>MEAN</b>		25	84	122	12	22	109	2.0
<b>Range</b>	<b>Min</b>	<b>15</b>	<b>78</b>	<b>100</b>	<b>4</b>	<b>18</b>	<b>35</b>	<b>1.6</b>
	<b>Max.</b>	<b>36</b>	<b>96</b>	<b>149</b>	<b>20</b>	<b>28</b>	<b>176</b>	<b>2.6</b>
	<b>Variance</b>	<b>17</b>	<b>20</b>	<b>104</b>	<b>12</b>	<b>6</b>	<b>1146</b>	<b>0.1</b>
	<b>SD</b>	<b>4</b>	<b>4</b>	<b>10</b>	<b>4</b>	<b>2</b>	<b>34</b>	<b>0.2</b>
	<b>CV %</b>	<b>16</b>	<b>5</b>	<b>8</b>	<b>29</b>	<b>11</b>	<b>31</b>	<b>10.9</b>

**Appendix II.2a**  
**BG102/BPT5204**  
**Salient feature of 50 F<sub>2</sub> selected plant based on LY**

Sl No.	Plant no.	Traits						
		GYP plant (g)	DF	PH (cm)	PPP	PL (cm)	GPP	TW (g)
1	807	15	86	116	8	21	87	2.0
2	672	17	88	123	10	22	72	1.4
3	559	15	86	112	9	21	86	1.8
4	709	14	90	127	12	20	75	2.2
5	15	21	83	128	18	25	135	1.8
6	365	18	93	133	8	25	135	2.3
7	327	16	81	126	12	21	70	2.0
8	788	20	86	134	13	22	98	2.1
9	704	14	80	110	9	19	85	1.9
10	404	15	83	102	5	23	125	2.6
11	711	21	83	136	13	25	132	2.0
12	898	20	81	118	6	21	44	1.9
13	457	18	83	130	9	22	85	2.3
14	786	18	83	118	14	17	61	2.1
15	587	16	82	130	8	17	50	2.2
16	785	15	83	115	12	22	87	1.7
17	991	20	86	131	10	22	113	2.0
18	60	20	87	136	12	21	75	2.1
19	538	16	89	131	10	18	106	2.3
20	742	20	86	132	9	20	40	2.4
21	146	18	80	103	9	20	89	2.3
22	6	16	89	123	11	24	80	1.9
23	821	3	83	116	6	21	96	2.5
24	26	18	78	133	11	23	92	2.2
25	740	19	84	132	9	22	95	2.5
26	73	10	86	112	8	22	121	2.0
27	4	13	84	100	10	22	60	2.2
28	589	18	88	117	10	20	93	2.5
29	731	15	90	117	10	16	42	2.3
30	819	13	86	116	9	23	123	2.3
31	871	14	80	120	11	20	69	2.4
32	429	13	82	117	11	16	57	2.4
33	484	16	83	118	11	23	120	2.1
34	636	13	81	144	5	24	105	2.2
35	157	17	80	99	8	21	90	2.3
36	839	21	84	120	14	22	105	1.7
37	527	18	83	136	7	23	85	2.2
38	97	19	86	86	10	21	95	1.9
39	490	18	78	145	9	22	87	2.3
40	479	17	84	116	11	21	85	2.7
41	196	16	81	118	9	23	135	2.1
42	491	20	87	158	15	21	80	1.5
43	405	17	86	120	9	20	46	2.4
44	375	24	89	118	13	24	105	1.9
45	305	6	83	123	12	22	66	2.0
46	380	15	84	115	8	21	150	2.3
47	370	20	90	142	12	22	85	1.8
48	306	15	92	120	12	17	45	1.7
49	362	14	80	123	6	22	125	2.1
50	487	15	84	122	10	23	101	2.1
<b>MEAN</b>		16	84	122	10	21	90	2.1
<b>Range</b>	<b>Min</b>	<b>3</b>	<b>78</b>	<b>86</b>	<b>5</b>	<b>16</b>	<b>40</b>	<b>1.4</b>
	<b>Max.</b>	<b>24</b>	<b>93</b>	<b>158</b>	<b>18</b>	<b>25</b>	<b>150</b>	<b>2.7</b>
	<b>Variance</b>	<b>13</b>	<b>12</b>	<b>162</b>	<b>6</b>	<b>5</b>	<b>729</b>	<b>0.1</b>
	<b>SD</b>	<b>4</b>	<b>3</b>	<b>13</b>	<b>3</b>	<b>2</b>	<b>27</b>	<b>0.3</b>
	<b>CV %</b>	<b>22</b>	<b>4</b>	<b>10</b>	<b>25</b>	<b>10</b>	<b>30</b>	<b>12.9</b>

**Appendix II.3a**  
**BG102/BPT5204**  
**Salient feature of 50 F<sub>2</sub> selected plant based on MTL**

Sl No.	Plant no.	Traits						
		GYP plant (g)	DF	PH (cm)	PPP	PL (cm)	GPP	Tw(g)
1	<b>836</b>	8	82	97	7	22	116	1.6
2	<b>813</b>	8	84	92	7	23	100	2.3
3	<b>823</b>	12	79	104	8	23	80	1.9
4	<b>653</b>	5	83	97	8	19	70	2.0
5	<b>791</b>	5	89	105	8	20	70	2.3
6	<b>755</b>	6	85	95	7	20	70	1.8
7	<b>756</b>	14	80	97	10	24	81	2.0
8	<b>667</b>	11	83	94	7	21	77	2.1
9	<b>658</b>	7	83	97	10	22	70	2.0
10	<b>689</b>	9	81	102	9	19	70	1.9
11	<b>378</b>	12	89	108	7	20	77	1.8
12	<b>533</b>	16	80	109	13	21	70	2.3
13	<b>591</b>	11	81	100	11	25	120	1.9
14	<b>160</b>	10	80	107	7	20	105	1.8
15	<b>972</b>	10	88	104	8	22	106	2.2
16	<b>985</b>	11	90	106	9	20	80	2.0
17	<b>598</b>	10	81	107	7	20	110	2.2
18	<b>828</b>	9	90	104	8	20	85	1.9
19	<b>547</b>	15	82	87	9	21	82	2.1
20	<b>886</b>	11	83	99	9	21	61	2.2
21	<b>500</b>	11	83	98	12	24	83	2.2
22	<b>449</b>	21	83	86	8	22	120	2.3
23	<b>472</b>	10	83	109	8	21	150	1.9
24	<b>364</b>	18	79	109	9	23	115	1.8
25	<b>436</b>	13	83	100	8	20	73	2.2
26	<b>410</b>	7	80	100	8	24	92	1.5
27	<b>499</b>	8	80	93	7	22	76	1.6
28	<b>921</b>	4	87	107	12	20	80	1.8
29	<b>612</b>	10	87	92	7	22	115	1.9
30	<b>654</b>	19	83	100	7	21	70	1.8
31	<b>178</b>	11	84	100	9	24	80	1.9
32	<b>282</b>	10	89	109	13	21	72	2.1
33	<b>468</b>	14	80	109	14	25	89	2.2
34	<b>138</b>	11	84	100	7	25	112	2.5
35	<b>113</b>	9	84	109	11	21	75	1.8
36	<b>335</b>	5	85	108	12	20	70	2.2
37	<b>61</b>	11	81	91	10	20	72	2.1
38	<b>259</b>	12	83	107	12	23	84	2.0
39	<b>86</b>	15	86	108	10	21	110	2.3
40	<b>226</b>	15	83	105	7	23	85	2.1
41	<b>340</b>	12	82	100	13	19	76	2.1
42	<b>242</b>	18	84	107	8	23	88	2.2
43	<b>42</b>	4	79	98	8	19	67	2.2
44	<b>21</b>	11	86	106	10	22	91	2.5
45	<b>39</b>	17	84	109	12	24	140	2.1
46	<b>471</b>	8	90	109	8	20	71	2.3
47	<b>948</b>	11	88	109	7	18	75	2.0
48	<b>932</b>	5	80	103	10	21	86	2.4
		11	84	102	9	21	88	2.1
	<b>Min</b>	<b>4</b>	<b>79</b>	<b>86</b>	<b>7</b>	<b>18</b>	<b>61</b>	<b>1.5</b>
	<b>Max.</b>	<b>21</b>	<b>90</b>	<b>109</b>	<b>14</b>	<b>25</b>	<b>150</b>	<b>2.5</b>
	<b>Variance</b>	<b>16</b>	<b>10</b>	<b>40</b>	<b>4</b>	<b>3</b>	<b>401</b>	<b>0.1</b>
	<b>SD</b>	<b>4</b>	<b>3</b>	<b>6</b>	<b>2</b>	<b>2</b>	<b>20</b>	<b>0.2</b>
	<b>CV %</b>	<b>37</b>	<b>4</b>	<b>6</b>	<b>22</b>	<b>8</b>	<b>23</b>	<b>11.0</b>

**Appendix II.4a**  
**BG102/BPT5204**  
**Salient feature of 50 F<sub>2</sub> selected plant based on RPS**

Sl No.	Plant no.	Traits						
		GYP plant (g)	DF	PH (cm)	PPP	PL (cm)	GPP	TW (g)
1	<b>155</b>	20	87	122	9	23	121	2.4
2	<b>914</b>	13	82	122	8	22	105	2.0
3	<b>986</b>	16	82	138	10	21	89	2.0
4	<b>450</b>	13	82	124	6	22	86	2.2
5	<b>604</b>	16	84	150	7	23	90	2.0
6	<b>640</b>	15	81	124	9	23	125	2.2
7	<b>576</b>	15	89	122	14	23	20	2.0
8	<b>91</b>	15	88	122	8	21	90	1.6
9	<b>566</b>	13	82	125	11	20	54	1.9
10	<b>697</b>	13	82	134	8	22	121	2.0
11	<b>23</b>	16	84	108	14	20	55	2.3
12	<b>2</b>	14	79	88	9	19	50	1.8
13	<b>734</b>	16	81	132	13	22	80	2.1
14	<b>102</b>	14	92	113	9	20	95	2.2
15	<b>188</b>	19	80	123	9	24	130	2.1
16	<b>605</b>	19	81	128	13	22	67	2.0
17	<b>984</b>	16	88	121	7	19	116	1.8
18	<b>590</b>	20	80	132	10	21	88	1.9
19	<b>111</b>	16	96	124	9	22	83	1.9
20	<b>284</b>	16	80	115	13	24	84	2.1
21	<b>294</b>	20	82	120	11	21	92	1.8
22	<b>294</b>	20	83	120	11	21	92	1.8
23	<b>947</b>	16	83	116	11	20	106	2.3
24	<b>288</b>	17	82	135	13	24	87	2.1
25	<b>203</b>	14	80	115	9	21	93	2.6
26	<b>562</b>	17	82	128	9	24	135	1.8
27	<b>536</b>	18	88	130	7	23	100	2.5
28	<b>848</b>	19	81	135	14	20	85	2.2
29	<b>290</b>	17	81	132	11	22	120	2.4
30	<b>628</b>	14	81	145	10	23	120	2.0
31	<b>966</b>	21	83	110	15	20	65	1.9
32	<b>945</b>	18	81	127	12	22	90	1.8
33	<b>980</b>	18	90	137	10	24	115	1.9
34	<b>931</b>	17	84	114	14	18	60	2.0
35	<b>864</b>	21	81	133	9	19	55	2.1
36	<b>360</b>	14	84	134	8	23	103	1.7
37	<b>593</b>	15	86	114	11	18	75	1.9
38	<b>845</b>	14	82	107	8	20	63	2.2
39	<b>867</b>	17	77	124	7	21	86	2.4
40	<b>875</b>	19	90	137	6	21	96	2.2
41	<b>273</b>	14	82	138	7	19	99	2.0
42	<b>680</b>	14	81	100	8	21	92	2.1
43	<b>480</b>	18	81	123	10	20	90	2.2
44	<b>962</b>	16	80	120	8	25	152	2.3
45	<b>834</b>	21	83	109	10	21	84	2.3
46	<b>289</b>	17	84	128	9	23	60	2.0
47	<b>218</b>	13	79	140	9	23	75	2.2
48	<b>1000</b>	3	80	124	11	21	80	1.7
49	<b>531</b>	16	83	142	6	24	85	2.1
50	<b>461</b>	14	97	132	6	24	110	1.8
<b>MEAN</b>		16	83	125	10	21	90	2.1
<b>Range</b>	<b>Min</b>	<b>3</b>	<b>77</b>	<b>88</b>	<b>6</b>	<b>18</b>	<b>20</b>	<b>1.6</b>
	<b>Max.</b>	<b>21</b>	<b>96</b>	<b>150</b>	<b>15</b>	<b>25</b>	<b>152</b>	<b>2.6</b>
	<b>Variance</b>	<b>9</b>	<b>14</b>	<b>133</b>	<b>5</b>	<b>3</b>	<b>613</b>	<b>0.1</b>
	<b>SD</b>	<b>3</b>	<b>4</b>	<b>12</b>	<b>2</b>	<b>2</b>	<b>25</b>	<b>0.2</b>
	<b>CV %</b>	<b>18</b>	<b>4</b>	<b>9</b>	<b>24</b>	<b>8</b>	<b>27</b>	<b>10.6</b>

**Appendix II.1b**  
**BG102/Naveen**  
**Salient feature of 50 F<sub>2</sub> selected plant based on HY**

Sl. No.	Plant no.	Traits						
		GYP plant (g)	DF	PH (cm)	PPP	PL (cm)	GPP	TW(g)
1	183	20	87	124	15	25	64	2.5
2	187	25	85	119	13	23	88	2.3
3	645	23	84	127	15	23	75	2.5
4	621	25	84	115	7	21	78	2.2
5	629	26	83	111	13	20	46	2.4
6	887	22	83	120	11	19	78	2.4
7	846	25	82	123	15	23	105	2.3
8	882	23	84	112	12	22	70	2.1
9	375	21	85	112	11	20	65	2.8
10	976	24	83	110	5	22	90	2.5
11	166	23	86	118	13	27	115	2.2
12	597	21	87	119	7	27	25	2.5
13	814	21	86	118	12	24	75	2.3
14	11	24	79	120	11	21	66	2.7
15	110	24	82	110	13	21	103	2.6
16	132	23	85	134	14	23	71	2.6
17	927	24	81	121	14	22	71	2.4
18	560	25	82	114	5	22	50	1.9
19	256	24	82	117	17	23	110	2.2
20	740	25	81	137	16	22	85	2.4
21	788	24	81	113	11	22	120	2.3
22	153	25	85	117	9	23	98	2.5
23	713	21	84	119	10	25	86	2.6
24	170	21	87	123	8	20	69	2.5
25	396	22	89	111	13	22	84	2.3
26	161	20	86	113	10	24	85	2.4
27	246	22	81	111	9	29	144	2.6
28	718	22	83	126	7	22	69	2.6
29	121	22	90	120	10	18	60	2.6
30	284	24	82	123	8	25	113	2.5
31	937	20	84	92	8	18	45	2.2
32	929	24	81	119	8	24	92	2.5
33	165	22	83	123	9	23	70	2.5
34	286	23	84	126	9	21	87	2.2
35	821	22	88	108	15	23	60	2.8
36	466	21	86	117	8	24	120	2.5
37	122	20	84	111	6	28	40	2.4
38	322	23	82	134	8	24	120	2.7
39	642	25	83	112	13	21	115	2.8
40	659	34	82	102	6	18	49	2.8
41	456	22	85	122	11	23	76	2.3
42	696	26	85	110	5	26	120	2.8
43	172	21	84	118	4	18	75	2.7
44	107	20	85	114	6	19	60	2.5
45	312	21	83	122	8	20	40	2.1
46	50	28	83	124	13	21	61	2.2
47	370	26	82	116	10	23	105	2.5
48	74	21	82	121	3	19	70	2.8
49	220	23	82	113	4	21	63	2.3
50	495	23	84	117	11	23	103	2.4
<b>MEAN</b>		<b>23</b>	<b>84</b>	<b>84</b>	<b>10</b>	<b>22</b>	<b>81</b>	<b>2.5</b>
<b>Range</b>	<b>Min</b>	<b>20</b>	<b>79</b>	<b>92</b>	<b>3</b>	<b>18</b>	<b>25</b>	<b>1.9</b>
	<b>Max.</b>	<b>34</b>	<b>90</b>	<b>137</b>	<b>17</b>	<b>29</b>	<b>144</b>	<b>2.8</b>
	<b>Variance</b>	<b>6</b>	<b>5</b>	<b>59</b>	<b>12</b>	<b>7</b>	<b>636</b>	<b>0.0</b>
	<b>SD</b>	<b>2</b>	<b>2</b>	<b>8</b>	<b>3</b>	<b>3</b>	<b>25</b>	<b>0.2</b>
	<b>CV %</b>	<b>10</b>	<b>3</b>	<b>7</b>	<b>35</b>	<b>12</b>	<b>31</b>	<b>8.5</b>

**Appendix II.2b**  
**BG102/Naveen**  
**Salient feature of 50 F<sub>2</sub> selected plant based on LY**

Sl. No.	Plant no.	Traits						
		GYP plant (g)	DF	PH (cm)	PPP	PL (cm)	GPP	TW(g)
1	<b>167</b>	16	86	117	10	24	108	2.8
2	<b>175</b>	15	84	120	8	21	70	2.4
3	<b>135</b>	14	87	125	7	19	41	2.2
4	<b>173</b>	11	85	110	7	17	80	2.1
5	<b>130</b>	12	82	114	7	19	75	2.7
6	<b>168</b>	15	83	116	5	25	117	2.5
7	<b>191</b>	20	85	115	12	25	90	2.5
8	<b>151</b>	18	82	130	9	26	113	2.5
9	<b>131</b>	13	82	128	9	21	58	2.5
10	<b>164</b>	14	88	112	5	18	57	2.8
11	<b>188</b>	12	87	119	8	25	75	2.1
12	<b>139</b>	17	85	118	8	25	108	2.1
13	<b>157</b>	16	87	127	7	22	89	2.5
14	<b>141</b>	10	86	108	11	20	57	2.4
15	<b>662</b>	13	85	120	7	21	91	2.2
16	<b>177</b>	14	87	118	6	19	60	2.1
17	<b>480</b>	11	85	121	15	19	40	2.5
18	<b>500</b>	18	82	120	9	23	95	2.5
	<b>152</b>	13	83	119	4	26	111	2.4
20	<b>185</b>	17	83	125	9	25	105	2.3
21	<b>314</b>	16	85	128	12	22	54	2.3
22	<b>320</b>	17	85	115	8	28	113	1.9
23	<b>321</b>	17	83	123	9	23	64	2.2
24	<b>325</b>	12	83	119	15	23	98	2.2
25	<b>311</b>	13	82	123	7	21	45	2.4
26	<b>316</b>	16	84	109	5	23	75	2.5
27	<b>323</b>	15	84	126	6	21	45	2.5
28	<b>144</b>	12	85	83	4	28	135	2.3
29	<b>313</b>	11	82	110	6	22	86	2.6
30	<b>327</b>	20	83	128	9	25	108	2.1
31	<b>186</b>	11	82	115	7	21	84	2.4
32	<b>310</b>	15	85	114	9	21	72	2.0
33	<b>305</b>	15	82	122	10	22	84	2.5
34	<b>399</b>	16	85	120	16	27	84	2.8
35	<b>378</b>	13	81	109	4	18	70	2.8
36	<b>350</b>	15	85	112	8	27	130	2.5
37	<b>303</b>	14	87	113	13	25	80	2.0
38	<b>353</b>	12	82	120	7	18	65	2.8
39	<b>351</b>	11	85	123	11	20	61	2.6
40	<b>383</b>	13	84	128	5	23	77	2.2
41	<b>357</b>	11	82	138	7	19	32	2.5
42	<b>371</b>	12	87	113	7	22	101	2.1
43	<b>381</b>	11	87	104	6	21	75	2.2
44	<b>391</b>	15	82	117	7	19	45	2.6
45	<b>329</b>	11	82	122	6	23	106	2.1
46	<b>393</b>	20	86	124	10	21	80	2.7
47	<b>389</b>	11	85	113	13	21	94	2.6
48	<b>395</b>	15	81	116	5	22	75	2.5
49	<b>331</b>	13	82	125	8	22	103	2.3
50	<b>384</b>	19	84	116	13	26	110	2.4
MEAN		14	<b>84</b>	118	8	22	82	2.4
Range	Min	10	<b>81</b>	83	4	17	32	1.9
	Max.	20	<b>88</b>	138	16	28	135	2.8
	Variance	7	<b>4</b>	69	9	8	590	0.1
	SD	3	<b>2</b>	8	3	3	24	0.2
	CV %	19	<b>2</b>	7	35	13	30	9.8

**Appendix II.3b**  
**BG102/Naveen**  
**Salient feature of 50 F<sub>2</sub> selected plant based on MTL**

Sl. no.	Plant No.	Traits						
		GYP plant (g)	DF	PH (cm)	PPP	PL (cm)	GPP	TW(g)
1	<b>110</b>	24	82	110	13	21	103	2.6
2	<b>20</b>	20	82	110	10	25	77	2.2
3	<b>61</b>	18	61	108	12	22	80	2.5
4	<b>504</b>	18	81	110	14	22	84	2.6
5	<b>874</b>	17	87	110	15	25	130	2.4
6	<b>986</b>	16	85	106	11	22	76	2.3
7	<b>554</b>	16	84	108	7	20	79	2.3
8	<b>448</b>	16	82	110	6	22	95	2.5
9	<b>470</b>	15	82	103	12	26	110	2.7
10	<b>988</b>	15	82	110	7	22	88	2.1
11	<b>60</b>	15	82	109	8	20	87	2.4
12	<b>720</b>	14	82	110	9	22	80	2.2
13	<b>782</b>	14	84	108	7	23	103	2.4
14	<b>968</b>	14	85	100	13	21	80	2.4
15	<b>532</b>	14	83	107	10	23	98	2.4
16	<b>724</b>	13	82	106	8	23	91	2.5
17	<b>884</b>	13	82	108	8	21	71	2.4
18	<b>643</b>	13	82	108	12	22	80	2.1
19	<b>261</b>	12	87	109	7	20	77	2.2
20	<b>682</b>	12	84	97	6	23	96	2.3
21	<b>57</b>	12	90	109	8	24	80	2.5
22	<b>69</b>	12	86	109	7	21	80	2.4
23	<b>468</b>	12	86	100	12	24	121	2.6
24	<b>890</b>	12	85	109	8	24	106	2.2
25	<b>97</b>	11	82	109	6	25	106	2.3
26	<b>431</b>	11	82	106	7	21	78	2.1
27	<b>313</b>	11	82	110	6	22	86	2.6
28	<b>381</b>	11	87	104	6	21	75	2.2
29	<b>35</b>	11	84	110	7	22	83	2.5
30	<b>272</b>	11	83	108	9	22	78	2.6
31	<b>959</b>	10	85	110	6	21	105	2.6
32	<b>441</b>	10	82	103	8	25	102	2.3
33	<b>26</b>	10	82	99	8	22	75	2.7
34	<b>46</b>	10	83	100	7	25	96	2.2
35	<b>690</b>	9	85	99	7	22	88	2.5
36	<b>87</b>	9	89	108	8	22	81	2.2
37	<b>226</b>	9	82	110	16	24	120	2.0
38	<b>229</b>	9	82	107	10	25	91	2.4
39	<b>923</b>	9	82	110	10	24	75	2.7
40	<b>528</b>	8	84	110	7	24	87	2.5
41	<b>190</b>	8	82	110	9	21	80	2.5
42	<b>210</b>	8	86	96	7	25	102	2.4
43	<b>335</b>	8	83	100	7	24	99	2.4
44	<b>77</b>	7	85	101	14	24	76	2.6
45	<b>2</b>	7	85	107	12	21	77	2.4
46	<b>180</b>	7	82	102	11	24	78	2.2
47	<b>786</b>	7	82	100	9	25	104	2.2
48	<b>147</b>	6	81	74	6	24	95	2.7
49	<b>280</b>	6	87	108	8	22	88	2.3
<b>MEAN</b>		<b>12</b>	<b>83</b>	<b>106</b>	<b>9</b>	<b>23</b>	<b>91</b>	<b>2.4</b>
<b>Range</b>	<b>Min</b>	<b>6</b>	<b>61</b>	<b>74</b>	<b>6</b>	<b>20</b>	<b>71</b>	<b>2.0</b>
	<b>Max.</b>	<b>24</b>	<b>90</b>	<b>110</b>	<b>16</b>	<b>26</b>	<b>130</b>	<b>2.7</b>
	<b>Variance</b>	<b>14</b>	<b>15</b>	<b>38</b>	<b>7</b>	<b>2</b>	<b>185</b>	<b>0.0</b>
	<b>SD</b>	<b>4</b>	<b>4</b>	<b>6</b>	<b>3</b>	<b>2</b>	<b>14</b>	<b>0.2</b>
	<b>CV %</b>	<b>32</b>	<b>5</b>	<b>6</b>	<b>29</b>	<b>7</b>	<b>15</b>	<b>7.5</b>

**Appendix II.4b**  
**BG102/Naveen**  
**Salient feature of 50 F<sub>2</sub> selected plant based on RPS**

Plant no.	Plant no.	Traits						
		GYP plant (g)	DF	PH (cm)	PPP	PL (cm)	GPP	TW (g)
1	651	12.1	84	109	6	19	46	2.4
2	18	14	83	107	11	22.5	58	1.9
3	435	18	82	110	5	22	97	2.1
4	445	15.9	87	109	5	21	75	2.7
5	418	11.9	83	109	4	17.5	32	2.6
6	414	11.4	82	107	5	23	84	2.6
7	438	14	85	127	10	22.5	115	2.1
8	450	15.3	85	115	11	22	55	2.2
9	473	14.9	82	105	11	21	67	2.4
10	497	15.8	82	110	9	17	42	2.6
11	750	12.8	82	127	12	20	65	2.5
12	407	15.4	83	108	12	21	70	2.5
13	171	14.6	82	125	8	18	57	2.4
14	71	8.7	82	122	7	21	85	2.2
15	403	18.9	84	107	5	21.5	90	2.6
16	409	12.1	81	107	7	19	40	2.2
17	479	10.7	84	112	6	21.5	65	2.1
18	486	18	82	113	11	21	85	2.4
19	481	10	83	108	11	19	60	2.1
20	447	12	82	105	8	17.5	65	2.2
21	432	17.5	82	130	8	22	80	2.3
22	477	11.9	89	112	5	20	47	2.1
23	145	11.2	84	114	8	16.5	58	2.3
24	462	18.2	82	111	9	24.5	113	2.6
25	467	12.6	82	106	9	17.5	47	2.4
26	96	10	84	124	23	19.2	91	2.5
27	460	10.5	87	120	8	19.5	92	2.7
28	420	15.5	82	110	10	21	40	2.5
29	408	18.1	82	107	8	17	52	2.3
30	415	18.3	82	107	11	21	65	2.6
31	476	14.1	84	122	12	22	70	2.3
32	75	14.9	82	134	9	21.5	88	2.1
33	660	13.9	82	114	7	18.5	51	2.7
34	733	11	82	112	8	21.5	105	2.2
35	33	17.9	83	112	6	22	91	2.6
36	133	16.9	84	125	11	20	67	2.5
37	23	13.2	82	115	14	23	79	2.4
38	181	16.4	84	120	8	23	50	2.8
39	196	10.9	83	114	8	25	80	2.1
40	179	10.6	85	126	8	22	57	2.5
41	455	14	90	122	6	19.5	58	2.2
42	194	14.6	82	115	7	23	60	2.8
43	68	6.6	82	129	7	19.5	70	2.8
44	31	13.4	82	130	12	23	112	2.3
45	683	12.9	84	112	9	20.5	55	2.2
46	797	19.5	85	116	12	22.5	115	2.5
47	772	13.9	86	125	10	25.5	125	2.3
48	780	17	84	121	6	22	105	2.5
49	671	17.3	85	113	7	24	73	2.1
50	91	17.6	81	128	8	26	122	2.2
<b>MEAN</b>		<b>14.14</b>	<b>83.36</b>	<b>115.76</b>	<b>8.76</b>	<b>20.98</b>	<b>73.42</b>	<b>2.38</b>
<b>Range</b>	<b>Min</b>	<b>6.6</b>	<b>81</b>	<b>105</b>	<b>4</b>	<b>16.5</b>	<b>32</b>	<b>1.9</b>
	<b>Max.</b>	<b>19.5</b>	<b>90</b>	<b>134</b>	<b>23</b>	<b>25.5</b>	<b>125</b>	<b>2.8</b>
	<b>Variance</b>	<b>8.65</b>	<b>3.55</b>	<b>61.96</b>	<b>9.77</b>	<b>4.51</b>	<b>508.45</b>	<b>0.05</b>
	<b>SD</b>	<b>2.94</b>	<b>1.88</b>	<b>7.87</b>	<b>3.13</b>	<b>2.12</b>	<b>22.55</b>	<b>0.22</b>
	<b>CV %</b>	<b>20.81</b>	<b>2.26</b>	<b>6.8</b>	<b>35.67</b>	<b>10.12</b>	<b>30.71</b>	<b>9.31</b>

**Appendix II.1c**  
**BG102/Reshmi (Commercial Pvt. hybrid victory seeds)**  
**Salient feature of 50 F<sub>2</sub> selected plant based on HY**

Sl. No.	Plant No.	Traits						
		GYP plant (g)	DF	PH (cm)	PPP	PL (cm)	GPP	TW (g)
1	364	23	92	101	6	22	98	2.4
2	253	22	96	129	10	24	110	3.2
3	378	21	82	119	11	25	117	3.1
4	238	18	95	115	7	26	126	2.7
5	884	18	87	128	15	22	96	2.8
6	242	17	87	113	10	21	88	2.4
7	94	18	89	138	10	23	102	2.8
8	506	21	84	100	5	17	58	3.1
9	960	18	89	120	8	17	40	2.8
10	262	18	93	121	10	24	41	2.1
11	400	21	89	117	10	23	125	2.8
12	981	20	86	103	15	27	102	2.5
13	737	17	97	126	7	21	96	2.2
14	783	18	89	121	12	21	98	3.1
15	313	24	83	125	13	24	135	2.4
16	379	32	82	113	14	21	66	2.4
17	200	17	91	105	7	23	120	2.4
18	391	21	85	123	8	23	105	2.6
19	168	24	85	123	14	21	116	2.5
20	27	23	96	123	4	22	115	2.6
21	530	17	85	121	7	28	140	2.5
22	638	18	90	119	5	20	80	2.6
23	26	24	83	127	9	20	81	2.8
24	68	21	97	130	9	25	120	2.5
25	359	22	96	106	10	23	92	2.2
26	500	22	82	132	9	25	112	3.0
27	464	20	86	140	10	27	140	2.4
28	635	18	97	121	5	25	110	2.4
29	458	31	84	129	9	28	130	2.6
30	672	17	91	120	6	18	54	2.6
31	648	20	84	119	11	14	80	2.5
32	462	19	97	121	6	19	61	2.5
33	382	21	95	114	7	24	96	2.4
34	81	17	98	119	10	23	97	2.8
35	125	17	86	121	11	16	44	2.9
36	280	17	97	115	8	26	105	2.6
37	651	17	98	121	7	22	101	2.8
38	171	18	88	116	13	22	98	2.9
39	414	18	95	107	6	20	92	2.5
40	434	17	83	125	7	23	130	2.5
41	388	22	83	120	5	20	56	2.4
42	149	17	95	130	9	21	100	2.9
43	454	24	83	107	8	26	123	2.7
44	279	23	85	117	11	23	105	2.7
45	703	12	84	108	6	21	97	2.3
46	99	20	91	110	6	21	98	2.5
47	277	17	85	112	13	18	78	2.5
48	637	18	95	128	14	19	39	2.7
49	384	20	97	107	9	21	86	2.7
50	121	18	92	131	8	24	81	2.7
	Mean	20	89.58	119	9	22	96	2.6
Range	Min	12	82	100	4	14	39	2.1
	Max.	32	98	140	15	28	140	3.2
	Variance	11	28.92	82	8	9	681	0.1
	SD	3	5.38	9	3	3	26	0.2
	CV %	17	6	8	32	14	27	9.3

**Appendix II.2c**  
**BG102/Reshmi (Commercial Pvt. hybrid victory seeds)**  
**Salient feature of 50 F<sub>2</sub> selected plant based on LY**

Sl. No.	Plant No.	Traits						
		GYP plant (g)	DF	PH (cm)	PPP	PL (cm)	GPP	TW (g)
1	451	8	90	124	5	19	98	2.5
2	704	13	97	128	8	23	109	2.4
3	536	12	86	112	7	24	105	2.5
4	409	12	91	114	8	21	70	2.3
5	438	13	85	119	8	21	101	2.5
6	446	8	85	102	9	15	80	2.5
7	837	14	89	121	8	21	95	2.5
8	877	6	86	111	6	21	74	2.3
9	698	11	86	100	8	22	98	2.3
10	505	13	83	119	13	17	43	2.2
11	686	10	89	129	7	18	72	2.5
12	520	12	89	118	9	24	116	2.6
13	701	12	83	115	6	19	74	2.5
14	820	12	93	107	7	21	88	2.5
15	786	12	98	118	9	22	99	2.3
16	684	13	91	122	9	23	111	2.3
17	580	14	94	96	8	18	70	2.5
18	825	13	86	125	3	20	78	2.5
19	889	12	97	121	5	27	130	2.5
20	810	12	86	119	5	24	88	2.5
21	663	11	86	124	9	22	90	2.5
22	430	10	95	109	5	19	105	2.7
23	735	15	83	114	14	20	59	2.5
24	416	14	94	139	7	25	101	2.8
25	499	10	89	110	4	24	122	2.1
26	717	10	94	126	8	16	49	2.5
27	745	13	89	115	6	21	70	2.1
28	54	14	84	88	10	23	115	2.0
29	755	10	92	96	6	20	72	2.8
30	707	13	91	113	14	17	45	2.6
31	563	11	91	120	7	18	40	2.7
32	461	7	83	110	7	25	111	2.5
33	586	11	89	108	7	22	70	2.0
34	546	12	84	90	4	18	58	2.6
35	584	13	85	100	3	19	80	2.7
36	372	10	97	110	8	22	82	2.4
37	575	14	91	116	11	20	48	2.8
38	547	14	85	114	9	19	88	2.5
39	516	13	85	120	11	19	49	2.3
40	435	14	85	126	10	23	112	2.1
41	408	12	92	130	8	25	112	2.5
42	237	12	95	120	8	23	77	3.1
43	496	15	85	128	5	23	98	2.3
44	439	9	91	119	4	20	77	2.6
45	306	10	83	119	9	20	57	2.5
46	418	9	86	115	8	24	116	2.5
47	524	11	87	130	7	25	140	2.5
48	366	10	84	113	5	23	99	3.0
49	377	11	83	112	6	20	70	2.7
50	335	10	85	100	6	21	80	2.1
	Mean	11.7	88.5	115.1	7.5	21.0	85.8	2.5
<b>Range</b>	<b>Min</b>	<b>6.1</b>	<b>83.0</b>	<b>88.0</b>	<b>3.0</b>	<b>15.0</b>	<b>40.0</b>	<b>2.0</b>
	<b>Max.</b>	<b>15.1</b>	<b>98.0</b>	<b>139.0</b>	<b>14.0</b>	<b>27.0</b>	<b>140.0</b>	<b>3.1</b>
	<b>Variance</b>	<b>3.8</b>	<b>19.1</b>	<b>111.0</b>	<b>6.0</b>	<b>6.6</b>	<b>569.2</b>	<b>0.1</b>
	<b>SD</b>	<b>2.0</b>	<b>4.4</b>	<b>10.5</b>	<b>2.5</b>	<b>2.6</b>	<b>23.9</b>	<b>0.2</b>
	<b>CV %</b>	<b>16.8</b>	<b>4.9</b>	<b>9.2</b>	<b>32.8</b>	<b>12.3</b>	<b>27.8</b>	<b>9.2</b>

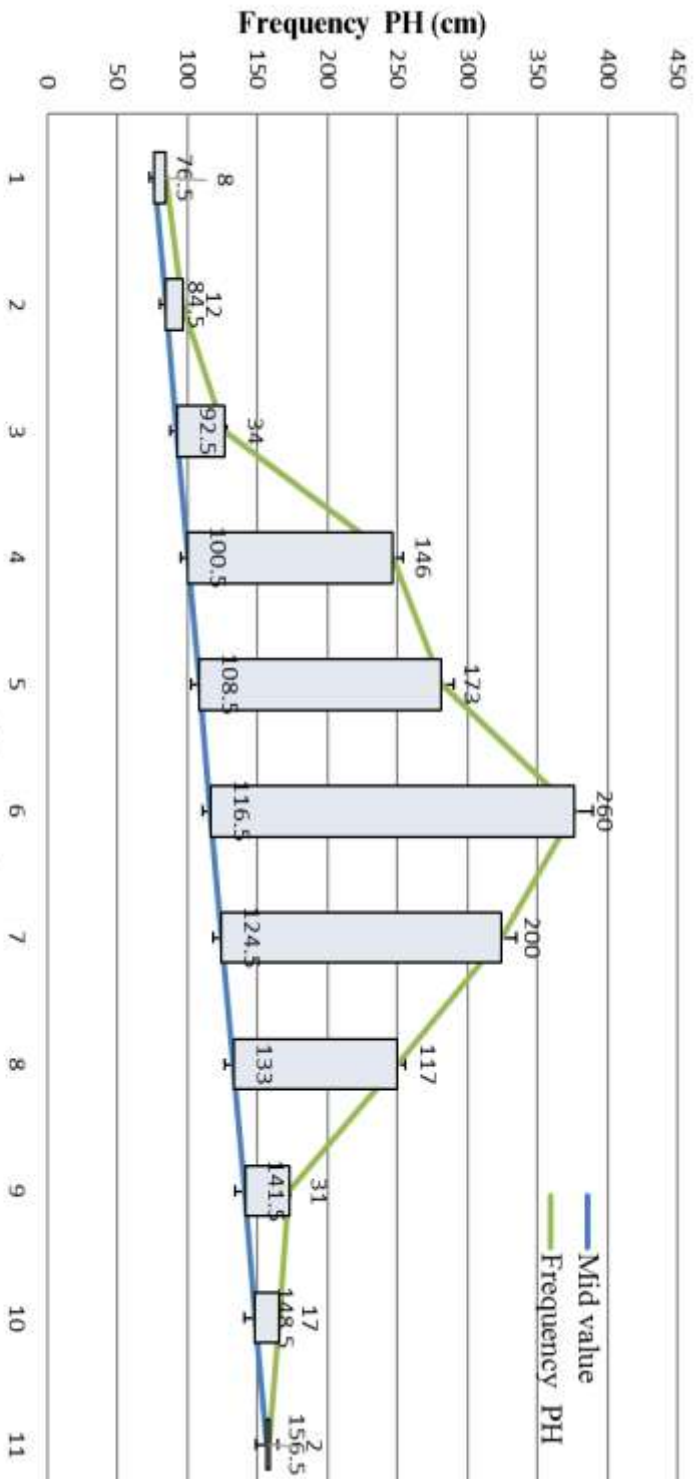
**Appendix II.3c**  
**BG102/Reshmi (Commercial Pvt. hybrid victory seeds)**  
**Salient feature of 50 F<sub>2</sub> selected plant based on MTL**  
**Plant no. 454, 364, 359, 384, 981, 414, 200 and 703 having high high yield in Rashmi**

Sl. No.	Plant No.	Traits						
		GYP plant (g)	DF	PH (cm)	PPP	PL (cm)	GPP	TW (g)
1	944	4	95	100	7	20	104	2.5
2	859	5	84	104	8	22	104	2.8
3	477	5	85	105	6	20	82	2.5
4	747	8	93	93	6	22	99	2.8
5	79	10	86	95	6	20	96	2.5
6	880	11	83	104	7	23	103	2.3
7	287	12	89	100	6	20	88	2.3
8	54	14	84	88	10	23	115	2.0
9	698	11	86	100	8	22	98	2.3
10	194	10	88	100	6	23	120	2.6
11	962	13	89	107	6	23	83	2.6
12	176	15	84	100	7	25	120	2.8
13	307	16	97	99	9	24	105	2.8
14	470	9	86	109	6	19	96	2.6
15	456	14	82	100	8	23	130	2.5
16	485	7	85	107	8	24	102	2.2
17	429	7	90	103	10	21	98	2.5
18	455	12	87	104	6	25	120	2.7
19	401	12	96	100	9	20	117	2.2
20	315	8	84	101	9	24	96	2.2
21	203	16	87	100	6	20	101	2.9
22	223	7	85	100	10	20	96	2.6
23	160	12	85	93	14	26	117	3.0
24	172	9	91	105	6	24	115	2.1
25	991	9	95	107	10	21	106	2.6
26	917	13	97	88	6	20	88	2.4
27	916	14	94	107	7	20	95	2.3
28	281	10	89	108	17	21	111	2.5
29	777	6	85	103	7	22	89	2.2
30	711	17	100	102	6	21	86	2.6
31	766	12	91	102	10	22	103	2.9
32	286	12	86	98	9	30	126	2.9
33	222	8	95	108	7	24	118	2.7
34	37	7	97	109	7	23	103	2.3
35	91	3	84	108	8	20	95	2.7
36	4	13	96	106	14	23	98	2.8
37	8	16	85	108	7	23	121	2.7
38	753	11	82	104	7	21	95	2.2
39	709	10	88	104	6	23	104	2.5
40	53	10	84	105	6	24	120	2.7
41	5	9	89	100	9	22	95	2.4
42	869	16	85	86	9	19	98	2.4
	<b>Mean</b>	<b>11</b>	<b>89</b>	<b>102</b>	<b>8</b>	<b>22</b>	<b>104</b>	<b>2.5</b>
<b>Range</b>	<b>Min.</b>	<b>3</b>	<b>82</b>	<b>86</b>	<b>6</b>	<b>19</b>	<b>82</b>	<b>2.0</b>
	<b>Max.</b>	<b>17</b>	<b>100</b>	<b>109</b>	<b>17</b>	<b>30</b>	<b>130</b>	<b>3.0</b>
	<b>Variance</b>	<b>13</b>	<b>24</b>	<b>32</b>	<b>6</b>	<b>4</b>	<b>144</b>	<b>0.1</b>
	<b>SD</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>2</b>	<b>2</b>	<b>12</b>	<b>0.2</b>
	<b>CV %</b>	<b>34</b>	<b>6</b>	<b>6</b>	<b>30</b>	<b>9</b>	<b>12</b>	<b>9.7</b>

**Appendix II.4c**  
**BG102/Reshmi (Commercial Pvt. hybrid victory seeds)**  
**Salient feature of 50 F<sub>2</sub> selected plant based on RPS**

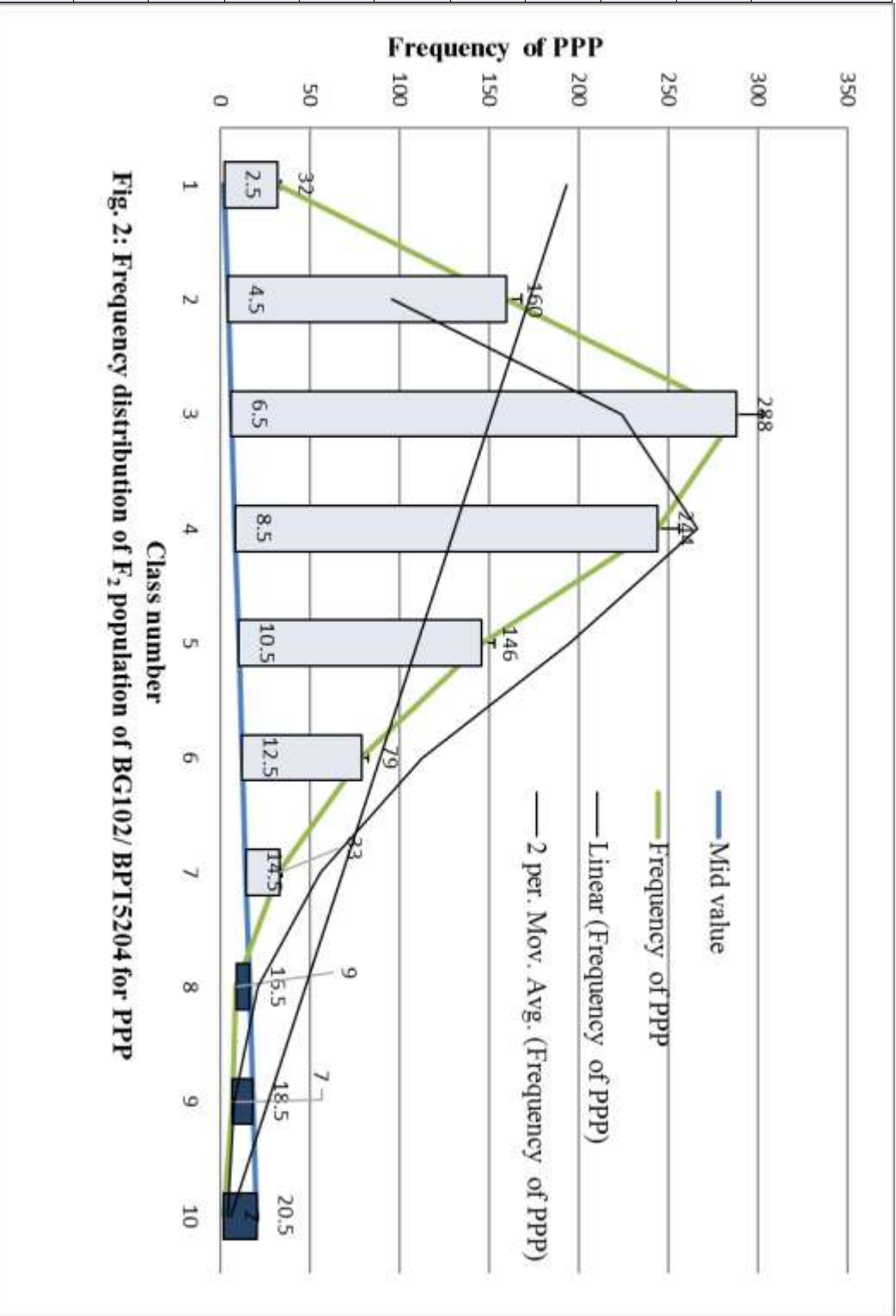
Sl. No.	Plant No.	Traits						
		GYP plant (g)	DFP	PH (cm)	PPP	PL (cm)	GPP	TW (g)
1	392	6	89	113	8	22	120	2.3
2	232	10	82	122	11	21	87	2.4
3	191	11	94	117	6	24	120	2.9
4	166	13	86	128	6	25	86	2.6
5	86	3	84	121	9	28	92	3.1
6	103	15	86	127	7	27	147	2.5
7	197	12	84	125	5	24	77	2.6
8	82	13	86	117	7	21	86	3.1
9	31	8	86	127	4	27	135	2.5
10	78	10	83	112	4	22	98	3.1
11	85	11	88	120	3	24	100	2.8
12	64	12	95	145	11	27	110	2.6
13	182	10	89	107	9	23	74	2.8
14	132	15	82	109	11	19	40	2.5
15	130	2	95	106	11	21	79	2.7
16	107	15	92	125	9	23	73	2.6
17	118	14	84	100	8	18	135	2.6
18	188	11	97	135	9	23	115	2.7
19	192	16	93	132	10	27	150	2.5
20	706	7	96	129	13	24	95	2.8
21	184	14	83	106	4	23	97	2.8
22	158	13	91	117	12	23	95	2.6
23	198	11	93	114	8	23	125	2.6
24	162	2	96	118	4	23	101	2.4
25	92	14	88	126	7	27	98	2.7
26	93	12	97	90	5	20	74	2.9
27	81	17	98	119	10	23	97	2.8
28	2	8	90	120	12	20	110	2.5
29	7	11	94	124	5	23	121	2.5
30	159	17	86	118	16	20	73	2.5
31	116	12	92	122	13	17	77	1.8
32	153	14	96	100	7	20	60	2.6
33	112	12	91	127	6	26	118	2.8
34	135	15	88	123	10	25	82	2.7
35	154	16	87	120	7	26	114	2.6
36	484	14	94	124	5	22	115	2.3
37	363	9	84	117	5	23	95	2.4
38	405	12	97	120	7	20	115	2.9
39	483	16	97	110	8	22	120	2.7
40	331	9	93	105	7	20	63	2.3
41	497	11	83	115	4	23	109	2.8
42	383	13	87	121	5	21	77	2.2
43	371	11	82	122	7	21	98	2.8
44	385	11	87	115	7	21	90	2.4
45	490	10	86	129	8	22	109	2.4
46	169	2	93	184	3	21	60	2.5
47	498	13	98	120	7	28	126	2.7
48	50	16	94	112	6	22	119	3.1
49	399	6	92	114	7	20	120	2.5
50	230	13	97	117	5	23	90	2.6
	<b>Mean</b>	<b>11</b>	<b>90</b>	<b>120</b>	<b>8</b>	<b>23</b>	<b>99</b>	<b>2.6</b>
<b>Range</b>	<b>Min</b>	<b>2</b>	<b>82</b>	<b>90</b>	<b>3</b>	<b>17</b>	<b>40</b>	<b>1.8</b>
	<b>Max.</b>	<b>17</b>	<b>98</b>	<b>145</b>	<b>16</b>	<b>28</b>	<b>150</b>	<b>3.1</b>
	<b>Variance</b>	<b>13.1</b>	<b>25</b>	<b>101.0</b>	<b>8.9</b>	<b>6.9</b>	<b>5.5</b>	<b>0.1</b>
	<b>SD</b>	<b>3.6</b>	<b>5</b>	<b>10.1</b>	<b>3.0</b>	<b>2.6</b>	<b>23.6</b>	<b>0.3</b>
	<b>CV %</b>	<b>32.0</b>	<b>6</b>	<b>8.4</b>	<b>39.5</b>	<b>11.5</b>	<b>23.7</b>	<b>9.5</b>

Mid value (class size)	Frequency PH (cm)
76.5 (73-80)	8
84.5 (81-88)	12
92.5 (89-96)	34
100.5 (97-104)	146
108.5 (105-112)	173
116.5 (113-120)	260
124.5 (121-128)	200
133 (129-137)	117
141.5 (138-145)	31
148.5 (146-152)	17
156.5 (153-160)	2
n	1000



**Fig. 1: Frequency distribution of  $F_2$  population of BG102/ BPT5204 for PH (cm)**

Mid value (class size)	Frequency of PPP
2.5 (2-3)	32
4.5 (4-5)	160
6.5 (6-7)	288
8.5 (8-9)	244
10.5 (10-11)	146
12.5 (12-13)	79
14.5 (14-15)	33
16.5 (16-17)	9
18.5 (18-19)	7
20.5 (20-21)	2
n	1000



**Fig. 2: Frequency distribution of  $F_2$  population of BG102/ BPT5204 for PPP**

Mid value (class size)	Frequency of GPP
19.5 (12-27)	12
35 (28-42)	54
50 (43-57)	189
65 (58-72)	196
80 (73-87) 95 (88-102)	228 118
110 (103-117)	112
125 (118-132)	53
145 (133-157)	31
165 (158-172)	6
145 (173-187)	1
n	1000

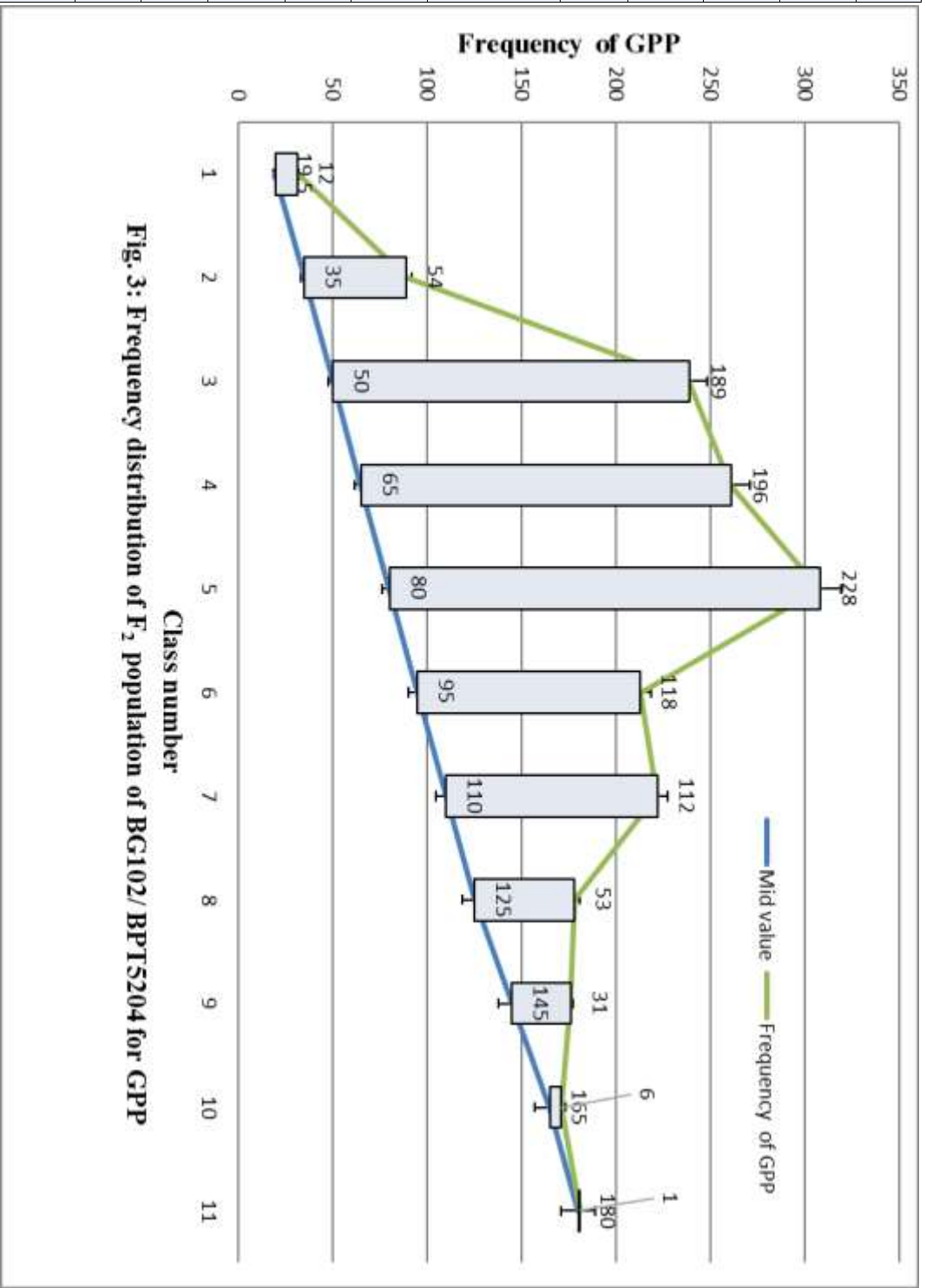
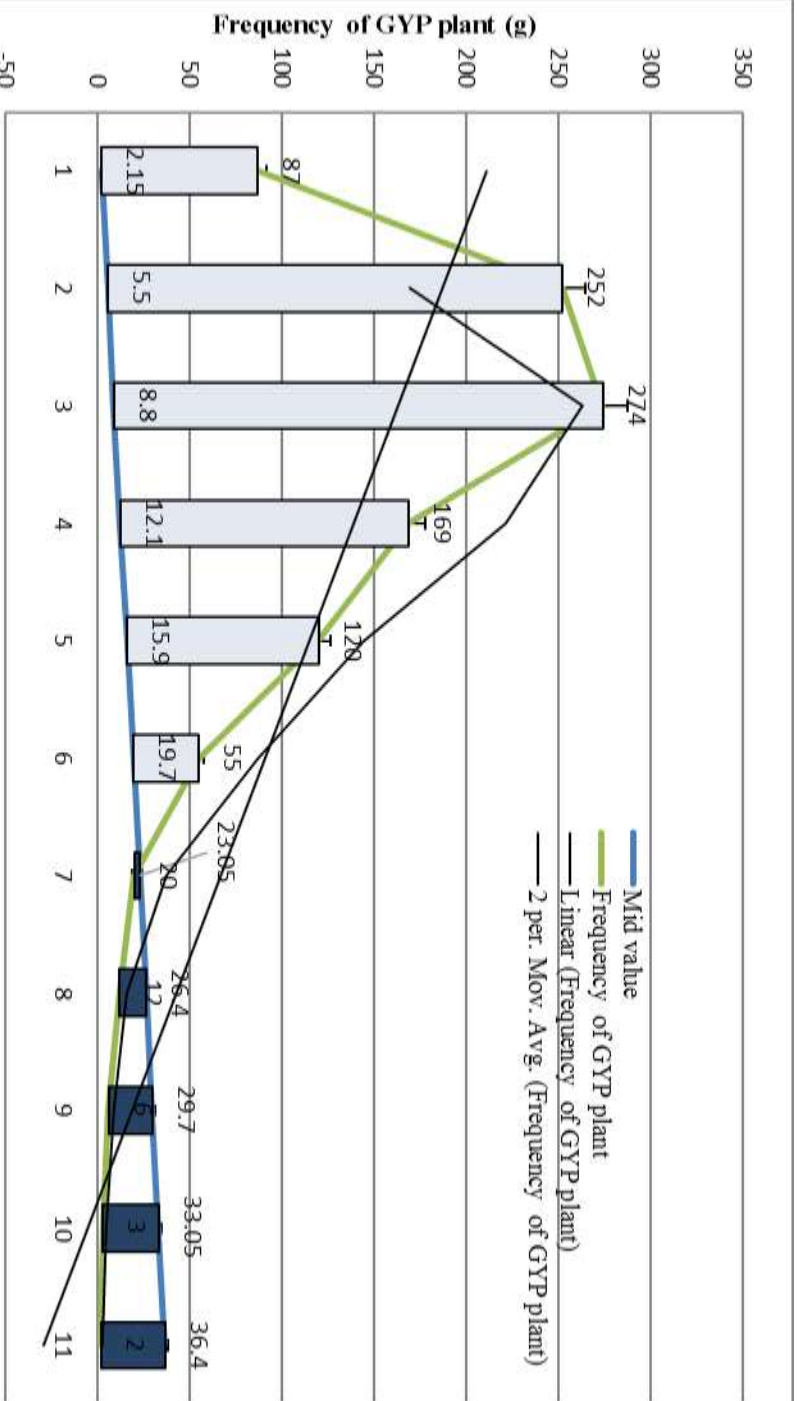


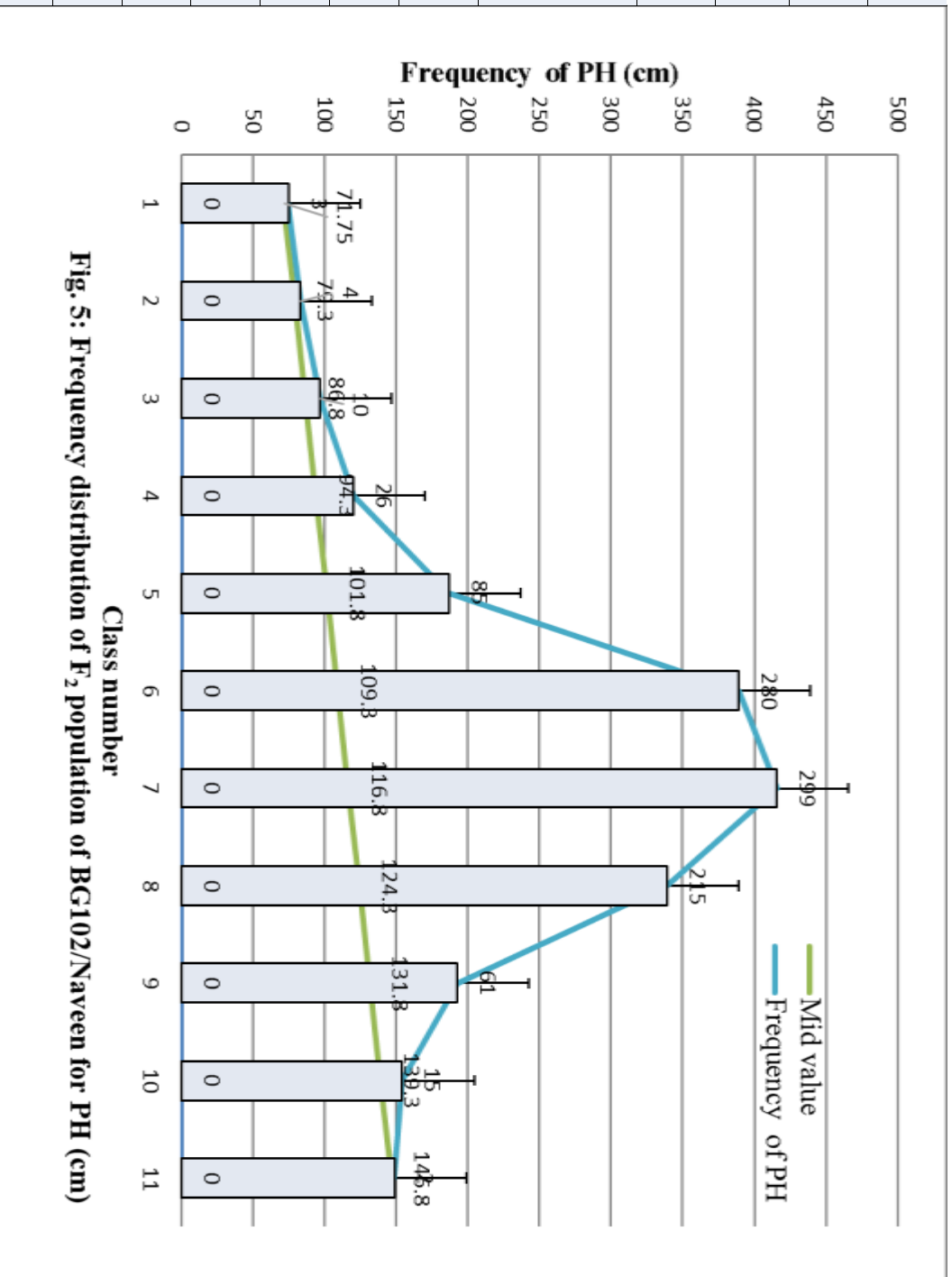
Fig. 3: Frequency distribution of  $F_2$  population of BG102/ BPT5204 for GPP

Mid value (class size)	Frequency of GYP plant (g)
2.15 (0.5-3.8)	87
5.5 (3.9-7.1)	252
8.8 (7.2-10.4)	274
12.1 (10.5-13.7)	169
15.9 (13.8-18)	120
19.7 (18.1-21.3)	55
23.05 (21.4-24.7)	20
26.4 (24.8-28)	12
29.7 (28.1-31.3)	6
33.05 (31.4-34.7)	3
37.11 (34.8-38)	2
n	1000



**Fig. 4: Frequency distribution of  $F_2$  population of BG102/ BPT5204 for GYP plant (g)**

Mid value (class size)	Frequency of PH (cm)
71.75 (68-75.5)	3
79.3 (75.6-83)	4
86.8 (83.1-90.5)	10
94.3 (90.6-98)	26
101.8 (98.1-105.5)	85
109.3 (105.6-113)	280
116.8 (113.1-120.5)	299
124.3 (120.6-128)	215
131.8 (128.1-135.5)	61
139.3 (143.1-150.5)	15
138.9 (143.1-150.5)	2
n	1000



**Fig. 5: Frequency distribution of F<sub>2</sub> population of BG102/Naveen for PH (cm)**

Mid value (class size)	Frequency of PPP
1.5 (1-2)	5
3.5 (3-4)	107
5.5 (5-6)	297
7.5 (7-8)	271
9.5 (9-10)	158
11.5 (11-12)	91
13.5 (13-14)	47
15.5 (15-16)	20
17.5 (17-18)	3
19.5 (19-20)	1
n	1000

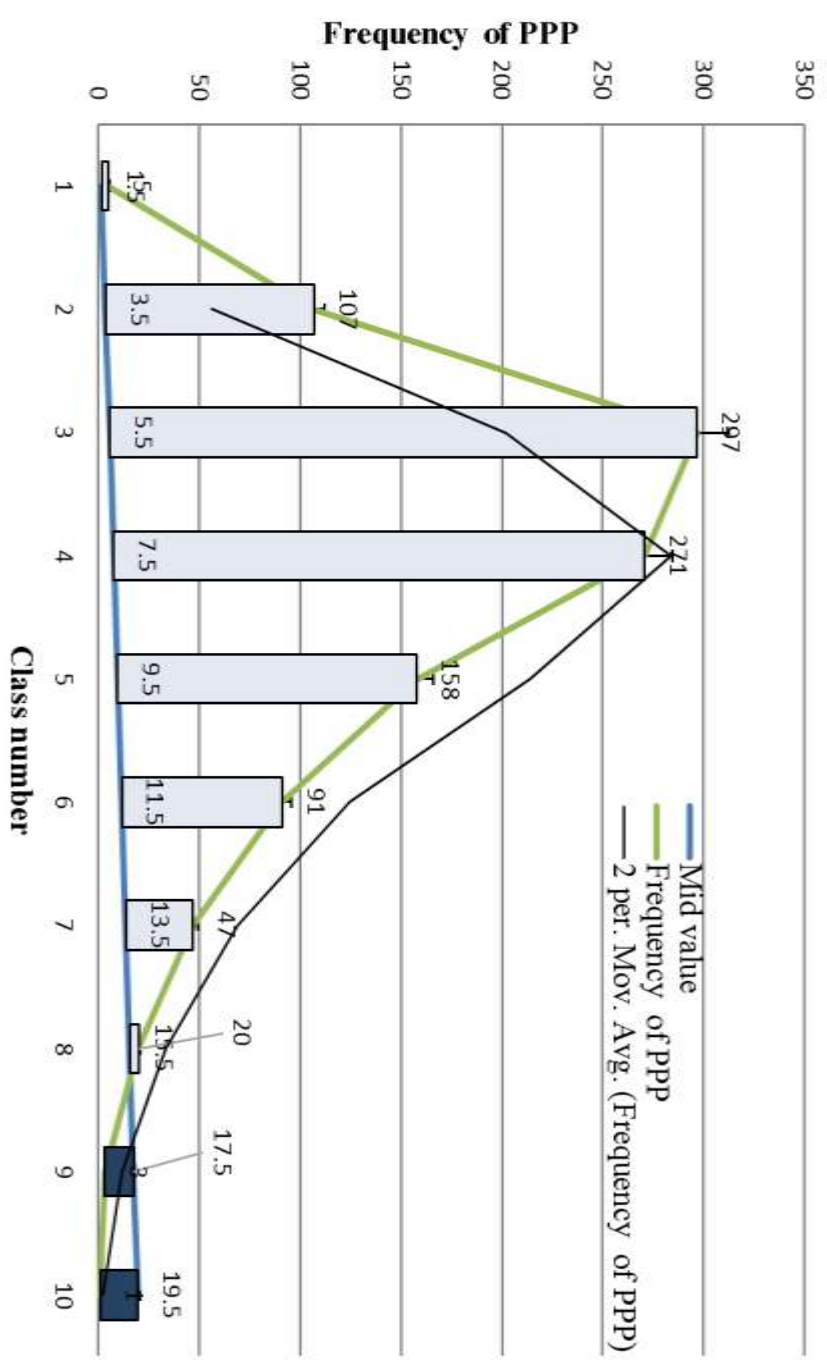


Fig. 6: Frequency distribution of  $F_2$  population of BG102/Naveen for PPP

Mid value (class size)	Frequency of GPP
17.75 (12-23.5)	10
29.8 (23.6-36)	60
42.75 (37-48.5)	144
54.8 (48.6-61)	219
67.75 (62-73.5)	160
79.8 (73.6-86)	162
92.75 (87-98.5)	97
104.8 (98.6-111)	77
117.75 (112.49)	49
129.8 (123.6-136)	16
143.5 (137-148)	3
n	1000

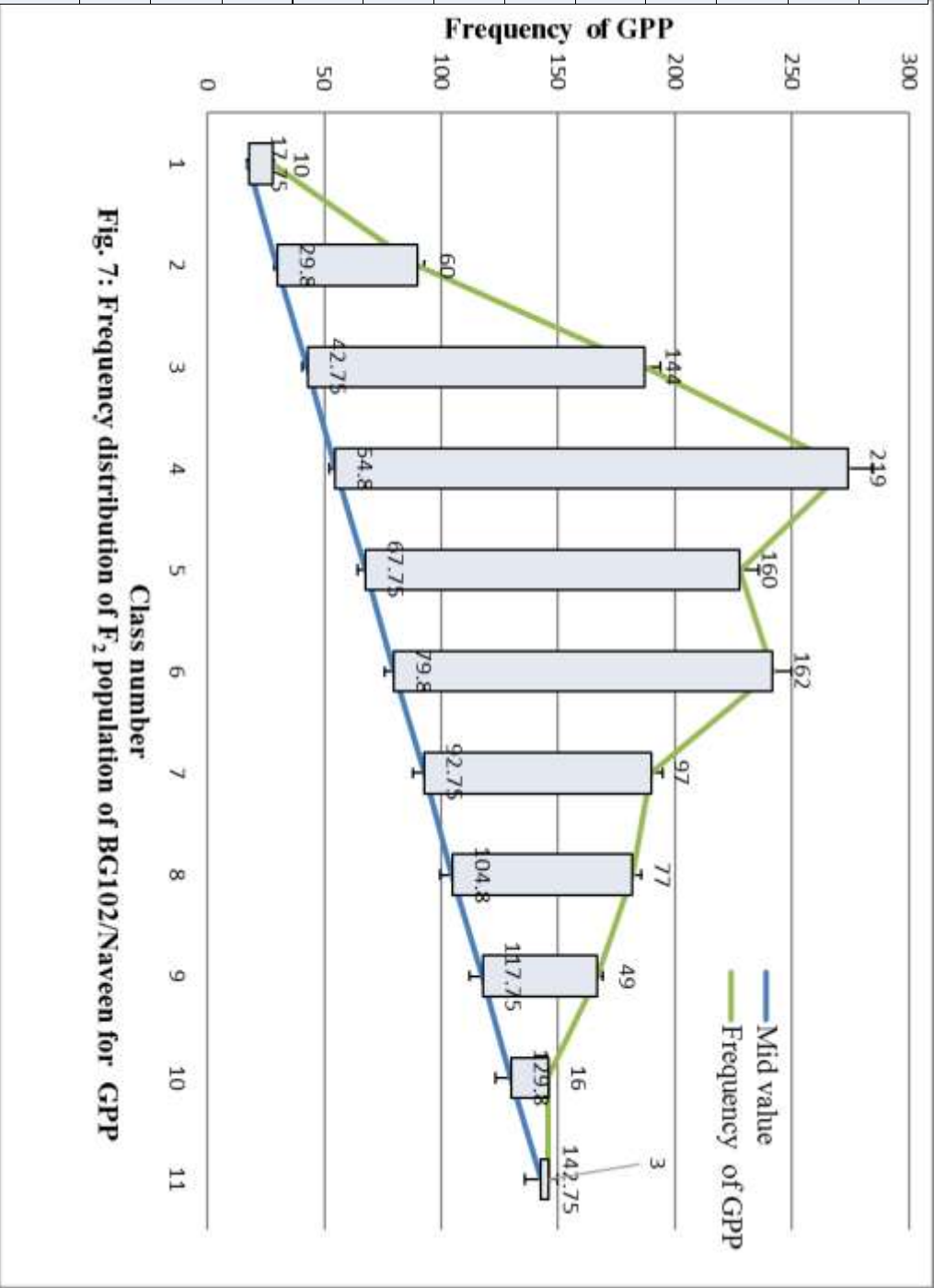


Fig. 7: Frequency distribution of F<sub>2</sub> population of BG102/Navreen for GPP

Mid value (class size)	Frequency of GYP plant (g)
1.7 (0.2-3.2)	83
4.75 (3.3-6.2)	167
7.75 (6.3-9.2)	252
10.75 (9.3-12.2)	208
13.75 (12.3-15.2)	133
16.75 (15.3-18.2)	73
19.75 (18.3-21.2)	45
22.75 (21.3-24.2)	26
25.75 (24.3-27.2)	11
28.75 (27.3-30.2)	1
33.8 (30.3-34.2)	1
n	1000

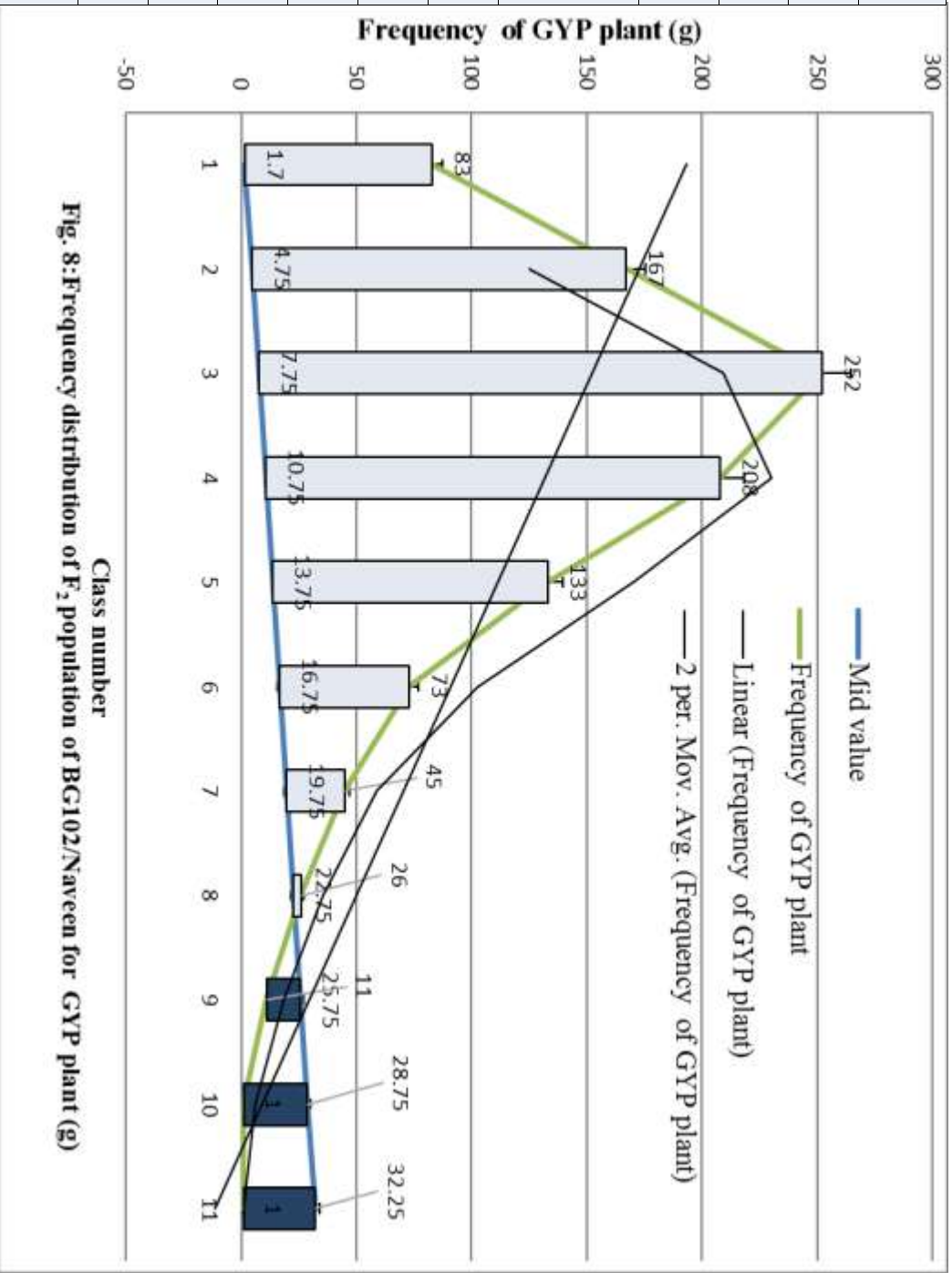
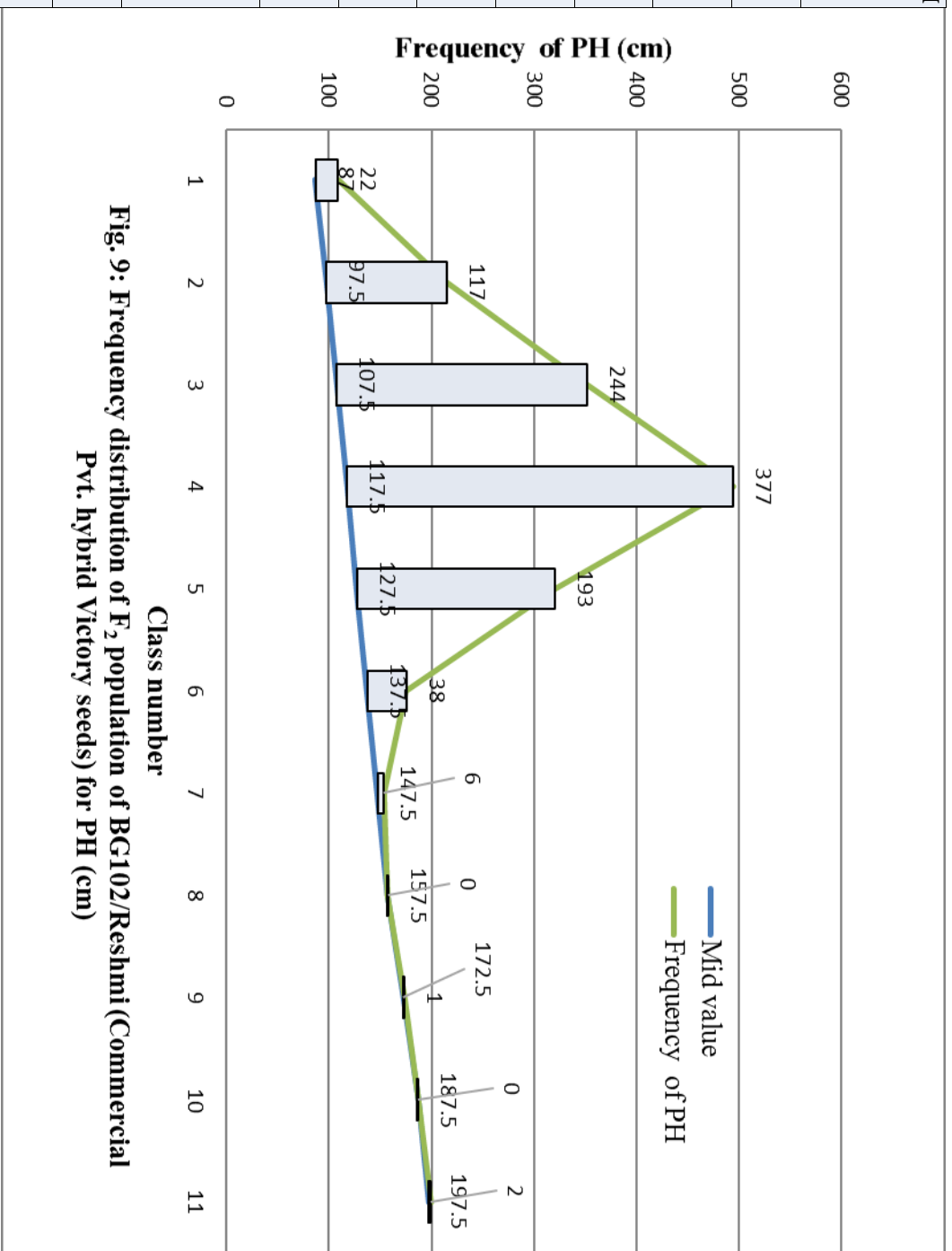


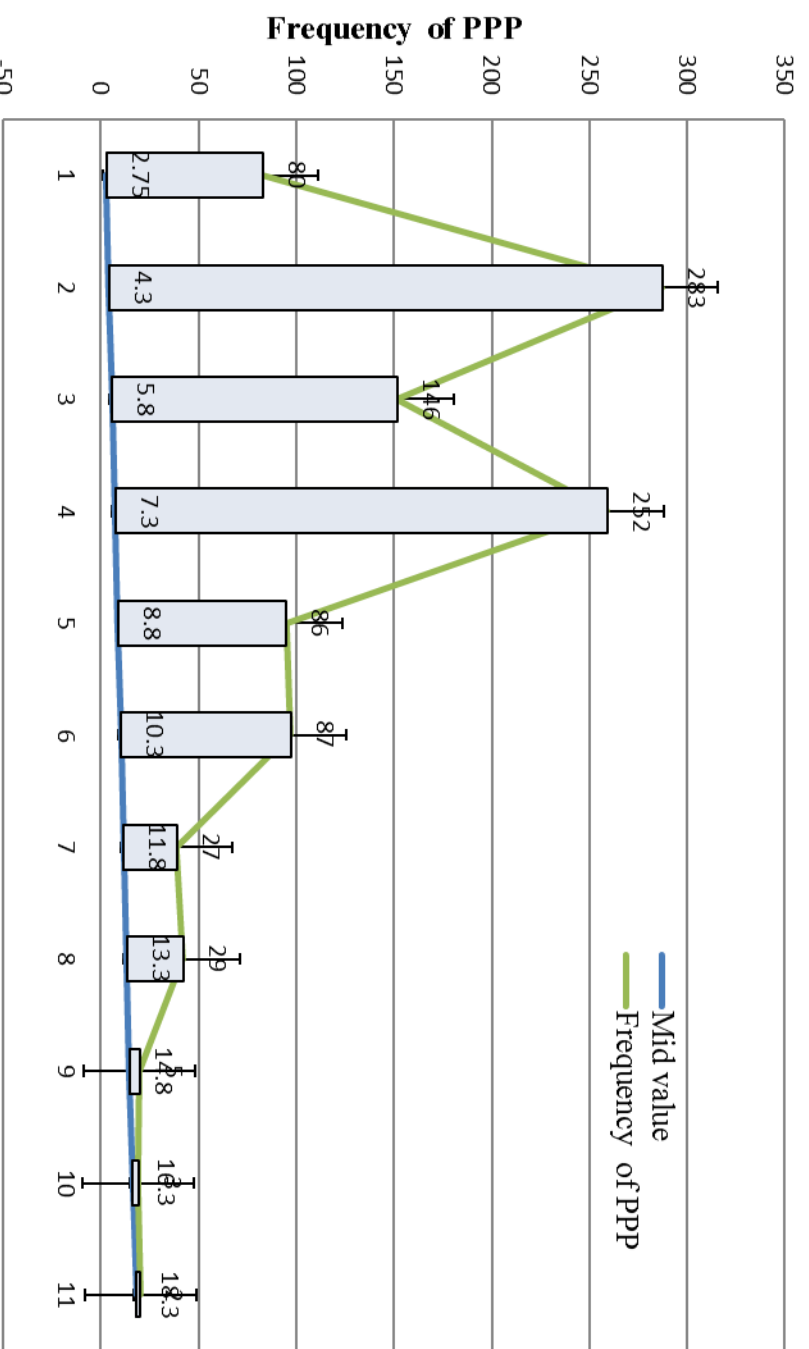
Fig. 8: Frequency distribution of  $F_2$  population of BG102/Naveen for GYP plant (g)

Mid value (class size)	Frequency of PH (cm)
87 (82-92)	22
97.5 (93-102)	117
107.5 (103-112)	244
117.5 (113-122)	377
127.5 (123-132)	193
137.5 (133-142)	38
147.5 (143-152)	6
157.5 (153-162)	0
172.5 (163-182)	1
187.5 (183-192)	0
190.2 (193-202)	2
n	1000



**Fig. 9: Frequency distribution of  $F_2$  population of BG102/Reshmi (Commercial Pvt. hybrid Victory seeds) for PH (cm)**

Mid value (class size)	Frequency of PPP
2.75 (2-3.50)	80
4.3 (3.6-5.0)	283
5.8 (5.10-6.50)	146
7.3 (6.60-8.00)	252
8.8 (8.10-9.50)	86
10.3 (9.60-11.00)	87
11.8 (11.10-12.5)	27
13.3 (12.60-14.0)	29
14.8 (14.10-15.5)	5
16.3 (15.6-17.00)	3
18.5 (15.6-19.5)2	
n	1000



**Fig. 10: Frequency distribution of F<sub>2</sub> population of BG102/Reshmi (Commercial Pvt. hybrid victory seeds) for PPP**

Mid value (class size)	Frequency of GPP
22 (16-28)	14
34.05 (28.1-40)	75
46.05 (40.1-52)	101
58.05 (52.1-64)	120
70.05 (64.1-76)	142
82.05 (76.1-88)	134
<b>94.05</b> (88.1-100)	<b>148</b>
<b>106.05</b> (100-112)	<b>145</b>
118.05 (112-124)	82
130.05 (124.1-136)	31
150.3 (136-150)	4
n	1000

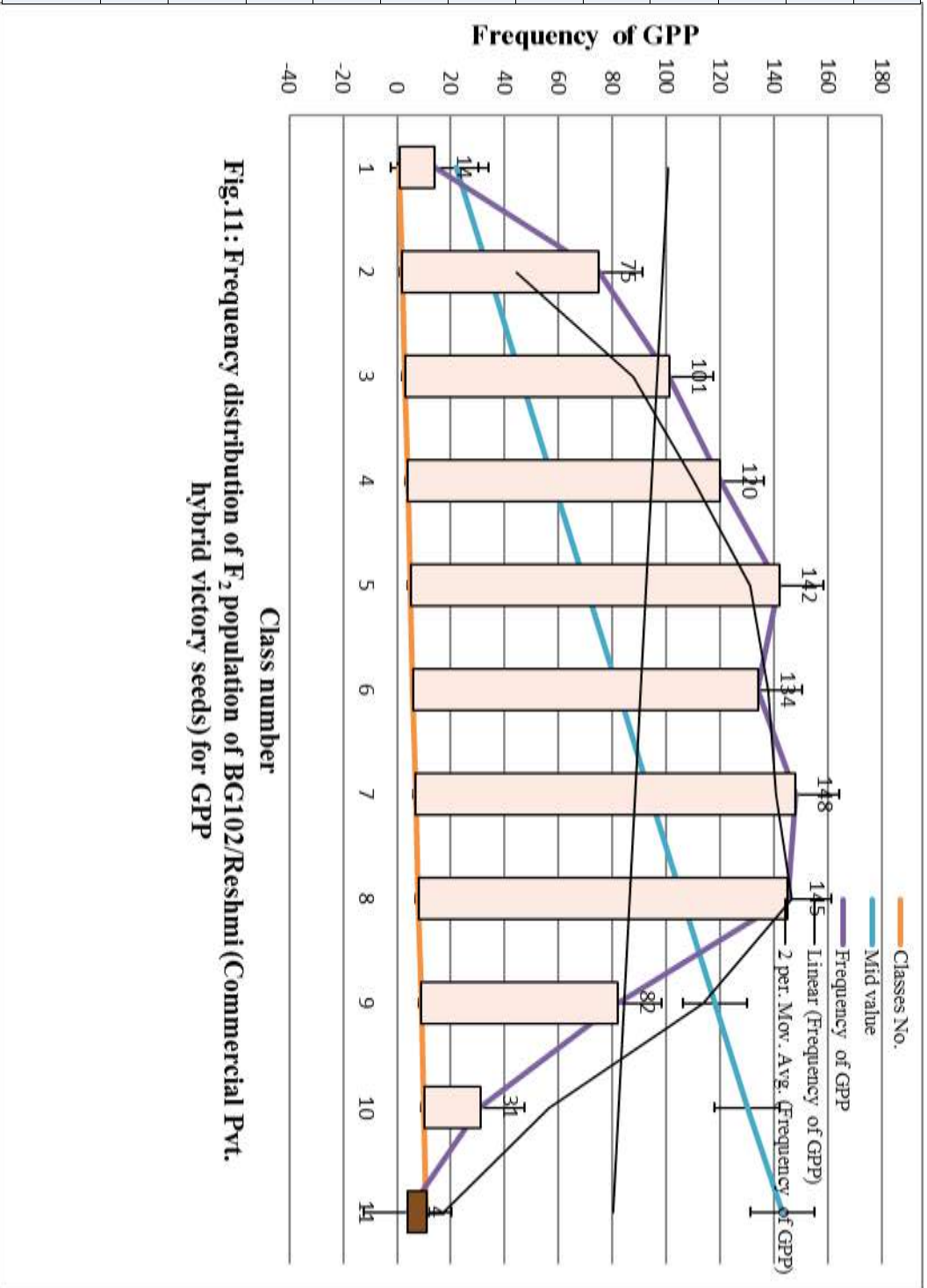
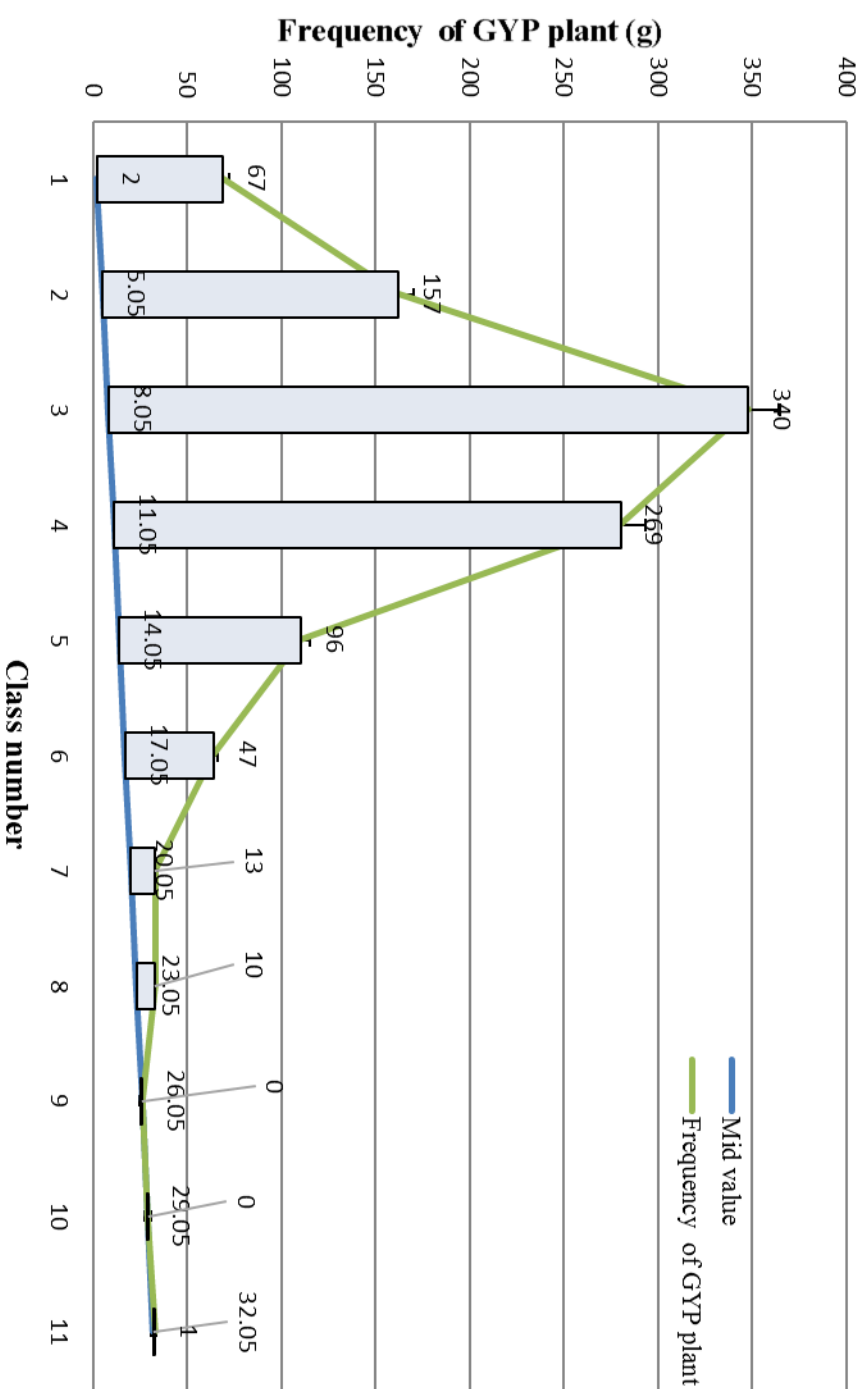


Fig.11: Frequency distribution of  $F_2$  population of BG102/Reshmi (Commercial Pvt. hybrid victory seeds) for GPP

Mid value (class size)	Frequency of GYP plant (g)
2 (0.5-3.5)	67
5.05 (3.6-6.5)	157
8.05 (6.6-9.5)	340
11.05 (9.6-12.5)	269
14.05 (12.6-15.5)	96
17.05 (15.6-18.5)	47
20.05 (18.6-21.5)	13
23.05 (21.6-24.5)	10
26.05 (24.6-27.5)	0
29.05 (27.6-30.5)	0
32.05 (30.6-33.5)	1
n	1000



**Fig. 12:** Frequency distribution of  $F_2$  population of BG102/Reshmi (Commercial Pvt. hybrid victory seeds) for GYP plant (g)

Table-6: Summary of genetical parameters of different Traits

Cross/ characters	Genetic parameters	1 <sup>st</sup> method of selection (HY)				2 <sup>nd</sup> method of selection (LY)				3 <sup>rd</sup> method of selection (MTL)				4 <sup>th</sup> method of selection (RPS)			
		1 <sup>st</sup> Date		2 <sup>nd</sup> Date		1 <sup>st</sup> Date		2 <sup>nd</sup> Date		1 <sup>st</sup> Date		2 <sup>nd</sup> Date		1 <sup>st</sup> Date		2 <sup>nd</sup> Date	
		DS	TP	DS	TP	DS	TP	DS	TP	DS	TP	DS	TP	DS	TP	DS	TP
BG102/BPTS204 DFF	h <sup>2</sup> (%)	74.59	76.75	42.53	67.64	73.21	22.03	9.60	64.28	65.43	84.12	65.98	84.26	91.13	71.48	78.87	86.18
	GA (%)	12.93	7.31	5.08	5.95	6.72	2.19	1.14	4.94	5.34	6.51	5.38	6.52	8.66	7.18	7.75	8.30
	GCV (%)	4.40	4.05	3.78	3.51	3.83	2.26	1.78	2.99	3.82	3.75	3.94	3.37	5.31	4.52	5.24	4.28
	PCV (%)	5.10	4.62	5.79	4.26	4.48	4.82	5.75	3.72	4.73	4.08	4.85	3.67	5.56	5.35	5.90	4.61
BG102/Naveen DFF	h <sup>2</sup> (%)	68.00	63.74	24.30	77.46	61.05	65.91	50.17	43.31	3.06	45.02	9.85	95.72	53.34	65.94	32.59	55.04
	GA (%)	4.83	4.26	2.06	4.38	4.28	4.17	3.69	2.65	0.11	1.42	0.45	26.92	2.67	3.18	1.94	2.75
	GCV (%)	2.94	2.57	1.94	2.54	2.68	2.41	2.34	1.99	0.40	1.13	0.83	14.33	2.24	2.09	1.97	1.88
	PCV (%)	3.56	3.22	3.93	2.88	3.43	2.96	3.30	3.03	2.30	1.69	2.66	14.65	3.07	2.58	3.45	2.53
BG102/Reshmi (Commercial Pvt. hybrid Victory seeds) DFF	h <sup>2</sup> (%)	87.00	69.17	69.17	44.48	69.63	69.63	71.68	69.63	99.82	99.87	99.76	99.92	99.62	99.80	99.43	99.84
	GA (%)	11.53	8.56	9.01	4.08	8.25	7.31	7.89	6.84	84.32	84.14	84.15	84.07	86.12	85.88	85.82	85.69
	GCV (%)	5.99	4.99	5.25	3.06	4.80	4.25	4.52	3.97	48.77	48.65	48.69	48.60	48.74	48.64	48.65	48.59
	PCV (%)	6.41	6.01	6.32	4.59	5.75	5.10	5.34	4.76	48.81	48.68	48.74	48.62	48.84	48.69	48.78	48.63
BG102/BPTS204 PH	h <sup>2</sup> (%)	5.35	16.38	10.45	3.73	11.07	18.69	34.66	37.65	15.98	11.21	12.78	27.98	11.34	10.35	70.42	13.12
	GA (%)	0.84	2.20	1.67	0.71	1.52	3.47	5.68	6.09	2.61	1.68	2.23	5.18	2.25	2.07	14.00	2.91
	GCV (%)	1.75	2.63	2.50	1.78	2.22	3.89	4.68	4.82	3.11	2.39	2.97	4.66	3.23	3.11	8.09	3.90
	PCV (%)	7.59	6.50	7.73	9.22	6.69	9.01	7.95	7.85	7.78	7.12	8.32	8.81	9.61	9.69	9.65	10.76
BG102/Naveen PH	h <sup>2</sup> (%)	17.14	15.52	14.91	10.41	15.95	12.03	11.02	17.08	10.75	23.14	13.55	60.23	6.53	5.71	14.20	12.15
	GA (%)	2.20	2.09	2.00	1.06	2.21	1.50	1.46	1.67	1.35	2.88	2.18	20.53	0.75	0.63	1.59	1.12
	GCV (%)	2.58	2.58	2.51	1.58	2.69	2.09	2.13	1.96	1.99	2.90	2.87	13.10	1.42	1.27	2.04	1.55
	PCV (%)	6.23	6.56	6.51	4.92	6.75	6.03	6.44	4.75	6.09	6.03	7.79	16.88	5.57	5.34	5.43	4.46
BG102/Reshmi (Commercial Pvt. hybrid Victory seeds) PH	h <sup>2</sup> (%)	82.50	36.72	5.08	15.57	55.20	25.87	43.13	28.08	97.06	94.82	95.39	95.73	91.77	94.87	95.65	95.14
	GA (%)	18.16	7.19	1.23	2.80	15.45	5.91	13.08	6.64	85.96	82.82	85.22	83.61	77.95	79.44	74.72	79.69
	GCV (%)	12.51	5.75	2.65	3.44	10.09	5.64	9.66	6.07	50.41	49.14	50.42	49.37	49.93	49.15	50.46	49.30
	PCV (%)	13.77	9.50	11.77	8.73	13.58	11.09	14.71	11.47	51.17	50.47	51.62	50.47	52.12	50.46	51.59	50.54
BG102/BPTS204 PPP	h <sup>2</sup> (%)	9.93	23.53	25.41	27.26	21.85	41.82	15.61	38.68	27.16	50.69	19.75	27.22	43.97	11.91	53.95	14.88
	GA (%)	3.78	9.56	8.69	12.00	5.64	16.73	5.42	15.24	10.09	35.25	14.98	11.59	20.28	5.84	26.70	7.15
	GCV (%)	5.81	10.87	8.08	9.98	7.38	12.29	6.45	12.54	10.40	24.04	15.57	11.01	13.18	8.97	16.76	8.91
	PCV (%)	18.45	22.41	16.03	19.12	15.79	19.00	16.33	20.17	19.97	33.77	35.06	21.12	19.88	26.01	22.82	23.10

Cont.....

Cross/characters	Genetic parameters	1 <sup>st</sup> method of selection (HY)				2 <sup>nd</sup> method of selection (LY)				3 <sup>rd</sup> method of selection (MTL)				4 <sup>th</sup> method of selection (RPS)			
		1 <sup>st</sup> Date		2 <sup>nd</sup> Date		1 <sup>st</sup> Date		2 <sup>nd</sup> Date		1 <sup>st</sup> Date		2 <sup>nd</sup> Date		1 <sup>st</sup> Date		2 <sup>nd</sup> Date	
		DS	TP	DS	TP	DS	TP	DS	TP	DS	TP	DS	TP	DS	TP	DS	TP
BG102/Navveen PPP	h <sup>2</sup> (%)	12.99	11.94	20.25	23.72	10.29	56.15	19.21	36.13	11.93	28.85	11.32	39.68	14.29	29.60	18.95	27.98
	GA (%)	4.26	3.28	6.47	8.55	3.52	15.17	7.11	11.96	5.48	10.65	5.20	11.45	11.45	3.94	7.59	6.26
	GCV (%)	5.73	4.39	8.65	8.41	5.18	10.13	7.64	9.89	7.13	8.74	4.77	16.16	5.20	6.32	6.98	6.58
	PCV (%)	15.90	12.71	19.23	17.27	16.14	13.52	17.44	16.46	20.65	16.28	14.19	25.66	13.77	11.62	16.03	12.45
BG102/Reshmi (Commercial Pvt. hybrid Victory seeds) PPP	h <sup>2</sup> (%)	87.48	38.56	22.62	40.79	39.55	36.17	37.64	28.92	68.04	17.49	64.66	78.08	73.05	89.54	71.95	79.57
	GA (%)	12.04	14.26	8.38	20.74	9.65	12.08	15.78	12.40	70.67	19.70	60.39	73.94	71.63	81.14	67.60	77.24
	GCV (%)	13.75	11.35	8.90	9.99	10.02	12.76	12.35	11.55	45.43	27.83	44.93	47.58	46.39	49.58	46.38	47.84
	PCV (%)	14.70	18.28	18.71	15.64	15.94	21.22	20.13	21.47	55.08	66.55	55.87	53.85	54.28	52.39	54.68	53.62
BG102/BPT5204 GPP	h <sup>2</sup> (%)	73.41	58.96	69.99	52.46	57.28	41.79	47.27	40.82	50.47	12.35	37.14	49.09	40.39	56.02	47.36	37.68
	GA (%)	39.07	25.91	30.92	21.59	24.72	17.22	20.21	15.90	24.26	6.24	15.43	20.71	18.54	22.30	23.37	16.06
	GCV (%)	22.13	16.38	17.94	14.46	15.85	12.92	14.26	12.27	16.28	8.47	12.08	14.10	14.16	14.46	14.60	12.70
	PCV (%)	25.83	21.33	21.44	19.97	20.94	19.99	20.75	19.20	22.91	24.12	19.82	20.12	22.28	19.32	21.22	20.68
BG102/Navveen GPP	h <sup>2</sup> (%)	52.06	40.26	39.69	36.43	18.22	57.45	20.14	19.28	26.57	25.39	19.47	45.58	47.41	40.39	56.89	46.98
	GA (%)	19.38	14.60	17.15	12.42	6.53	19.78	7.63	7.03	8.19	7.94	6.30	20.13	19.60	15.18	23.26	16.32
	GCV (%)	13.03	11.17	13.21	9.98	7.42	12.67	8.25	7.77	7.73	7.63	6.92	14.76	13.81	11.59	14.96	11.55
	PCV (%)	18.06	17.60	20.97	16.54	17.39	16.72	18.39	17.69	14.99	15.15	15.70	21.87	20.06	18.23	19.84	16.85
BG102/Reshmi (Commercial Pvt. hybrid Victory seeds) GPP	h <sup>2</sup> (%)	87.02	23.52	46.49	49.25	36.35	20.55	39.10	26.00	88.40	87.76	81.34	84.15	86.38	84.86	88.90	86.43
	GA (%)	19.67	7.37	18.65	20.49	12.57	6.53	13.25	8.08	83.88	78.47	77.12	76.02	82.92	75.73	81.75	75.68
	GCV (%)	16.16	7.37	13.27	14.16	10.12	6.99	10.28	7.69	51.55	48.40	49.41	47.89	51.23	47.99	50.64	48.24
	PCV (%)	17.33	15.20	19.47	20.19	16.78	15.42	16.44	15.08	54.83	51.66	54.78	52.20	55.12	52.10	53.70	51.89
BG102/BPT5204 TW(g)	h <sup>2</sup> (%)	76.00	84.77	82.59	96.42	95.35	92.00	93.39	89.07	86.38	92.10	88.87	95.94	62.27	86.06	79.19	86.47
	GA (%)	12.20	14.56	13.13	26.33	20.97	19.94	21.24	21.17	15.98	16.76	16.17	27.90	10.01	14.42	12.86	13.07
	GCV (%)	6.79	7.67	7.01	13.01	10.42	10.09	10.66	10.83	8.17	8.30	8.15	13.55	6.15	7.54	7.01	6.82
	PCV (%)	7.79	8.33	7.71	13.25	10.67	10.51	11.04	11.48	8.80	8.65	8.65	13.83	7.79	8.13	7.88	7.33
BG102/Navveen TW(g)	h <sup>2</sup> (%)	57.46	90.64	87.24	94.25	64.83	95.61	93.37	95.13	81.65	92.16	94.49	95.28	89.75	95.28	90.05	94.65
	GA (%)	9.36	13.98	14.41	21.54	16.00	21.61	21.46	21.69	19.61	21.44	22.16	35.47	21.12	22.07	21.35	21.74
	GCV (%)	5.98	7.12	7.49	10.76	9.64	10.72	10.70	10.79	10.53	10.84	11.06	18.00	10.81	10.97	10.91	10.84
	PCV (%)	7.90	7.48	8.01	11.09	11.98	10.97	11.15	11.06	11.66	11.29	11.38	18.44	11.41	11.24	11.50	11.14

Cont.....

Cross/characters	Genetic parameters	1 <sup>st</sup> method of selection (HY)				2 <sup>nd</sup> method of selection (LY)				3 <sup>rd</sup> method of selection (MTL)				4 <sup>th</sup> method of selection (RPS)			
		1 <sup>st</sup> Date		2 <sup>nd</sup> Date		1 <sup>st</sup> Date		2 <sup>nd</sup> Date		1 <sup>st</sup> Date		2 <sup>nd</sup> Date		1 <sup>st</sup> Date		2 <sup>nd</sup> Date	
		DS	TP	DS	TP	DS	TP	DS	TP	DS	TP	DS	TP	DS	TP	DS	TP
BG102/Reshmi (Commercial Pvt. hybrid Victory seeds) TW	h <sup>2</sup> (%)	97.08	96.98	96.87	96.42	97.01	90.10	96.75	96.76	99.77	99.44	99.63	99.70	99.40	99.76	99.80	99.70
	GA (%)	29.69	26.36	28.94	28.31	26.43	25.27	27.82	27.53	87.39	38.61	41.98	89.67	86.54	84.11	87.03	89.63
	GCV (%)	14.62	12.99	14.26	13.01	13.02	13.04	13.72	13.29	50.55	56.11	59.47	50.51	50.50	50.54	50.53	50.51
	PCV (%)	14.84	13.19	14.49	13.25	13.21	13.74	13.95	13.51	50.60	56.26	59.58	50.58	50.65	50.60	50.58	50.58
BG102/BPT5204 GYP Plant (g)	h <sup>2</sup> (%)	46.14	28.47	35.74	50.26	50.32	59.74	32.16	25.01	49.89	53.38	31.42	17.23	31.57	29.84	41.84	16.05
	GA (%)	18.45	11.58	14.92	25.29	28.25	25.77	10.73	6.38	45.55	43.06	22.30	6.26	14.67	10.76	28.40	4.60
	GCV (%)	13.18	10.53	12.10	17.31	19.32	16.18	9.18	6.44	30.80	28.14	19.02	7.19	12.67	9.55	21.30	5.56
	PCV (%)	19.40	19.75	20.25	24.42	27.24	20.93	16.18	12.87	43.61	38.51	33.94	17.31	22.55	17.48	32.94	13.89
BG102/Navveen GYP Plant (g)	h <sup>2</sup> (%)	37.93	43.56	59.96	21.44	53.37	72.25	55.45	65.28	39.62	47.11	59.73	35.14	46.53	45.26	15.98	59.05
	GA (%)	13.12	14.52	27.20	8.33	30.46	37.25	31.19	39.26	21.93	23.91	37.90	22.89	20.82	19.51	7.47	27.70
	GCV (%)	10.24	10.48	16.88	8.65	19.29	20.31	19.35	22.43	15.16	15.12	21.81	17.57	14.81	14.07	9.06	17.48
	PCV (%)	16.62	15.88	21.80	18.68	26.40	23.90	25.99	27.77	24.09	22.03	28.21	29.65	21.71	20.92	22.67	22.75
BG102/Reshmi (Commercial Pvt. hybrid Victory seeds) GYP Plant (g)	h <sup>2</sup> (%)	88.09	42.27	41.66	35.03	31.53	10.07	43.94	54.60	83.49	76.35	76.97	86.73	84.91	83.31	85.75	77.83
	GA (%)	12.57	17.21	19.26	16.77	14.65	23.00	21.48	23.23	98.27	79.08	84.34	84.61	90.92	82.10	93.59	93.55
	GCV (%)	17.04	12.84	14.48	13.59	12.65	3.80	15.71	18.21	62.09	52.28	55.52	60.32	62.43	53.30	57.15	58.96
	PCV (%)	18.15	19.75	22.43	22.96	22.53	11.97	23.71	24.65	67.95	59.83	63.28	64.77	67.75	58.40	61.71	66.83
BG102/BPT5204 GYP Plot (g)	h <sup>2</sup> (%)	44.28	35.19	57.01	34.98	19.01	18.99	49.76	19.01	14.13	13.36	16.44	33.57	4.09	12.41	21.24	14.97
	GA (%)	17.23	15.01	29.53	16.42	6.59	7.01	25.07	6.59	4.12	4.17	6.61	12.64	1.37	4.01	12.50	5.65
	GCV (%)	12.57	12.27	18.98	13.47	7.33	7.80	17.25	8.65	5.32	5.53	7.91	10.58	3.29	5.52	13.15	7.09
	PCV (%)	18.89	20.69	25.14	22.77	16.81	17.91	24.45	19.84	14.16	15.13	19.52	18.27	16.28	15.66	28.54	18.32
BG102/Navveen GYP Plot (g)	h <sup>2</sup> (%)	10.09	12.67	49.11	22.18	14.11	14.50	15.58	10.24	27.14	32.28	14.33	21.72	2.96	11.36	18.98	10.39
	GA (%)	1.49	1.95	22.21	4.61	9.29	7.55	3.31	2.24	92.64	39.07	45.13	71.57	0.35	1.87	2.25	1.30
	GCV (%)	2.28	2.65	15.38	4.74	4.07	3.90	4.06	3.39	11.25	3.96	2.88	9.29	0.99	2.68	2.50	1.96
	PCV (%)	7.17	7.45	21.95	10.07	10.83	10.24	10.30	10.60	21.59	6.98	7.61	19.94	5.78	7.96	5.75	6.08
BG102/Reshmi (Commercial Pvt. hybrid Victory seeds) GYP Plot (g)	h <sup>2</sup> (%)	77.20	55.28	44.53	51.05	65.51	74.54	70.73	75.07	88.67	93.86	89.20	90.88	91.10	92.70	91.85	92.94
	GA (%)	16.18	25.19	19.87	22.65	33.93	52.39	39.47	52.68	79.76	76.57	63.51	72.61	85.34	95.18	87.64	89.64
	GCV (%)	16.43	16.44	14.45	15.38	20.35	29.45	22.78	29.51	63.18	69.53	66.39	74.32	63.64	69.30	66.67	74.76
	PCV (%)	18.70	22.12	21.66	21.53	25.14	34.11	27.08	34.06	67.10	71.76	70.29	77.96	66.67	71.98	69.57	77.54

**Table-4.1a: Analysis of variance (MSS) for seven characters of BG102/BPT5204 in F<sub>3</sub> progeny of direct seeding and Transplanting as well as first and second date of sowing**

F <sup>1</sup> method of selection (HY)															
F <sup>1</sup> date DS							F <sup>1</sup> date TP								
df	DFE	PH (cm)	PPP	GPP	TW(g)	GYP Plant (g)	GYP Plot (g)	DFE	PH (cm)	PPP	GPP	TW(g)	GYP Plant (g)	GYP Plot (g)	
Replication	1.00	0.28	1.05	506.97	152.23	9.30	33.87	1144.92	0.26	1585.23	10.59	293.73	7.13	28.79	294.46
Treatment	49.00	27.14**	90.18	5.45	758.50**	5.22**	34.13*	3369.74**	27.14**	72.27	7.01*	772.60**	5.84**	30.33*	3360.37**
Error	49.00	3.95	81.02	4.47	116.27	0.71	12.58	1301.33	3.57	51.93	4.34	199.45	0.48	16.89	1610.60
2 <sup>nd</sup> date DS															
Replication	1.00	6.76	323.32	3.80	186.22	48.30	23.10	11226.67	0.38	204.22	6.58	176.21	174.37	44.79	1833.85
Treatment	49.00	27.14**	97.18	3.90*	775.54**	5.22**	22.83**	4742.08**	27.14**	130.71	7.03*	475.08**	15.92**	27.42**	3342.38**
Error	49.00	10.94	78.79	2.32	136.91	0.50	10.81	1298.03	5.24	121.32	4.02	148.13	0.29	9.08	1609.73
2 <sup>nd</sup> method of selection (LY)															
F <sup>1</sup> date DS							F <sup>1</sup> date TP								
Replication	1.00	5.66	1.05	5.86	4401.53	0.42	42.69	3738.22	16.00	538.47	4.46	658.93	0.25	4.60	766.02
Treatment	49.00	19.67**	74.28	2.88	559.85**	9.91**	28.21**	1983.79	19.36	141.81	5.06**	452.25**	9.46**	19.16**	1966.73
Error	49.00	3.04	59.47	1.85	152.03	0.24	9.32	1349.84	12.37	97.15	2.08	185.65	0.39	4.83	1338.78
2 <sup>nd</sup> date DS															
Replication	1.00	0.64	1463.90	539.77	1134.21	23.33	8.61	18267.14	0.28	28.53	3.93	226.78	126.90	3.63	26176.33
Treatment	49.00	19.36	126.89**	3.11	531.93**	10.40**	8.55*	3880.62**	19.36**	126.68**	5.13**	408.02**	11.20**	4.85*	1983.79
Error	49.00	15.97	61.56	2.27	190.43	0.36	4.39	1301.58	4.21	57.37	2.27	171.44	0.65	2.91	1349.84
3 <sup>rd</sup> method of selection (MTL)															
F <sup>1</sup> date DS							F <sup>1</sup> date TP								
Replication	1.00	1.06	327.19	0.01	5430.73	10.21	31.57	804.10	0.16	105.55	0.04	214.70	5.39	3.05	1215.06
Treatment	47.00	21.97**	96.22	3.91*	577.97**	6.27**	32.95**	1138.91	21.97**	78.17	12.78**	485.38	6.25**	25.19**	1136.38
Error	47.00	4.59	69.70	2.24	190.22	0.46	11.01	856.86	1.89	62.40	4.18	378.66	0.26	7.66	868.37
2 <sup>nd</sup> date DS															
Replication	1.00	0.38	157.20	30.63	382.49	54.23	33.88	1989.11	0.16	126.96	8.58	188.25	0.21	0.26	1302.95
Treatment	47.00	21.97**	108.46	11.67	425.86**	6.14**	17.33*	1529.93	21.97**	137.32*	4.18*	431.01**	16.31**	3.98	1438.55**
Error	47.00	4.50	83.88	7.82	195.16	0.36	9.05	1097.79	1.88	77.27	2.40	147.18	0.34	2.81	715.37
4 <sup>th</sup> method of selection (RPS)															
F <sup>1</sup> date DS							F <sup>1</sup> date TP								
Replication	1.00	0.21	1022.20	783.50	7836.78	3.92	94.09	39748.80	0.72	4.56	14.69	481.94	3.31	646.43	191.82
Treatment	49.00	34.46**	149.89	5.15**	548.83**	4.61**	16.92*	1544.30	34.46**	156.63	5.90	396.62**	5.73**	9.80*	1373.37
Error	49.00	1.60	146.63	2.01	233.03	1.07	8.80	1422.70	5.73	127.22	4.65	111.80	0.43	5.30	1069.92
2 <sup>nd</sup> date DS															
Replication	1.00	0.46	311.88	497.43	2189.12	39.19	9.12	20549.22	0.27	223.29	28.15	559.52	157.00	2.48	12499.46
Treatment	49.00	34.46**	244.08**	6.91**	520.61**	5.28**	33.85**	3211.94	34.46**	201.16	5.38	467.18**	4.57**	4.93	1373.61
Error	49.00	4.07	42.35	2.07	185.96	0.61	13.88	2086.20	2.56	154.47	3.98	211.45	0.33	3.57	1015.81

\* Significant at P = 0.05, \*\* Significant at P = 0.01

**Table-4.1b: Analysis of variance (MSS) for seven characters of BG102/Naveen under different methods of selection in F<sub>3</sub> progeny of direct seeding and Transplanting followed by two date of sowing**

1 <sup>st</sup> method of selection (HY)												
1 <sup>st</sup> date DS						1 <sup>st</sup> date TP						
	Df	DFE	PH (cm)	PPP	GYP	TW(g)	GYP Plant (g)	GYP Plot (g)	DFE	PH (cm)	PPP	GYP
Replication	1	0.01	5.12	82.57	1802.60	0.09	4.80	24.64	0.00	3.16	2.14	128.72
Treatment	49	11.89**	62.40	2.47	321.03**	6.04**	13.02**	291.66	12.38**	74.41	1.72	239.89**
Error	49	2.23	44.13	1.90	101.19	1.63	5.86	238.16	2.74	54.41	1.35	102.17
2 <sup>nd</sup> date DS												
Replication	1	256.00	3.26	4.42	368.28	0.02	5.90	7491.77	0.00	4.33	323.75	53.39
Treatment	49	11.90	71.89	2.75	309.83**	6.04**	13.02**	3432.25**	11.89**	38.79	2.33*	201.23**
Error	49	7.24	53.23	1.82	133.75	0.41	3.26	1171.20	1.51	31.47	1.44	93.74
2 <sup>nd</sup> method of selection (LY)												
1 <sup>st</sup> date DS						1 <sup>st</sup> date TP						
Replication	1	0.00	12.99	8.89	874.62	39.63	55.58	274.86	0.36	0.02	651.78	70.44
Treatment	49	10.67**	73.21	1.92	228.99	13.68**	13.77**	655.32	10.67**	60.52	1.79**	247.15**
Error	49	2.58	53.07	1.56	158.39	2.92	4.19	493.25	2.19	47.52	0.50	66.77
2 <sup>nd</sup> date DS												
Replication	1.00	0.05	64.45	8.96	243.64	0.04	37.16	0.25	0.29	4.74	1.87	134.39
Treatment	49.00	10.22**	67.08	2.41	214.26	13.81**	13.73**	531.31	10.67**	38.29	2.33**	200.83
Error	49.00	3.39	53.76	1.64	142.41	0.47	3.94	388.00	4.22	27.12	1.10	135.90
3 <sup>rd</sup> method of selection (MTT)												
1 <sup>st</sup> date DS						1 <sup>st</sup> date TP						
Replication	1	2.24	3.99	42.50	1315.04	1.58	23.69	1387.52	0.02	0.08	4.85	467.16
Treatment	48	2.87	50.29	3.51	180.34*	14.13**	9.54**	296.43	2.87**	37.80	3.04*	159.61*
Error	48	2.70	40.52	2.76	104.62	1.43	4.13	1719.31	1.09	23.59	1.68	94.95
2 <sup>nd</sup> date DS												
Replication	1	0.04	70.79	7.15	64.40	0.13	7.74	431.13	0.15	2296.61	19.13	675.87
Treatment	48	4.54	59.62	4.93	146.88	14.52**	9.48**	294.87	309.20**	371.61**	6.02**	342.44**
Error	48	3.73	45.39	3.92	99.00	0.41	2.39	220.92	6.75	92.23	2.60	128.00
4 <sup>th</sup> method of selection (RPS)												
1 <sup>st</sup> date DS						1 <sup>st</sup> date TP						
Replication	1	3.58	15.03	0.83	123.71	1.68	1.67	138.45	0.60	44.79	589.47	149.20
Treatment	49	7.72**	44.14	1.41	318.57**	14.13**	8.90**	160.55	7.72**	43.35	1.30	244.61**
Error	49	2.35	38.73	1.05	113.65	0.76	3.25	151.30	1.58	38.66	0.71	103.85
2 <sup>nd</sup> date DS												
Replication	1	0.28	0.51	2.31	42.64	7.54	25.43	15.16	0.02	0.00	3.68	4.35
Treatment	49	9.36**	48.70	2.27	329.65**	14.60**	11.75	160.55	7.72**	31.86	1.64*	202.82**
Error	49	4.76	36.58	1.54	90.56	0.76	8.51	109.31	2.24	24.95	0.93	73.16

\* Significant at P = 0.05\*\* Significant at P = 0.01

**Table-4.1c: Analysis of variance (MSS) for seven characters of BG102/Reshmi (Commercial pvt. hybrid victory seeds) under different methods of selection in F<sub>3</sub> progeny of direct seeding and T transplanting followed by two Date of sowing**

		F <sup>1</sup> method of selection (HY)										F <sup>1</sup> method of selection (LY)											
		F <sup>1</sup> Date DS					F <sup>1</sup> Date TP					2 <sup>nd</sup> Date DS					2 <sup>nd</sup> Date TP						
	df	DFE	PH (cm)	PPP	GPP	TW(g)	GYP Plant (g)	GYP Plot (g)	DFE	PH (cm)	PPP	GPP	TW(g)	GYP Plant (g)	GYP Plot (g)	DFE	PH (cm)	PPP	GPP	TW(g)	GYP Plant (g)	GYP Plot (g)	
Replication	1	0.01	105.12	12.07	1410.38	27.14	19.73	43977.45	27.04	527.99	2.44	189.15	10.58	0.34	5496.15								
Treatment	49	50.83**	219.45**	2.81**	365.06**	27.12**	22.84*	24720.19**	50.83**	99.54**	3.09**	184.75	22.45**	17.13**	26158.06**								
Error	49	3.46	55.02	1.40	25.32	0.40	12.94	3180.26	9.26	46.06	1.37	19.20	0.34	6.95	7534.38								
		2 <sup>nd</sup> Date DS										2 <sup>nd</sup> Date TP											
Replication	1	104.04	475.25	58.01	356.08	34.28	3.49	34785.23	51.84	66.99	38.42	1347.11	174.37	289.14	14897.54								
Treatment	49	50.83**	98.90	2.65	363.37**	26.66**	20.10**	24720.19**	27.14**	130.74	5.28**	475.08	15.92**	22.59**	3342.38**								
Error	49	9.26	89.33	1.67	18.17	0.42	8.28	3180.26	10.43	95.49	2.22	1.12	0.29	10.87	1083.08								
		F <sup>1</sup> Date DS										F <sup>1</sup> Date TP											
Replication	1	187.69	804.95	6.35	0.00	9.36	22.75	0.77	187.69	43.40	2.94	0.05	0.01	0.06	8.62								
Treatment	49	33.49**	189.46**	3.00**	288.72*	22.98**	8.16*	10927.90**	33.49**	132.42*	3.02**	176.50**	21.62*	134.63**	14623.37**								
Error	49	6.00	54.68	1.30	50.39	0.35	4.25	806.62	6.00	77.98	1.42	24.67	1.13	32.15	661.34								
		2 <sup>nd</sup> Date of DS										2 <sup>nd</sup> Date of TP											
Replication	1	3.60	14.82	2.21	0.53	14.88	10.12	0.72	187.69	104.57	3.67	0.04	0.17	7.00	3277.05								
Treatment	49	33.49**	204.63**	2.79**	245.33**	22.91**	8.43**	10927.90**	33.49**	134.87*	2.79*	176.50**	21.62**	8.43**	14623.37**								
Error	49	5.52	81.29	1.26	21.67	0.38	3.28	635.61	6.00	75.73	1.54	20.39	0.36	2.48	2082.85								
		F <sup>1</sup> Date DS										F <sup>1</sup> Date TP											
Replication	1	0.18	50.20	33.96	3582.02	0.00	79.79	15502.68	0.15	353.99	76.20	879.36	0.02	73.10	4338.07								
Treatment	41	2177.30**	2531.80**	19.98**	2893.85**	233.38**	59.06**	51036.65**	2737.85**	2925.94**	19.49	2275.88**	43.42**	43.42**	26158.06**								
Error	41	1.92	37.69	3.80	16.64	0.26	5.31	3065.36	1.68	77.79	13.69	17.47	0.12	5.82	2683.72								
		2 <sup>nd</sup> Date of DS										2 <sup>nd</sup> Date of TP											
Replication	1	0.27	169.48	38.76	2.34	0.01	79.89	15712.37	0.11	114.01	14.53	3.33	0.00	58.53	6898.47								
Treatment	49	2477.49**	2556.66**	17.93**	2782.92**	54.56**	54.56**	45968.50**	3105.64**	2754.12**	18.59**	2225.78**	235.97**	43.98**	45537.54**								
Error	49	2.97	60.25	3.85	24.32	0.10	7.10	2623.13	1.22	60.00	2.29	27.51	0.35	3.12	2174.66								
		F <sup>1</sup> Date DS										F <sup>1</sup> Date TP											
Replication	1	0.04	149.89	4.21	355.47	8.89	8.69	7087.37	0.02	252.21	2.02	28.61	0.00	21.87	4290.86								
Treatment	41	2177.30**	2512.28**	19.98**	416.61**	233.38**	59.03**	51036.57**	2737.85**	2925.93**	19.49**	107.78*	221.34**	44.15**	46295.40**								
Error	41	4.13	107.72	3.11	142.73	0.69	4.82	2377.70	2.67	76.91	1.08	66.97	0.26	4.02	1754.35								
		2 <sup>nd</sup> Date of DS										2 <sup>nd</sup> Date of TP											
Replication	1	268.96	62.35	10.26	96.66	0.00	22.90	5473.02	0.02	131.47	3.71	331.24	0.00	49.26	4495.82								
Treatment	41	2477.49**	2556.66**	17.87**	300.18**	235.71**	55.42**	45242.86**	3105.64**	2754.12**	18.59**	105.98**	235.97**	46.13**	45537.54**								
Error	41	7.03	56.73	2.92	144.28	0.23	4.25	1921.21	2.49	68.54	2.11	53.53	0.35	5.75	1666.41								

**Table-4.3a: DFF of F<sub>3</sub> progeny of various F<sub>2</sub> BG102/BPT5204 plants selected from different methods of selection and grown under different crop ecology**

Sl. No.	F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014								
		F <sub>2</sub> 2013		F <sub>3</sub> method of selection (HY)			F <sub>2</sub> 2013		F <sub>3</sub> method of selection (LY)			F <sub>2</sub> 2013		F <sub>3</sub> method of selection (MTL)			F <sub>2</sub> 2013		F <sub>3</sub> method of selection (RPS)						
		DFF	DS	TP	DS		DFF	DS	TP	DS		DFF	DS	TP	DS		DFF	DS	TP	DS	DFF	DS	TP	DS	TP
1	339	93	79	86	77	96	807	86	74	82	73	92	836	82	82	92	82	82	101	155	87	77	83	74	93
2	54	82	74	81	72	91	672	88	82	91	82	101	813	84	78	84	74	93	914	82	76	86	77	96	
3	806	82	75	82	72	91	559	86	74	83	74	93	823	79	75	80	70	89	986	82	81	91	82	101	
4	130	82	79	86	76	95	709	90	76	84	74	93	653	83	76	83	74	93	450	82	83	90	80	99	
5	496	84	76	84	75	94	15	83	74	83	74	93	791	89	78	82	72	91	604	84	83	93	83	102	
6	398	81	72	80	70	89	365	93	83	90	81	100	755	85	73	82	73	92	640	81	71	81	72	91	
7	963	89	73	82	72	91	327	81	75	84	75	94	756	80	74	84	75	94	576	89	79	86	77	96	
8	140	84	77	84	74	93	788	86	72	81	72	91	667	83	72	81	72	91	91	88	86	92	82	101	
9	275	82	81	88	79	98	704	80	69	79	69	88	658	83	78	85	75	94	566	82	81	90	81	100	
10	856	82	81	88	79	98	404	83	75	85	75	94	689	81	73	82	72	91	697	82	71	81	71	90	
11	279	84	75	82	72	91	711	83	72	80	70	89	378	89	86	89	79	98	23	84	80	88	78	97	
12	343	79	75	82	73	92	898	81	81	86	76	95	533	80	76	86	76	95	2	79	74	83	73	92	
13	833	81	76	84	74	93	457	83	82	88	79	98	591	81	79	88	79	98	734	81	71	79	69	88	
14	853	84	76	84	75	94	786	83	71	81	71	90	160	80	79	86	77	96	102	92	89	96	87	106	
15	377	80	76	83	74	93	587	82	77	83	73	92	972	88	81	87	77	96	188	80	71	80	70	89	
16	744	81	73	81	72	91	785	83	79	81	72	91	985	90	84	89	79	98	605	81	76	85	75	94	
17	728	88	75	83	74	93	991	86	78	82	73	92	598	81	77	87	77	96	984	88	79	87	78	97	
18	922	80	78	86	76	95	60	87	72	82	72	91	828	90	75	85	76	95	590	80	73	80	71	90	
19	695	96	91	97	87	106	538	89	81	87	78	97	547	82	76	86	77	96	111	96	81	89	80	99	
20	561	80	81	87	77	96	742	86	81	87	78	97	886	83	71	82	73	92	284	80	74	81	72	91	
21	374	82	79	85	76	95	146	80	73	83	73	92	500	83	75	82	73	92	294	82	73	81	71	90	
22	624	83	79	84	75	94	6	89	75	85	75	94	449	83	75	82	72	91	294	83	77	86	76	95	
23	95	83	76	83	74	93	821	83	73	80	71	90	472	83	73	82	72	91	947	83	77	84	75	94	
24	572	82	82	89	79	98	26	78	75	82	73	92	364	79	76	88	78	97	288	82	70	78	69	88	
25	90	80	81	88	79	98	740	84	74	81	72	91	436	83	74	83	74	93	203	80	79	87	78	97	
26	629	81	76	84	74	93	73	86	77	83	73	92	410	80	77	82	73	92	562	82	73	81	72	91	
27	142	88	73	80	70	89	4	84	78	84	74	93	499	80	75	84	75	94	536	88	77	84	75	94	

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Sl. No.	F <sub>2</sub> Plant No.	F <sub>2</sub> 2013	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013	F <sub>3</sub> Progeny 2014					
			1 <sup>st</sup> method of selection (HY)		2 <sup>nd</sup> Date				1 <sup>st</sup> Date		2 <sup>nd</sup> Date				1 <sup>st</sup> Date		2 <sup>nd</sup> Date				3 <sup>rd</sup> method of selection (MTL)		2 <sup>nd</sup> Date		1 <sup>st</sup> Date	
		DFE	DS	TP	DS	TP	DFE	DS	TP	DS	TP	DFE	DS	TP	DS	TP	DFE	DS	TP	DS	TP	DFE	DS	TP	DS	TP
28	375	89	77	83	74	93	88	80	86	77	96	908	87	75	85	75	94	848	81	75	82	73	92			
29	572	82	78	85	75	94	90	80	86	76	95	612	87	77	86	77	96	290	81	80	87	78	97			
30	319	78	79	86	76	95	86	74	80	71	90	654	83	81	87	77	96	628	81	72	79	70	89			
31	737	78	77	83	74	93	80	73	82	72	91	178	84	85	91	82	101	966	83	74	81	72	91			
32	435	80	77	83	74	93	82	72	78	68	87	282	89	75	81	71	90	945	81	74	81	72	91			
33	497	87	78	84	75	94	83	70	79	69	88	468	80	71	82	72	91	980	90	74	82	72	91			
34	852	78	78	84	74	93	81	76	82	72	91	138	84	83	89	79	98	931	84	82	89	80	99			
35	51	81	76	84	74	93	80	77	84	75	94	113	84	82	91	81	100	864	81	72	80	70	89			
36	372	79	78	86	76	95	84	75	82	72	91	335	85	82	91	81	100	360	84	72	79	70	89			
37	182	86	88	94	84	103	83	70	78	68	87	61	81	73	82	72	91	593	86	74	81	72	91			
38	714	86	72	80	70	89	86	73	78	69	88	259	83	75	80	70	89	845	82	75	83	73	92			
39	567	83	74	84	74	93	78	72	81	71	90	86	86	84	90	80	99	867	77	75	82	73	92			
40	582	81	77	84	75	94	84	74	81	72	91	226	83	70	81	72	91	875	90	75	83	73	92			
41	729	83	79	88	78	97	81	71	78	69	88	340	82	70	80	70	89	273	82	74	82	72	91			
42	930	80	84	94	84	103	87	71	78	69	88	242	84	70	84	74	93	680	81	73	80	71	90			
43	237	79	77	86	76	95	86	81	86	77	96	42	79	75	82	73	92	480	81	75	83	73	92			
44	498	96	76	85	76	95	89	76	83	74	93	21	86	75	85	76	95	962	80	74	82	72	91			
45	811	81	79	84	74	93	83	80	84	75	94	39	84	78	88	79	98	834	83	75	82	73	92			
46	542	83	75	82	73	92	84	83	87	77	96	471	90	77	82	73	92	289	84	74	81	72	91			
47	727	93	89	95	86	105	90	75	80	70	89	948	88	75	82	73	92	218	79	75	82	73	92			
48	1	90	79	88	78	97	92	78	84	74	93	932	80	80	87	78	97	1000	80	76	83	74	93			
49	165	81	76	85	75	94	80	75	82	72	91						531	83	76	83	74	93				
50	575	88	76	82	72	91	84	80	84	75	94						461	97	83	90	81	100				
	Mean	78	72	80	70	89	78	69	78	68	87		79	70	80	70	89		77	70	78	69	88			
	Range	96	91	97	87	106	93	83	91	82	101		90	86	92	82	101		97	89	96	87	106			
	Max.	96	90	96	87	106	93	69	77	68	87		90	85	91	82	101		96	88	96	86	105			
	Sem(±)	1	1	1	2	2		1	2	3	1			2	2	1	1			1	2	1	1			
	CD at 0.05	1	4	4	6	5		4	7	8	4			4	4	3	3			4	3	5	4	3		
	CV %	5	3	2	6	2		4	4	5	2		4	3	3	2	1			4	2	3	3	2		

\* Significant at P = 0.05, \*\* Significant at P = 0.01

**Table-4.3.1a: PH (cm) of F<sub>3</sub> progeny of various F<sub>2</sub>BG102/BPT5204 plants selected from different methods of selection and grown under different crop ecology**

Sl. No.	F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014						F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014						F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014						F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014					
		F <sub>2</sub> 2013			F <sub>2</sub> 2013				F <sub>2</sub> 2013			F <sub>2</sub> 2013				F <sub>2</sub> 2013			F <sub>2</sub> 2013				F <sub>2</sub> 2013			F <sub>2</sub> 2013		
		PH(cm)	DS	TP	PH(cm)	DS	TP		PH(cm)	DS	TP	PH(cm)	DS	TP		PH(cm)	DS	TP	PH(cm)	DS	TP		PH(cm)	DS	TP	PH(cm)	DS	TP
1	339	116	117	124	124	126	807	121	114	112	106	111	836	97	102	131	110	94	155	122	148	123	115	117				
2	54	123	132	129	126	128	672	111	117	117	112	116	813	92	122	115	102	115	914	122	113	109	114	117				
3	806	112	131	130	126	130	559	127	116	112	115	116	823	104	127	120	116	122	986	138	118	126	112	114				
4	130	127	123	126	128	112	709	100	110	121	105	110	653	97	116	127	116	114	450	124	124	111	125	129				
5	496	128	131	129	127	130	15	115	115	112	116	115	791	105	129	122	116	123	604	150	105	101	103	106				
6	398	133	126	128	124	125	365	121	118	115	120	118	755	95	117	123	119	117	640	124	117	96.3	120	123				
7	963	126	118	121	119	119	327	136	118	117	121	118	756	97	101	110	111	101	608	122	119	124	117	122				
8	140	134	124	124	123	125	788	113	117	119	115	117	667	94	129	114	108	120	576	122	119	122	119	122				
9	275	110	130	132	130	129	704	128	122	114	124	122	658	97	122	123	119	121	91	125	118	122	123	126				
10	856	102	116	109	118	119	404	120	118	128	114	118	689	102	118	127	118	117	566	134	112	120	111	114				
11	279	136	128	128	131	131	711	115	123	116	123	123	378	108	120	119	113	118	697	108	125	117	131	132				
12	343	118	126	122	128	125	898	131	119	120	120	119	533	109	113	117	114	113	23	88	115	127	116	118				
13	833	130	125	123	125	127	457	132	127	116	129	127	591	100	109	108	112	111	2	132	114	126	109	111				
14	853	118	121	119	120	121	786	114	118	120	120	118	160	107	115	113	117	120	734	113	101	115	96	99				
15	377	130	126	127	126	126	587	110	125	116	127	125	972	104	123	118	127	129	102	123	114	111	113	116				
16	744	115	125	112	124	125	785	135	119	120	120	119	985	106	118	123	119	120	188	128	118	123	119	119				
17	728	131	125	122	125	127	991	142	123	110	122	123	598	107	114	111	113	118	605	121	107	121	107	107				
18	922	136	133	124	135	138	60	132	116	126	114	116	828	104	105	112	120	118	984	132	117	110	123	122				
19	695	131	118	117	115	117	538	123	125	117	127	125	547	87	119	103	128	121	590	124	110	116	116	114				
20	561	132	126	123	128	127	742	132	124	122	122	124	886	99	115	118	120	117	111	115	116	121	119	118				
21	374	103	130	122	131	131	146	136	120	115	125	120	500	98	115	109	119	117	284	120	109	121	110	107				
22	624	123	123	120	121	123	6	123	115	116	116	115	449	86	129	117	134	130	294	120	110	110	115	115				
23	95	116	126	112	128	128	821	119	128	117	134	128	472	109	116	125	122	117	947	116	117	122	116	118				
24	572	133	124	115	126	122	26	106	115	128	115	115	364	109	109	114	108	109	288	135	119	122	127	125				
25	90	132	125	127	126	125	740	120	136	129	139	136	436	100	116	112	118	117	203	115	118	125	123	122				
26	142	100	125	124	124	127	4	125	123	134	124	123	499	93	121	117	122	120	536	130	114	117	118	116				
27	375	117	123	123	120	122	589	118	129	123	132	129	908	107	118	124	107	118	848	135	115	122	118	114				

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Sl. No.	F <sub>2</sub> Plant No.	F <sub>2</sub> 2013		F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013		F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013		F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013		F <sub>3</sub> Progeny 2014			
		PH(cm)	DS	F <sup>1</sup> method of selection (HY)	TP	DS	TP		PH(cm)	DS	F <sup>1</sup> Date	TP	DS	TP		PH(cm)	DS	3 <sup>rd</sup> method of selection (MTL)	TP	DS	TP		PH(cm)	DS	F <sup>1</sup> Date	TP	DS	TP
28	375	117	122	131	120	120	120	589	118	130	128	130	130	908	107	117	119	113	116	848	135	120	122	129	129	127		
29	572	117	129	124	127	131	131	731	106	126	113	123	126	612	92	117	118	119	116	290	132	122	125	129	127			
30	319	116	133	124	131	137	137	819	115	127	160	125	127	654	100	125	117	125	628	145	122	124	130	130	127			
31	737	120	123	117	121	125	125	871	129	126	113	129	126	178	100	120	125	125	966	110	129	127	138	134	134			
32	435	117	125	125	125	129	129	429	100	130	122	135	130	282	109	125	123	122	945	127	114	126	119	117	117			
33	497	118	131	125	129	133	133	484	122	120	127	117	120	468	109	121	118	112	980	137	125	124	134	134	132			
34	852	144	124	121	121	125	125	636	118	128	119	131	128	138	100	121	124	118	931	114	134	122	147	145	145			
35	51	99	124	128	125	125	125	157	111	137	126	139	137	113	109	112	114	114	864	133	132	136	142	139	139			
36	372	120	116	124	115	115	115	839	131	125	134	123	125	335	108	108	116	123	360	134	132	138	140	134	140			
37	182	136	120	116	120	119	119	527	117	123	116	123	123	61	91	103	108	106	593	114	130	128	141	140	140			
38	714	86	113	122	114	113	113	97	119	131	117	138	131	259	107	124	112	128	845	107	124	135	130	129	129			
39	567	145	114	113	115	115	115	490	122	109	126	105	109	86	108	117	121	121	867	124	125	127	130	129	129			
40	582	116	114	115	120	112	112	479	128	131	108	133	131	226	105	119	112	128	875	137	131	130	137	135	135			
41	729	118	111	120	114	109	109	196	132	116	125	114	116	340	100	120	114	129	273	138	131	139	137	136	136			
42	930	158	108	106	116	106	106	491	104	123	121	121	123	242	107	122	114	133	680	100	128	132	135	133	133			
43	237	120	117	111	113	110	110	405	122	127	129	120	127	42	98	105	127	104	480	123	127	129	135	133	133			
44	498	118	116	122	108	113	113	375	149	125	121	125	125	21	106	118	127	123	962	120	126	133	135	134	134			
45	811	123	114	118	108	115	115	305	120	121	121	120	121	39	109	109	122	110	834	109	121	136	125	123	123			
46	542	115	117	119	120	117	117	380	121	122	120	119	122	471	109	125	112	126	289	128	123	126	130	130	130			
47	727	142	115	117	114	113	113	370	118	124	128	120	124	948	109	112	122	114	218	140	117	130	121	120	120			
48	1	120	108	116	115	104	104	306	130	124	127	121	124	932	103	115	108	115	1000	124	130	126	136	135	135			
49	165	123	117	114	109	109	109	362	127	122	126	119	122						531	142	128	116	132	138	138			
50	575	122	116	115	110	110	110	487	129	119	127	117	119						461	132	130	135	132	134	134			
Mean		122	122	121	122	122	122		122	122	121	122	122		102	115	115	116	115		125	121	123	124	124	124		
Range		Min.	108	106	108	104	104		100	109	108	105	109		86	101	103	102	94		88	101	96	96	99	99		
		Max.	133	132	135	138	138		149	137	160	139	137		109	129	131	134	135		150	148	139	147	145	145		
Semi(±)			8	5	7	8	8			5	7	6	5		6	6	6	6	6		9	9	8	5	9	9		
CV at 0.05			22	14	20	22	22			16	20	16	15			17	18	16	18			24	23	13	25	25		
CV %		8	9	6	8	9	9		10	6	8	6	6		6	7	8	7	7		9	10	9	5	10	10		

**Table-4.3.2a: PPP of F<sub>2</sub> progeny of various F<sub>2</sub> BG102/BPT5204 plants selected from different methods of selection and grown under different crop ecology**

Sl. No.	F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014						
		F <sub>2</sub> 2013		F <sub>3</sub> method of selection (HY)			F <sub>2</sub> 2013		F <sub>3</sub> method of selection (LY)			F <sub>2</sub> 2013		F <sub>3</sub> method of selection (MTL)			F <sub>2</sub> 2013		F <sub>3</sub> method of selection (RPS)				
		PPP	DS	TP	DS		TP	PPP	DS	TP		DS	TP	PPP	DS		TP	DS	TP	PPP	DS	TP	DS
1	339	8	16	13	12	12	20	9	9	10	9	836	7	9	9	15	9	155	9	3	7	15	9
2	54	10	15	14	10	11	14	8	9	9	8	813	7	8	9	10	9	914	8	8	14	12	8
3	806	9	12	12	10	12	10	10	10	11	10	823	8	8	8	8	9	986	10	9	8	7	8
4	130	12	13	16	11	12	16	9	9	9	9	653		10	7	8	9	450	6	8	8	7	7
5	496	18	11	9	10	13	15	12	11	11	12	791	8	8	6	14	8	604	7	10	10	8	8
6	398	8	13	13	11	14	365	15	9	8	9	755	7	8	8	7	6	640	9	10	6	8	8
7	963	12	10	9	11	11	327	9	9	10	10	756	10	9	13	7	8	608	14	11	10	10	10
8	140	13	13	9	12	11	788	16	11	10	10	667	7	11	9	12	9	576	8	9	8	7	7
9	275	9	12	12	12	12	704	11	9	11	9	658	10	7	8	8	8	91	11	10	8	7	7
10	856	5	9	10	10	14	404	10	9	10	9	689	9	10	7	15	10	566	8	10	9	8	8
11	279	13	10	11	9	14	711	4	9	9	8	378	7	10	7	10	9	697	14	11	11	9	9
12	343	6	15	9	11	11	898	20	8	7	8	533	13	9	9	8	8	23	9	9	7	8	8
13	833	9	11	10	12	14	457	13	10	9	13	591	11	9	9	7	8	2	13	7	8	7	8
14	853	14	11	9	12	13	786	13	10	12	13	160	7	9	7	8	12	734	9	9	9	8	8
15	377	8	9	9	9	17	587	7	11	14	11	972	8	9	7	12	8	102	9	8	8	8	8
16	744	12	10	9	12	11	785	8	10	9	11	985	9	8	8	7	8	188	13	9	10	7	8
17	728	10	13	9	11	14	991	13	7	13	9	598	7	7	11	7	9	605	7	8	7	10	10
18	922	12	12	10	15	14	60	13	11	10	11	828	8	9	11	9	8	984	10	10	11	8	9
19	695	10	14	11	10	14	538	18	8	10	9	547	9	9	18	7	10	590	9	8	12	7	8
20	561	9	10	9	12	15	742	9	10	10	10	886	9	10	8	9	9	111	13	11	11	8	8
21	374	9	11	9	12	13	146	9	9	11	9	500	12	11	14	8	11	284	11	9	8	7	7
22	624	11	11	12	13	14	6	12	11	10	9	449	8	8	14	10	10	294	11	9	11	10	10
23	95	6	14	10	13	12	821	13	7	8	9	472	8	9	7	16	10	947	11	13	8	7	8
24	572	11	15	13	11	13	26	15	11	9	10	364	9	7	8	9	9	288	13	11	11	8	9
25	90	9	13	9	13	13	740	15	9	12	10	436	8	8	8	8	8	203	9	8	7	8	8
26	629	8	13	12	11	13	73	19	8	10	10	410	8	9	7	14	9	562	9	9	10	11	11
27	142	10	12	8	11	14	4	10	10	9	9	499	7	10	6	8	10	536	7	10	7	9	9

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Sl. No.	F <sub>2</sub> Plant No.	F <sub>2</sub> 2013	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013	F <sub>3</sub> Progeny 2014				
			1 <sup>st</sup> method of selection (HY)		2 <sup>nd</sup> Date				2 <sup>nd</sup> method of selection (LY)		2 <sup>nd</sup> Date				3 <sup>rd</sup> method of selection (MTL)		2 <sup>nd</sup> Date				4 <sup>th</sup> method of selection (RPS)		2 <sup>nd</sup> Date		
		PPP	DS	TP	DS	TP		PPP	DS	TP	DS	TP		PPP	DS	TP	DS	TP	DS	TP	DS	TP	DS	TP	
28	375	10	12	8	11	12	589	13	12	8	11	12	908	12	9	7	14	8	8	848	14	7	11	9	9
29	572	10	15	13	12	14	731	15	9	13	11	9	612	7	10	6	7	8	290	11	10	9	11	11	
30	319	9	12	10	13	13	819	10	10	9	11	10	654	7	8	6	7	9	628	10	10	9	9	10	
31	737	11	12	10	11	13	871	12	11	14	9	11	178	9	10	7	9	10	966	15	11	12	8	8	
32	435	11	10	11	12	11	429	6	10	9	11	10	282	13	10	8	9	8	945	12	9	10	9	10	
33	497	11	11	9	12	12	484	12	8	11	9	8	468	14	11	9	7	8	980	10	11	9	11	11	
34	852	5	13	12	11	14	636	15	10	9	13	10	138	7	7	10	7	9	931	14	11	11	10	20	
35	51	8	10	9	10	10	157	6	11	10	10	11	113	11	8	8	8	8	864	9	10	7	11	21	
36	372	14	13	9	10	13	839	13	9	10	10	9	335	12	13	7	7	9	360	8	8	8	11	25	
37	182	7	15	13	12	12	527	16	10	11	10	10	61	10	9	8	8	8	593	11	11	9	13	21	
38	714	10	12	10	9	12	97	13	9	10	13	9	259	12	10	9	7	8	845	8	13	9	12	22	
39	567	9	12	9	12	10	490	9	10	9	13	10	86	10	10	8	8	8	867	7	9	8	9	22	
40	582	11	11	10	10	11	479	11	11	10	9	11	226	7	7	10	7	9	875	6	9	8	13	13	
41	729	9	11	13	10	9	196	15	12	8	9	12	340	13	9	14	8	9	273	7	9	9	11	11	
42	930	15	11	15	8	14	491	11	8	8	11	8	242	8	7	13	8	8	680	8	10	7	8	8	
43	237	9	13	11	10	12	405	14	10	11	9	10	42	8	8	7	8	8	480	10	10	8	9	9	
44	498	13	11	9	8	11	375	10	9	9	10	9	21	10	7	6	7	8	962	8	8	8	8	9	
45	811	12	13	11	12	11	305	13	10	8	12	10	39	12	6	6	7	8	834	10	12	10	10	11	
46	542	8	12	9	11	14	380	11	11	9	10	11	471	8	7	8	7	10	289	9	10	8	10	10	
47	727	12	11	10	9	11	370	11	10	10	9	10	948	7	7	6	9	9	218	9	10	8	11	11	
48	1	12	12	13	9	4	306	15	12	12	9	12	932	10	8	11	8	1	1000	11	11	9	12	12	
49	165	6	12	9	12	11	362	10	10	11	10	10						531	6	6	10	6	10	11	
50	575	10	12	13	10	11	487	16	11	10	8	11						461	6	10	6	10	11	11	
Mean		10	12	11	11	12		12	10	10	10	10		9	9	9	9	8		10	10	9	9	9	
Range		5	9	8	8	4		4	7	7	8	7		7	6	6	7	1		6	3	6	7	7	
Max.		18	16	16	15	17		20	12	14	13	12		14	13	18	16	12		15	13	14	15	25	
Semi(±)		1	1	1	1	1		1	1	1	1	1		1	1	2	1	1		1	1	2	1	1	
CD at 0.05			4	4	3	4			3	3	3	3			3	6	4	3			3	4	3	4	
CV %		29	18	20	14	16		25	14	14	15	16		22	17	31	24	18		24	15	24	15	21	

**Table-4.3.3a: GPP of F<sub>3</sub> progeny of various F<sub>2</sub> BG102/BPT5204 plants selected from different methods of selection and grown under different crop ecology**

Sl. No.	F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014					
		F <sub>2</sub> 2013		F <sub>2</sub> 2013			F <sub>2</sub> 2013		F <sub>2</sub> 2013			F <sub>2</sub> 2013		F <sub>2</sub> 2013			F <sub>2</sub> 2013		F <sub>2</sub> 2013		F <sub>2</sub> 2013	
		GPP	DS	TP	DS		GPP	DS	TP	DS		GPP	DS	TP	DS		GPP	DS	TP	DS	GPP	DS
1	339	87	66	91	80	807	77	74	73	98	836	116	100	90	101	103	155	121	108	66	114	
2	54	72	67	76	83	672	75	78	71	80	813	100	94	81	95	79	914	105	97	73	97	
3	806	86	54	83	83	559	81	67	69	70	823	80	82	83	89	65	986	89	99	98	88	
4	130	75	92	78	84	709	56	76	96	80	653	70	87	73	91	70	450	86	80	86	87	
5	496	135	93	93	73	15	146	117	131	119	791	70	83	67	86	95	604	90	72	75	88	
6	398	135	98	117	116	365	136	121	103	121	755	70	68	84	74	71	640	125	104	75	103	
7	963	70	59	122	111	327	160	81	75	82	756	81	78	79	81	89	608	20	79	85	83	
8	140	98	84	99	118	788	71	67	82	70	667	77	92	76	94	73	576	90	102	75	98	
9	275	85	83	89	78	704	115	103	99	104	658	70	68	83	73	72	91	54	86	47	87	
10	856	125	84	111	102	404	130	109	121	109	689	70	141	68	116	66	566	121	101	53	99	
11	279	132	79	112	102	711	116	117	102	118	378	77	63	92	67	77	697	55	69	54	69	
12	343	44	44	108	97	898	118	80	75	81	533	70	77	109	81	71	23	50	62	96	103	
13	833	85	98	81	65	457	66	86	81	87	591	120	93	101	96	88	2	80	83	90	83	
14	853	61	93	93	118	786	135	94	87	93	160	105	108	87	111	72	734	95	81	87	98	
15	377	50	79	120	111	587	106	97	89	94	972	106	97	97	102	83	102	130	82	86	93	
16	744	87	81	106	101	785	110	96	102	96	985	80	81	101	84	96	188	67	87	81	94	
17	728	113	87	100	99	991	110	101	93	102	598	110	102	78	106	85	605	116	80	85	176	
18	922	75	83	105	105	60	120	79	78	81	828	85	88	77	92	77	984	88	92	82	91	
19	695	106	92	114	101	538	140	87	90	86	547	82	73	78	81	93	590	83	110	77	81	
20	561	40	91	116	110	742	152	89	95	91	886	61	87	94	92	87	111	84	96	85	87	
21	374	89	93	112	111	146	105	102	84	102	500	83	74	124	78	81	284	92	72	75	69	
22	624	80	84	111	111	6	121	81	81	81	449	120	101	121	107	74	294	92	86	67	91	
23	95	96	60	105	105	821	88	100	81	102	472	150	112	103	116	107	947	106	77	105	76	
24	572	92	68	81	80	26	68	73	74	75	364	115	110	97	113	93	288	87	69	112	88	
25	90	95	70	75	85	740	120	85	101	85	436	73	97	82	99	110	203	93	71	81	70	
26	629	121	90	81	88	73	60	117	111	118	410	92	99	69	103	110	562	135	115	81	90	
27	142	60	90	98	109	4	120	106	82	106	499	76	70	88	74	99	536	100	76	73	70	

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Sl. No.	F <sub>2</sub> Plant No.	F <sub>2</sub> 2013	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013	F <sub>3</sub> Progeny 2014				
			1 <sup>st</sup> method of selection (HY)		2 <sup>nd</sup> method of selection				1 <sup>st</sup> method of selection (LY)		2 <sup>nd</sup> method of selection				3 <sup>rd</sup> method of selection (MTL)		2 <sup>nd</sup> method of selection				4 <sup>th</sup> method of selection (RPS)				
		GPP	DS	TP	DS	TP	GPP	DS	TP	DS	TP	GPP	DS	TP	DS	TP	GPP	DS	TP	DS	TP	DS	TP	DS	TP
28	375	93	101	112	108	78	589	78	66	79	78	908	80	73	105	78	848	85	81	88	80	77			
29	572	42	113	112	120	97	731	73	83	74	73	612	115	101	92	103	290	120	81	99	81	85			
30	319	123	83	129	132	97	819	94	94	93	94	654	70	107	69	110	628	120	105	105	108	96			
31	737	69	98	121	99	70	871	96	78	99	96	178	80	82	68	86	966	65	106	79	106	87			
32	435	57	75	107	117	102	429	79	91	80	79	282	72	63	97	70	945	90	131	73	129	78			
33	497	120	109	106	93	90	484	99	108	100	99	468	89	81	90	86	980	115	103	88	105	84			
34	852	105	107	116	131	101	636	103	123	103	103	138	112	97	61	102	931	60	74	85	75	90			
35	51	90	88	143	127	72	157	135	119	138	135	113	75	69	74	75	864	55	89	75	89	103			
36	372	105	105	129	106	92	839	84	81	85	84	335	70	58	84	65	360	103	101	65	99	105			
37	182	85	100	126	126	93	527	78	69	79	78	61	72	94	92	98	593	75	86	79	89	80			
38	714	95	93	139	120	92	97	78	85	78	78	259	84	78	84	80	845	63	66	99	68	87			
39	567	87	73	129	111	77	490	108	91	109	108	86	110	93	57	95	867	86	77	100	78	84			
40	582	85	59	104	91	89	479	91	98	91	91	226	85	93	63	69	875	96	90	81	92	87			
41	729	135	94	90	80	83	196	109	94	110	109	340	76	62	75	59	273	99	102	101	101	88			
42	930	80	40	109	112	109	491	85	72	87	85	242	88	54	72	81	680	92	64	96	66	70			
43	237	46	51	87	59	81	405	78	82	79	78	42	67	76	100	80	480	90	77	60	77	81			
44	498	105	105	57	72	73	375	87	78	89	87	21	91	77	106	80	962	152	135	80	133	75			
45	811	66	72	111	126	82	305	50	92	52	50	39	140	76	73	111	834	84	67	83	67	80			
46	542	150	36	130	91	102	380	104	98	105	104	471	71	84	70	87	289	60	90	76	90	93			
47	727	85	39	73	56	74	370	67	67	68	67	948	75	67	98	72	218	75	104	98	101	90			
48	1	45	101	54	59	18	306	69	79	70	69	932	86	77	114	80	1000	80	72	72	74	93			
49	165	125	55	100	122	86	362	86	95	86	86						531	85	97	97	103	87			
50	575	101	89	109	75	86	487	89	96	90	89						461	110	103	103	103	79			
	Mean	109	81	103	99	88	90	88	89	90	89							90	89	83	89	89			
	Range	40	36	54	56	18	35	50	66	52	50		61	54	57	59	20	20	62	47	64	69			
	Max.	150	113	143	132	118	176	135	131	138	135		150	141	124	116	152	152	135	112	133	176			
	Seem(±)		8	10	8	9		9	10	10	9			10	10	14			11	7	10	10			
	CD at 0.05		22	28	24	24		25	27	28	26			28	28	39			31	21	27	29			
	CV%	31	13	14	12	14	30	14	15	15	15		23	16	16	23			27	17	13	15	16		

**Table-4.3.4a: Tw (g) of F<sub>3</sub> progeny of various F<sub>2</sub> BG102/BPT5204 plants selected from different methods of selection and grown under different crop ecology**

Sl. No.	F <sub>2</sub> Plant No.	F <sub>2</sub> 2013 Tw (g)	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013 Tw (g)	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013 Tw (g)	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013 Tw (g)	F <sub>3</sub> Progeny 2014			
			F <sup>1</sup> method of selection (HY)		2 <sup>nd</sup> Date				2 <sup>nd</sup> method of selection (LY)		2 <sup>nd</sup> Date				3 <sup>rd</sup> method of selection (MTL)		2 <sup>nd</sup> Date				F <sup>1</sup> method of selection (RPS)		2 <sup>nd</sup> Date	
			DS	TP	DS	TP			DS	TP	DS	TP			DS	TP	DS	TP			DS	TP	DS	TP
1	339	2.0	24	25	24	25	807	2	20	19	17	18	836	1.6	18	22	21	21	155	2.4	21	22	22	23
2	54	1.4	23	22	23	23	672	1.4	17	22	18	20	813	2.3	20	18	19	22	914	2.0	21	19	21	
3	806	1.8	23	23	23	23	559	1.8	18	22	20	19	823	1.9	22	21	21	19	986	2.0	21	22	21	
4	130	2.2	25	22	25	23	709	2.2	20	20	19	22	653	2.0	19	21	22	21	450	2.2	22	21	21	
5	496	1.8	23	22	23	23	15	1.8	19	20	22	22	791	2.3	21	20	18	23	604	2.0	21	21	21	
6	398	2.3	23	23	23	23	365	2.3	22	24	22	20	755	1.8	22	18	21	19	640	2.2	24	22	23	
7	963	2.0	23	23	23	23	327	2	22	19	20	21	756	2.0	19	22	21	21	608	2.0	22	20	22	
8	140	2.1	23	21	23	23	788	2.1	20	20	20	25	667	2.1	21	21	20	22	576	1.6	19	20	19	
9	275	1.9	23	22	23	23	704	1.9	20	22	24	19	658	2.0	22	19	18	21	91	1.3	22	23	21	
10	856	2.6	23	23	23	23	404	2.6	24	20	19	20	689	1.9	20	21	22	19	566	2.0	21	21	21	
11	279	2.0	22	23	22	23	711	2	19	18	20	22	378	1.8	18	22	21	22	697	2.3	21	20	21	
12	343	1.9	23	20	22	20	898	1.9	20	22	22	20	533	2.3	22	23	19	22	23	1.8	22	20	23	
13	833	2.3	23	19	23	19	457	2.3	22	19	20	19	591	1.9	22	20	21	20	2	2.1	20	19	20	
14	853	2.1	23	22	23	23	786	2.1	20	23	18	23	160	1.8	19	20	22	22	734	2.2	20	19	20	
15	377	2.2	21	22	20	22	587	2.2	18	21	22	20	972	2.2	21	21	23	22	102	2.1	23	20	23	
16	744	1.7	19	18	19	19	785	1.7	23	23	19	23	985	2.0	22	22	20	24	188	2.0	21	22	21	
17	728	2.0	23	20	23	20	991	2	19	22	23	21	598	2.2	23	24	20	21	605	1.8	20	23	20	
18	922	2.1	22	18	22	18	60	2.1	23	22	21	24	828	1.9	20	19	21	21	984	1.9	20	22	20	
19	695	2.3	19	21	19	19	538	2.3	21	27	23	23	547	2.1	21	19	22	21	590	1.9	19	24	19	
20	561	2.4	20	22	20	23	742	2.4	23	21	22	22	886	2.0	21	23	24	22	111	2.1	19	20	23	
21	374	2.3	18	21	18	21	146	2.3	22	23	22	27	500	2.2	22	19	19	25	284	1.8	20	23	19	
22	624	1.9	22	22	22	22	6	1.9	22	20	27	21	449	2.3	25	20	19	20	294	1.8	22	24	22	
23	95	2.5	23	23	23	23	821	2.5	27	20	21	23	472	1.9	19	19	23	19	947	2.3	23	24	23	
24	572	2.2	21	19	21	20	26	2.2	21	27	23	20	364	1.8	19	19	19	24	288	2.1	22	22	22	
25	90	2.5	22	23	22	23	740	2.5	23	22	20	21	436	2.2	23	19	20	19	203	2.6	24	23	23	
26	629	2.0	23	23	23	24	73	2	20	21	20	27	410	1.5	19	18	19	20	562	1.8	20	21	20	
27	142	2.2	20	21	20	21	4	2.2	20	23	27	22	499	1.5	20	17	19	20	536	2.5	23	23	23	

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Sl. No.	F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014			
		F <sub>2</sub> 2013		F <sub>3</sub> method of selection (HY)			F <sub>2</sub> 2013		F <sub>3</sub> method of selection (LY)			F <sub>2</sub> 2013		F <sub>3</sub> method of selection (MTL)			F <sub>2</sub> 2013		F <sub>3</sub> method of selection (RPS)						
		T <sub>w</sub> (g)	DS	TP	DS		TP	DS	TP	DS		TP	T <sub>w</sub> (g)	DS	TP		DS	TP	T <sub>w</sub> (g)	DS		TP	DS	TP	
28	375	2.50	23	21	23	21	23	21	21	908	1.80	20	22	19	19	848	2.2	25	22	23	24				
29	572	2.30	24	21	24	22	22	21	23	612	1.90	19	23	18	19	290	2.4	24	21	21	24				
30	319	2.30	21	20	21	21	23	23	23	654	1.80	19	19	18	19	628	2.0	22	22	23	22				
31	737	2.40	21	23	21	23	23	23	23	178	1.90	18	19	22	18	966	1.9	23	20	23	22				
32	435	2.40	22	21	22	21	23	23	23	282	2.10	18	21	23	22	945	1.8	21	21	21	21				
33	497	2.10	21	22	21	23	23	23	26	468	2.20	22	20	19	23	980	1.9	23	25	22	23				
34	852	2.20	23	23	23	24	24	26	23	138	2.50	23	24	19	20	931	2.0	23	20	20	22				
35	51	2.30	21	18	21	19	23	22	20	113	1.80	19	21	21	20	864	2.1	21	22	21	21				
36	372	1.70	23	23	23	23	23	20	20	335	2.20	19	20	20	21	360	1.7	22	22	22	22				
37	182	2.20	24	23	24	23	23	23	23	61	2.10	21	22	24	21	593	2.9	20	23	21	20				
38	714	1.90	19	20	18	21	23	23	23	259	2.00	20	21	21	24	845	2.2	21	21	22	20				
39	567	2.30	23	20	23	20	23	21	21	86	2.30	24	25	20	22	867	2.4	25	24	22	24				
40	582	3.30	23	24	23	24	24	18	20	226	2.10	21	20	22	21	875	2.2	20	22	23	20				
41	729	2.10	21	19	21	20	18	18	20	340	2.10	21	21	21	22	273	2.0	22	20	22	21				
42	930	1.50	20	22	20	22	20	20	21	242	2.20	22	19	25	22	680	2.1	22	21	25	22				
43	237	2.40	25	23	24	23	23	19	21	42	2.20	22	25	20	25	480	2.2	23	24	22	23				
44	498	1.90	20	20	20	21	18	23	19	21	2.50	25	22	21	21	962	2.3	22	19	21	21				
45	811	2.00	22	21	22	21	22	19	22	39	2.10	21	20	20	21	834	2.3	25	23	21	24				
46	542	2.30	23	23	23	24	24	19	22	471	2.30	21	21	25	20	289	2.0	22	26	24	22				
47	727	1.80	21	22	21	22	18	21	20	948	2.00	20	20	22	25	218	2.2	21	21	20	20				
48	1	1.70	21	18	21	26	21	20	20	932	2.40	25	23	20	25	1000	1.7	21	23	23	21				
49	165	2.10	24	19	24	22	18	20	25						531	2.1	24	26	26	24					
50	575	1.70	23	21	22	18	18	18	18	461						461	1.8	20	21	22	19				
		2.12	22	21	22	22	21	21	21		2.04	21	21	21	21.26		2.1	22	22	22	21				
Range	Min.	1.4	18	18	18	18	17	17	18		1.5	18	17	18	17.89		1	19	19	19	19				
	Max.	3.3	25	25	25	26	27	27	27		2.5	25	25	25	25.41		3	25	26	26	24				
Sem(±)			1	0	0	0	0	0	1			0	0	0	0.41			1	0	1	0				
CD at 0.05			2	1	1	1	1	1	2			1	1	1	1.17			2	1	2	1				
CV %		10	4	3	3	3	3	3	4		12.00	3	3	2	2.79		11	5	3	4	3				

**Table-4.3.5a: GYP plant (g) of F<sub>3</sub> progeny, of various F<sub>2</sub> BG102/BPT5204 plants selected from different methods of selection and grown under different crop ecology**

Sl. No.	F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				
		F <sub>2</sub> 2013 GYP plant (g)		F <sub>3</sub> method of selection (HY)			F <sub>2</sub> 2013 GYP plant (g)		F <sub>3</sub> method of selection (LY)			F <sub>2</sub> 2013 GYP plant (g)		F <sub>3</sub> method of selection (MTL)			F <sub>2</sub> 2013 GYP plant (g)		F <sub>3</sub> method of selection (RPS)		
		DS	TP	DS	TP		DS	TP	DS	TP		DS	TP	DS	TP		DS	TP	DS	TP	
1	339	36	27	27	26	807	12	16	15	15	836	8	6	10	14	11	155	20	14	12	23
2	54	25	26	25	19	672	17	15	15	15	813	8	8	12	11	12	914	13	13	15	13
3	806	22	22	21	19	559	15	14	17	17	823	12	12	9	9	10	986	16	16	14	16
4	130	24	19	24	21	709	14	21	15	15	653	5	5	7	8	12	450	13	13	15	12
5	496	26	27	26	22	15	21	18	14	14	791	5	5	12	16	12	604	16	16	15	13
6	398	24	24	23	22	365	18	16	17	17	755	6	6	10	15	11	640	15	15	12	22
7	963	21	21	20	18	327	16	21	16	16	756	14	14	6	9	9	608	15	15	12	10
8	140	21	22	21	20	788	20	13	13	13	667	11	11	7	14	13	576	15	15	15	12
9	275	22	22	21	19	704	13	15	17	17	658	7	7	10	8	9	91	13	13	14	17
10	856	22	23	22	19	404	14	20	18	18	689	9	9	15	9	10	566	13	13	15	12
11	279	21	20	21	18	711	21	20	15	15	378	12	12	10	7	10	697	16	15	13	14
12	343	24	23	23	20	898	20	18	17	17	533	16	16	8	10	11	23	14	14	18	12
13	833	25	25	24	19	457	17	17	14	14	591	11	11	8	11	10	2	16	16	18	18
14	853	26	26	25	21	786	17	17	14	14	160	10	10	10	10	10	734	14	13	15	11
15	377	21	20	21	17	587	16	15	15	15	972	10	10	8	15	9	102	19	19	20	21
16	744	21	20	21	20	785	14	20	14	14	985	11	11	7	14	12	188	19	19	15	13
17	728	34	35	33	28	991	20	20	15	15	598	10	10	13	9	11	605	16	16	16	14
18	922	24	23	23	19	60	19	16	17	17	828	9	9	9	9	12	984	20	20	19	14
19	695	29	28	28	23	538	16	20	19	19	547	15	15	9	9	9	590	16	15	19	13
20	561	26	25	26	20	742	20	18	14	14	886	11	11	19	13	9	111	16	16	16	15
21	374	23	22	22	17	146	17	15	17	17	500	11	11	8	10	12	284	20	20	16	13
22	624	29	28	28	23	6	15	11	14	14	449	21	21	17	16	10	294	20	20	13	10
23	95	23	22	22	18	821	2	17	16	16	472	10	10	11	19	9	947	16	16	16	15
24	572	23	22	22	20	26	17	19	17	17	364	18	18	6	7	10	288	17	17	17	16
25	90	28	28	27	19	740	19	10	15	15	436	13	13	7	7	10	203	14	14	18	15
26	629	31	31	30	25	73	9	13	15	15	410	7	7	16	11	10	562	17	17	17	14
27	142	27	27	27	22	4	13	18	13	13	499	8	8	8	9	11	536	18	17	13	12

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Sl. No.	F <sub>2</sub> Plant No.	F <sub>2</sub> 2013		F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013		F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013		F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013		F <sub>3</sub> Progeny 2014			
		GYP plant (g)	DS	1 <sup>st</sup> method of selection (HY)		2 <sup>nd</sup> method of selection (HY)			GYP plant (g)	DS	2 <sup>nd</sup> method of selection (LY)		GYP plant (g)	DS		3 <sup>rd</sup> method of selection (NTTL)		GYP plant (g)	DS	4 <sup>th</sup> method of selection (RPS)								
				I <sup>st</sup> Date	TP	I <sup>st</sup> Date	TP				I <sup>st</sup> Date	TP				I <sup>st</sup> Date	TP			I <sup>st</sup> Date	TP		I <sup>st</sup> Date	TP	I <sup>st</sup> Date	TP		
28	375	24	24	24	21	23	589	24	17	15	14	15	908	4	4	17	17	10	10	848	19	19	19	20	17	15		
29	572	23	23	22	18	18	731	23	15	13	16	15	612	10	10	9	10	17	17	290	17	17	17	16	14			
30	319	29	28	29	23	18	819	29	13	15	15	14	654	19	19	8	11	11	628	14	14	14	18	13	14			
31	737	31	30	30	25	23	871	31	14	13	12	15	178	11	11	13	8	10	966	21	20	16	16	15	17			
32	435	26	25	25	21	17	429	26	13	16	16	16	282	10	10	9	10	10	945	18	18	15	15	17	15			
33	497	25	25	25	20	17	484	25	15	13	13	16	468	14	14	8	9	10	980	18	18	13	13	11	13			
34	852	33	33	32	25	24	636	33	12	17	16	18	138	11	11	3	12	9	931	17	17	16	16	13	14			
35	51	24	23	24	19	17	157	24	17	21	19	15	113	9	9	9	11	11	864	21	21	18	12	17				
36	372	25	25	24	19	16	839	25	20	19	16	16	335	5	5	11	8	11	360	14	14	14	14	15	15			
37	182	36	36	36	26	13	527	36	18	19	16	14	61	11	11	13	12	10	593	15	15	14	14	14	14			
38	714	26	25	25	20	16	97	26	19	18	14	14	259	12	12	14	12	10	845	14	14	14	18	16	13			
39	567	23	23	22	18	16	490	23	17	17	13	14	86	15	15	10	10	10	867	17	17	15	12	14				
40	582	22	22	21	16	9	479	22	17	16	14	14	226	15	15	17	9	11	875	19	19	20	15	14				
41	729	24	23	23	18	22	196	24	16	20	15	17	340	12	12	7	10	11	273	14	14	16	10	19				
42	930	23	22	22	18	17	491	23	20	17	18	20	242	18	18	9	6	11	680	14	14	13	17	14				
43	237	15	15	14	9	13	405	15	17	24	21	14	42	4	4	15	9	13	480	18	18	17	14	15				
44	498	30	30	29	24	19	375	30	24	16	14	14	21	11	11	6	9	11	962	16	16	15	12	14				
45	811	26	26	25	19	14	305	26	6	14	13	14	39	17	17	9	11	13	834	21	21	14	9	17				
46	542	22	22	21	15	19	380	22	14	20	15	14	471	8	8	11	7	10	289	17	17	15	12	17				
47	727	26	25	25	21	24	370	26	20	14	14	16	948	11	11	18	14	11	218	13	13	14	13	14				
48	1	21	21	21	16	8	306	21	14	14	17	15	932	5	5	12	11	8	1000	3	3	15	26	16				
49	165	27	28	27	22	12	362	27	13	15	16	12							531	16	16	18	29	14				
50	575	32	33	31	26	10	487	32	15	8	14	13							461	14	14	14	23	14				
	Mean	25	25	25	20	17	16	16	16	16	16	15.30		11	11	10	11	11		16	16	16	15	15				
	Range	15	15	14	9	8	15	15	2	8	12	2		4	4	3	6	8		3	3	12	9	12				
	Max.	36	36	36	28	26	36	24	24	21	21	24		21	21	19	19	17		21	21	20	29	20				
	SD at 0.05		3	3	2	2		2	2	2	1	1			2	2	2	1			2	2	3	1				
	CV %	16	14	17	16	17	22	19	13	13	13	11		37	31	28	26	16		28	19	15	25	13				

**Table-4.3.6a: GYP plot (g) of F<sub>3</sub> progeny, of various F<sub>2</sub> BG102/BPT5204 plants selected from different methods of selection and grown under different crop ecology**

Sl. No.	Plant No.	F <sub>3</sub> Progeny				Plant No.	F <sub>3</sub> Progeny				Plant No.	F <sub>3</sub> Progeny				Plant No.	F <sub>3</sub> Progeny			
		1 <sup>st</sup> method of selection (HY)		2 <sup>nd</sup> Date			2 <sup>nd</sup> method of selection (LY)		2 <sup>nd</sup> Date			3 <sup>rd</sup> method of selection (MTL)		2 <sup>nd</sup> Date			4 <sup>th</sup> method of selection (RPS)		2 <sup>nd</sup> Date	
		DS	TP	DS	TP		DS	TP	DS	TP		DS	TP	DS	TP		DS	TP	DS	TP
1	339	320	307	284	284	807	203	189	167	203	836	257	241	178	220	155	247	233	190	199
2	54	355	342	300	319	672	219	204	156	219	813	252	236	188	215	914	189	175	142	141
3	806	237	224	193	201	559	215	200	163	215	823	247	231	162	210	986	230	215	147	181
4	130	298	285	267	263	709	198	184	136	198	653	232	216	142	195	450	177	163	137	129
5	496	291	278	226	255	15	218	203	155	218	791	182	166	132	145	604	172	158	137	123
6	398	281	268	261	245	365	220	205	175	220	755	192	176	157	155	640	235	220	152	186
7	963	239	226	228	203	327	211	195	171	211	756	222	206	177	185	608	235	220	192	186
8	140	263	250	231	228	788	189	173	151	189	667	204	188	177	167	576	242	228	178	193
9	275	276	263	251	240	704	214	198	185	214	658	252	236	212	215	91	281	267	177	233
10	856	304	291	319	269	404	184	168	141	184	689	247	231	207	210	566	212	198	137	163
11	279	256	243	213	220	711	212	196	196	212	378	212	196	177	175	697	207	193	137	158
12	343	236	223	168	201	898	230	214	197	230	533	215	199	187	178	23	222	208	152	174
13	833	277	264	205	241	457	224	208	191	224	591	229	216	192	192	2	227	212	147	178
14	853	323	311	218	288	786	258	242	271	258	160	256	243	217	219	734	224	210	137	176
15	377	285	272	207	251	587	255	239	236	255	972	230	217	217	193	102	170	206	148	171
16	744	257	244	195	223	785	253	237	226	253	985	250	237	207	213	188	230	215	162	181
17	728	247	234	195	213	991	275	259	261	275	598	227	214	217	190	605	252	237	167	203
18	922	267	254	265	233	60	257	241	230	257	828	227	214	217	190	984	240	225	162	186
19	695	303	240	217	219	538	287	271	246	287	547	237	224	207	200	590	244	230	162	196
20	561	255	242	211	218	742	245	229	251	245	886	262	249	232	225	111	240	225	167	191
21	374	309	296	284	272	146	256	240	211	256	500	251	238	207	214	284	244	208	182	173
22	624	220	207	146	183	6	230	214	226	230	449	255	242	227	218	294	240	192	142	158
23	95	314	300	269	277	821	266	250	266	266	472	257	244	262	208	947	232	217	141	183
24	572	257	243	245	220	26	228	212	226	228	364	244	231	182	196	288	232	217	192	183
25	90	300	286	257	263	740	269	253	251	269	436	217	204	172	168	203	242	227	187	193
26	629	274	259	219	237	73	342	326	286	342	410	197	184	165	148	562	232	218	163	183
27	142	301	286	299	263	589	237	221	201	237	908	198	185	185	149	536	274	260	192	225
28	375	301	286	299	263	589	237	221	201	237	908	187	174	155	138	848	257	243	223	208

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Sl. No.	Plant No.	F <sub>3</sub> Progeny						Plant No.	F <sub>3</sub> Progeny						Plant No.	F <sub>3</sub> Progeny					
		1 <sup>st</sup> method of selection (HY)			2 <sup>nd</sup> method of selection (LY)				4 <sup>th</sup> method of selection (MTL)			4 <sup>th</sup> method of selection (RPS)									
		DS	TP	DS	TP	DS	TP		DS	TP	DS	TP	DS	TP		DS	TP				
29	572	275	260	243	238	731	247	231	259	247	612	179	166	150	130	290	310	295	303	261	
30	319	284	269	309	246	819	279	263	288	279	654	226	213	200	177	628	272	258	258	223	
31	737	259	244	251	222	871	224	208	173	224	178	221	208	195	172	966	279	265	293	231	
32	435	255	240	257	218	429	240	224	223	240	282	215	202	185	166	945	269	255	243	221	
33	497	250	235	237	213	484	260	244	238	260	468	202	189	190	153	980	295	280	254	246	
34	852	230	215	201	193	636	253	237	214	253	138	209	196	215	160	931	295	205	178	171	
35	51	247	232	187	210	157	342	326	303	342	113	169	156	140	120	864	220	225	203	191	
36	372	211	196	181	174	839	245	229	193	245	335	190	177	160	142	360	240	225	218	191	
37	182	283	268	258	246	527	265	249	253	265	61	201	188	191	152	593	239	233	198	198	
38	714	203	188	164	166	97	229	213	228	229	259	207	194	175	158	845	244	230	183	196	
39	567	213	198	209	176	490	232	216	153	232	86	245	232	215	196	867	262	247	218	213	
40	582	205	190	164	168	479	265	249	254	265	226	228	215	190	179	875	245	230	198	196	
41	729	211	196	165	174	196	230	214	198	230	340	250	237	200	201	273	227	212	183	178	
42	930	208	193	168	171	491	244	228	218	244	242	236	223	170	188	680	240	226	159	191	
43	237	220	205	177	183	405	250	234	179	250	42	143	198	175	162	480	227	212	188	178	
44	498	205	190	152	168	375	212	196	188	212	21	144	203	190	167	962	220	205	184	171	
45	811	220	205	167	182	305	258	242	204	258	39	207	193	140	158	834	217	203	193	168	
46	542	199	184	156	162	380	272	256	243	272	471	229	215	170	181	289	240	225	208	191	
47	727	194	179	146	157	370	228	212	144	228	948	147	185	145	151	218	259	245	203	211	
48	1	189	174	156	152	306	224	208	153	224	932	148	211	155	176	1000	252	237	153	203	
49	165	188	174	160	151	362	245	229	158	245					531	227	213	123	178		
50	575	206	191	155	169	487	227	211	139	227					461	220	205	128	171		
		<b>Mean</b>	<b>241</b>	<b>219</b>	<b>218</b>		<b>243</b>	<b>227</b>	<b>208</b>	<b>243</b>		<b>223</b>	<b>209</b>	<b>186</b>	<b>180</b>		<b>237</b>	<b>223</b>	<b>180</b>	<b>189</b>	
		<b>Range</b>	<b>188</b>	<b>174</b>	<b>146</b>		<b>184</b>	<b>168</b>	<b>136</b>	<b>184</b>		<b>169</b>	<b>156</b>	<b>132</b>	<b>120</b>		<b>170</b>	<b>158</b>	<b>123</b>	<b>123</b>	
		<b>Max.</b>	<b>355</b>	<b>342</b>	<b>319</b>		<b>342</b>	<b>326</b>	<b>303</b>	<b>342</b>		<b>262</b>	<b>249</b>	<b>262</b>	<b>225</b>		<b>310</b>	<b>295</b>	<b>303</b>	<b>261</b>	
		<b>Sem(±)</b>	<b>26</b>	<b>28</b>	<b>25</b>		<b>26</b>	<b>26</b>	<b>26</b>	<b>26</b>		<b>21</b>	<b>21</b>	<b>23</b>	<b>19</b>		<b>27</b>	<b>23</b>	<b>32</b>	<b>23</b>	
		<b>CD at 0.05</b>	<b>73</b>	<b>81</b>	<b>72</b>		<b>74</b>	<b>74</b>	<b>73</b>	<b>74</b>		<b>59</b>	<b>59</b>	<b>67</b>	<b>54</b>		<b>76</b>	<b>66</b>	<b>92</b>	<b>64</b>	
		<b>CV %</b>	<b>14</b>	<b>17</b>	<b>16</b>		<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>		<b>13</b>	<b>14</b>	<b>18</b>	<b>15</b>		<b>16</b>	<b>15</b>	<b>25</b>	<b>17</b>	



**Table-4.5.1b: Estimates of correlation coefficients between  $F_2$  and  $F_3$  generation of BG102/Navreen for six characters in two date and methods of sowing followed by different method of selection.**

	1 <sup>st</sup> Date of sowing												2 <sup>nd</sup> Date of sowing					
	DS						TP						DS			TP		
	HY	LY	MTL	RPS	HY	LY	MTL	RPS	HY	LY	MTL	RPS	HY	LY	MTL	RPS		
DFP	0.011	-0.022	0.239	0.054	0.996**	0.956**	0.818**	0.953**	0.993**	0.996**	0.818**	0.953**	0.996**	0.956**	0.984**	0.971**		
PH	0.050	0.112	-0.061	-0.157	0.998**	0.975**	0.887**	0.911**	0.992**	0.977**	0.966**	0.926**	0.833**	0.810**	0.635**	0.737**		
PPP	0.445**	0.473**	0.606**	0.293**	0.912**	0.871**	0.751**	0.891**	0.925**	0.979**	0.839**	0.943**	0.882**	0.905**	0.926**	0.892**		
GPP	0.538**	0.510**	0.544**	0.142	0.864**	0.624**	0.535**	0.548**	0.962**	0.919**	0.887**	0.9340**	0.859**	0.619**	0.549**	0.459**		
Tw	0.166	0.201	-0.069	0.130	0.997**	0.996**	0.999**	0.997**	0.997**	0.996**	0.996**	0.996**	0.997**	0.987**	0.998**	0.999**		
GYP plant	0.724**	0.654**	0.472**	0.295**	0.993**	0.998**	0.999**	0.961**	0.993**	0.998**	0.998**	0.939**	0.998**	0.998**	0.997**	0.998**		

HY = High yield, LY = Low yield, MTL = High selection Indices, RPS = Low selection Indices

**Table-4.5.2b: Phenotypic (Upper value) and Genotypic (Lower value) Correlation Coefficient between different character Combination among six Characters in F<sub>3</sub> progeny of BG102/Naveen under different methods of selection followed by two methods and Date of sowing**

1 <sup>st</sup> method of selection (HY)																	
		Ch-2	Ch-3	Ch-4	Ch-5	Ch-6											
		1 <sup>st</sup> Date DS					1 <sup>st</sup> Date TP										
DFP	P	-0.119	-0.121	0.138	0.172	0.251	0.005	0.115	0.265	0.067	0.176						
	G	-0.592	-0.138	0.109	0.034	0.037	-0.532	-0.311	0.109	-0.012	0.033						
PH (cm)	P		-0.122	0.101	0.311	0.042		-0.015	0.081	0.140	0.044						
	G		-0.183	0.153	-0.444	-0.170		-0.480	-0.125	0.078	-0.130						
PPP	P			0.053	-0.191	0.021			-0.036	-0.166	0.048						
	G			0.047	-0.256	0.057			-0.248	-0.291	-0.106						
GPP	P				-0.065	-0.140				-0.022	-0.049						
	G				-0.104	-0.212				-0.066	-0.136						
TW(g)	P					0.178					0.153						
	G					0.090					0.129						
		2 <sup>nd</sup> Date DS					2 <sup>nd</sup> Date TP										
DFP	P	-0.199	-0.067	0.106	0.105	0.086	0.034	0.031	-0.010	0.2660**	0.114						
	G	-0.741	-0.153	0.209	0.165	0.225	-0.920	-0.115	-0.242	0.176	0.015						
PH (cm)	P		-0.205	0.057	0.104	-0.051		0.174	0.163	0.099	0.098						
	G		-0.650	-0.212	0.035	-0.386		-0.141	-0.417	-0.254	-0.193						
PPP	P			-0.082	-0.190	0.130			-0.333	0.045	-0.007						
	G			-0.162	-0.245	0.110			-0.496	-0.023	-0.069						
GPP	P				-0.070	-0.151				0.148	0.213						
	G				-0.104	-0.274				0.059	0.144						
TW(g)	P					0.105					0.102						
	G					0.119					0.053						
2 <sup>nd</sup> method of selection (LY)																	
		1 <sup>st</sup> Date DS					1 <sup>st</sup> Date TP										
DFP	P	0.141	-0.160	-0.033	0.041	0.163	0.268	-0.159	-0.074	-0.005	0.121						
	G	-0.260	-0.420	-0.184	-0.038	0.134	-0.372	-0.271	-0.029	0.030	0.188						
PH (cm)	P		0.172	0.077	0.020	0.130		-0.050	-0.223	-0.031	-0.065						
	G		-0.707	-0.727	0.084	-0.235		-0.140	-0.317	0.000	-0.076						
PPP	P			0.011	0.117	-0.038			-0.002	0.038	-0.050						
	G			-0.238	0.083	-0.194			0.011	0.064	-0.060						
GPP	P				0.082	0.195				-0.052	-0.011						
	G				0.112	0.103				-0.153	-0.134						
TW(g)	P					0.071					0.104						
	G					0.089					0.051						
						* Significant at P = 0.05						** Significant at P = 0.01					
		2 <sup>nd</sup> Date DS					2 <sup>nd</sup> Date TP										
DFP	P	0.234	-0.239	-0.135	-0.001	0.125	-0.041	0.038	0.093	0.091	0.240						
	G	-0.317	-0.234	-0.114	0.040	0.193	0.487	-0.485	-0.372	-0.115	0.012						
PH (cm)	P		-0.128	-0.215	-0.005	0.014		-0.052	-0.060	-0.037	-0.039						
	G		-0.069	-0.250	0.068	0.093		0.158	0.096	0.041	0.048						
PPP	P			0.066	0.087	-0.035			0.034	0.154	-0.002						
	G			-0.121	-0.027	-0.194			-0.180	0.067	-0.159						
GPP	P				0.108	0.197				0.146	0.233						
	G				0.010	0.091				0.061	0.120						
TW(g)	P					0.115					0.109						
	G					0.041					0.045						
						* Significant at P = 0.05						** Significant at P = 0.01					

3 <sup>rd</sup> method of selection MTL											
		1 <sup>st</sup> Date DS					1 <sup>st</sup> Date TP				
		Ch-2	Ch-3	Ch-4	Ch-5	Ch-6	Ch-2	Ch-3	Ch-4	Ch-5	Ch-6
DFF	P	-0.119	-0.121	0.138	0.172	0.251	0.005	0.115	0.265	0.067	0.176
	G	0.704	0.196	-0.510	0.113	-0.543	-0.600	-0.199	-0.432	-0.072	-0.298
PH (cm)	P		-0.122	0.101	0.311	0.042		-0.015	0.081	0.140	0.044
	G		-0.482	-0.753	-0.438	-0.698		-0.519	-0.604	-0.408	-0.319
PPP	P			0.053	-0.191	0.021			-0.036	-0.166	0.048
	G			0.215	0.045	0.521			0.169	0.004	0.483
GPP	P				-0.065	-0.140				-0.022	-0.049
	G				0.231	-0.070				-0.111	0.067
TW(g)	P					0.178					0.153
	G					0.013					0.010
2 <sup>nd</sup> Date DS											
DFF	P	-0.199	-0.067	0.106	0.105	0.086	0.034	0.031	-0.010	0.266	0.114
	G	-0.222	-0.097	-0.877	-0.421	-0.317	0.017	-0.031	-0.036	-0.019	-0.034
PH (cm)	P		-0.205	0.057	0.104	-0.051		0.174	0.163	0.099	0.098
	G		-0.463	-0.448	-0.256	-0.310		-0.054	0.001	-0.004	-0.032
PPP	P			-0.082	-0.190	0.130			-0.333	0.045	-0.007
	G			-0.074	-0.020	0.496			0.014	0.014	0.272
GPP	P				-0.070	-0.151				0.148	0.213
	G				0.035	-0.139				0.026	-0.036
TW(g)	P					0.105					0.102
	G					0.003					0.007
4 <sup>th</sup> method of selection (RPS)											
		1 <sup>st</sup> Date DS					1 <sup>st</sup> Date TP				
		Ch-2	Ch-3	Ch-4	Ch-5	Ch-6	Ch-2	Ch-3	Ch-4	Ch-5	Ch-6
DFF	P	0.220	0.280*	0.134	0.397**	0.06509	0.236	0.284*	0.139	0.408**	0.075
	G	-0.552	-0.054	0.073	0.418	-0.285	-0.223	0.156	-0.196	0.377	-0.200
PH (cm)	P		0.294*	-0.017	0.054	0.207		0.294*	-0.017	0.054	0.207
	G		0.999	-3.592	0.068	0.546		0.662	-0.434	-0.076	-0.156
PPP	P			0.056	-0.016	0.150			0.056	-0.016	0.150
	G			-0.011	-0.087	-0.091			-0.117	-0.139	0.023
GPP	P				-0.117	0.108				-0.117	0.108
	G				-0.139	0.070				-0.106	-0.107
TW(g)	P					0.097					0.097
	G					0.053					0.040
2 <sup>nd</sup> Date DS											
DFF	P	0.519	0.184	0.156	0.266	0.011	0.519	0.184	0.156	0.379**	0.011
	G	-0.781	0.031	0.088	0.474	-0.197	-0.665	-0.058	0.072	0.266	-0.150
PH (cm)	P		0.312	-0.011	0.006	0.139		0.312*	-0.011	0.006	0.139
	G		0.353	-0.288	0.003	0.047		0.013	-0.339	-0.408	0.092
PPP	P			0.066	0.075	0.162			0.066	0.075	0.162
	G			-0.121	0.102	-0.035			0.046	-0.177	-0.058
GPP	P				-0.091	0.167				-0.091	0.167
	G				-0.095	0.051				-0.116	0.074
TW(g)	P					0.154					0.154
	G					0.179					0.065
* Significant at P = 0.05						** Significant at P = 0.01					

**Table-4.6b: Genotypic Direct (Diagonal) and Indirect Effect of Six Characters on Yield of BG102/Naveen in DS and TP as well as two Date of sowing followed by different methods of selection**

1 <sup>st</sup> method of selection (HY)												
	1 <sup>st</sup> Date DS					Correlation with GYP Plant	1 <sup>st</sup> Date TP					Correlation with GYP Plant
	Ch-1	Ch-2	Ch-3	Ch-4	Ch-5		Ch-1	Ch-2	Ch-3	Ch-4	Ch-5	
DFP	<b>-0.012</b>	0.075	-0.007	-0.021	0.009	0.251	<b>-0.910</b>	0.641	0.352	-0.052	0.002	0.176
PH (cm)	0.007	<b>-0.127</b>	-0.009	-0.029	-0.012	0.042	0.484	<b>-0.205</b>	0.542	0.059	-0.012	0.044
PPP	0.016	0.023	<b>0.048</b>	-0.009	-0.007	0.021	0.283	0.578	<b>-0.129</b>	0.118	0.043	0.048
GPP	-0.001	-0.019	0.002	<b>0.191</b>	-0.003	-0.140	-0.099	0.150	0.280	<b>-0.477</b>	0.010	-0.049
TW(g)	-0.040	0.056	-0.012	0.020	<b>0.026</b>	0.178	0.011	-0.094	0.329	0.032	<b>-0.148</b>	0.153
GYP Plant (g)	Residual Effect = 0.209						Residual Effect = 0.072					
1 <sup>st</sup> method of selection (HY)												
	2 <sup>nd</sup> Date DS					Correlation with GYP Plant	2 <sup>nd</sup> Date TP					Correlation with GYP Plant
	Ch-1	Ch-2	Ch-3	Ch-4	Ch-5		Ch-1	Ch-2	Ch-3	Ch-4	Ch-5	
DFP	<b>-0.091</b>	0.350	0.040	-0.082	0.008	0.086	<b>0.158</b>	-0.076	-0.010	-0.063	0.006	0.114
PH (cm)	0.068	<b>-0.473</b>	0.171	-0.083	0.002	-0.051	-0.146	<b>0.082</b>	-0.013	-0.109	-0.008	0.098
PPP	0.014	0.307	<b>0.263</b>	0.064	-0.011	0.130	-0.018	-0.012	<b>0.091</b>	-0.129	-0.074	-0.007
GPP	-0.019	0.100	0.043	<b>0.393</b>	-0.005	-0.151	-0.038	-0.034	-0.045	<b>0.260</b>	0.002	0.213
TW(g)	-0.015	-0.017	0.064	0.041	<b>0.046</b>	0.105	0.028	-0.021	-0.002	0.015	<b>0.033</b>	0.102
GYP Plant (g)	Residual Effect = 0.245						Residual Effect = 0.019					
2 <sup>nd</sup> method of selection (LY)												
	1 <sup>st</sup> Date DS					Correlation with GYP Plant	1 <sup>st</sup> Date TP					Correlation with GYP Plant
	Ch-1	Ch-2	Ch-3	Ch-4	Ch-5		Ch-1	Ch-2	Ch-3	Ch-4	Ch-5	
DFP	<b>0.312</b>	-0.051	-0.064	-0.062	-0.001	0.163	<b>0.148</b>	0.027	0.008	0.004	0.001	0.121
PH (cm)	-0.081	<b>0.196</b>	-0.108	-0.244	0.002	0.130	-0.055	<b>-0.071</b>	0.004	0.047	-0.260	-0.065
PPP	-0.131	-0.139	<b>0.153</b>	-0.080	0.003	-0.038	-0.040	0.010	<b>0.029</b>	-0.002	0.002	-0.050
GPP	-0.057	-0.143	-0.036	<b>0.336</b>	0.003	0.195	-0.004	0.023	-0.031	<b>0.148</b>	-0.004	-0.011
TW(g)	-0.012	0.017	0.018	0.038	<b>0.029</b>	0.071	0.004	0.001	-0.002	0.023	<b>0.026</b>	<b>0.104</b>
GYP Plant (g)	Residual Effect = 0.003						Residual Effect = 0.056					
	2 <sup>nd</sup> Date DS					Correlation with GYP Plant	2 <sup>nd</sup> Date TP					Correlation with GYP Plant
	Ch-1	Ch-2	Ch-3	Ch-4	Ch-5		Ch-1	Ch-2	Ch-3	Ch-4	Ch-5	
DFP	<b>0.251</b>	-0.065	0.024	-0.018	0.000	0.125	<b>-0.421</b>	0.164	0.216	0.056	-0.003	0.240
PH (cm)	-0.080	<b>0.204</b>	0.007	-0.040	0.080	0.014	-0.205	<b>0.337</b>	-0.070	-0.014	0.090	-0.039
PPP	-0.059	-0.014	<b>0.102</b>	-0.019	-0.033	-0.035	0.204	0.053	<b>0.445</b>	0.027	0.001	-0.002
GPP	-0.029	-0.051	0.012	<b>0.158</b>	0.000	0.197	0.157	0.032	0.080	<b>0.151</b>	0.001	0.233
TW(g)	0.010	0.014	0.003	0.002	<b>0.012</b>	0.115	0.048	0.014	-0.030	-0.009	<b>0.022</b>	0.109
GYP Plant (g)	Residual Effect = 0.102						Residual Effect = 0.064					
3 <sup>rd</sup> method of selection (MTL)												
	1 <sup>st</sup> Date DS					Correlation with GYP Plant	1 <sup>st</sup> Date TP					Correlation with GYP Plant
	Ch-1	Ch-2	Ch-3	Ch-4	Ch-5		Ch-1	Ch-2	Ch-3	Ch-4	Ch-5	
DFP	<b>-0.918</b>	-0.319	0.138	0.540	0.015	0.251	<b>0.160</b>	-0.206	-0.129	-0.110	-0.014	0.176
PH (cm)	-0.646	<b>-0.453</b>	-0.340	0.798	-0.058	0.042	-0.096	<b>0.343</b>	-0.337	-0.153	-0.076	0.044
PPP	-0.180	0.219	<b>0.705</b>	-0.228	0.006	0.021	-0.032	-0.178	<b>0.649</b>	0.043	0.001	0.048
GPP	0.468	0.341	0.152	<b>1.060</b>	0.030	-0.140	-0.069	-0.207	0.110	<b>0.254</b>	-0.021	-0.049
TW(g)	-0.104	0.198	0.032	-0.245	<b>0.132</b>	0.178	-0.012	-0.140	0.002	-0.028	<b>0.187</b>	<b>0.153</b>
GYP Plant (g)	Residual Effect = 0.257						Residual Effect = 0.175					
	2 <sup>nd</sup> Date DS					Correlation with GYP Plant	2 <sup>nd</sup> Date TP					Correlation with GYP Plant
	Ch-1	Ch-2	Ch-3	Ch-4	Ch-5		Ch-1	Ch-2	Ch-3	Ch-4	Ch-5	
DFP	<b>0.451</b>	-0.105	-0.078	-0.454	-0.131	0.086	<b>-0.026</b>	-0.027	-0.008	0.001	-0.074	0.114
PH (cm)	-0.100	<b>0.474</b>	-0.372	-0.232	-0.080	-0.051	-0.439	<b>-0.017</b>	-0.015	-0.032	-0.017	0.098
PPP	-0.044	-0.219	<b>0.804</b>	-0.038	-0.006	0.130	0.081	0.009	<b>0.271</b>	-0.560	0.052	-0.007
GPP	-0.395	-0.212	-0.060	<b>0.517</b>	0.011	-0.151	0.094	-0.013	0.004	<b>0.041</b>	0.099	0.213
TW(g)	-0.190	-0.121	-0.016	0.018	<b>0.312</b>	0.105	0.051	0.073	0.004	-0.001	<b>0.004</b>	0.102
GYP Plant (g)	Residual Effect = 0.037						Residual Effect = 0.076					

4 <sup>th</sup> method of selection (RPS)												
	1 <sup>st</sup> Date DS						1 <sup>st</sup> Date TP					
DFE	<b>-0.402</b>	0.037	0.002	-0.008	0.087	0.065	<b>-0.899</b>	0.283	0.151	0.134	0.131	0.075
PH (cm)	0.222	<b>-0.067</b>	-0.029	0.406	0.014	0.207	0.200	<b>-1.270</b>	0.643	0.297	-0.026	0.207
PPP	0.022	-0.067	<b>0.029</b>	0.001	-0.018	0.150	-0.140	-0.841	<b>0.971</b>	0.080	-0.048	0.150
GPP	-0.029	0.241	0.000	<b>0.113</b>	-0.029	0.108	0.176	0.551	-0.114	<b>0.684</b>	-0.037	0.108
TW(g)	-0.168	-0.005	0.003	0.016	<b>0.207</b>	0.097	-0.339	0.096	-0.135	0.072	<b>0.346</b>	0.097
GYP Plant (g)												
	Residual Effect = 0.084						Residual Effect = 0.486					
	2 <sup>nd</sup> Date DS						2 <sup>nd</sup> Date TP					
DFE	<b>-0.806</b>	0.928	0.023	-0.016	0.675	0.011	<b>-0.157</b>	-0.074	0.002	0.011	0.068	0.011
PH (cm)	0.191	<b>-0.471</b>	0.267	0.053	0.004	0.139	0.105	<b>0.111</b>	-0.540	-0.049	-0.073	0.139
PPP	-0.086	-0.872	<b>0.756</b>	0.022	0.145	0.162	0.009	0.001	<b>-0.043</b>	0.007	-0.032	0.162
GPP	-0.248	0.710	-0.091	<b>-0.186</b>	-0.134	0.167	-0.011	-0.037	-0.002	<b>0.145</b>	-0.021	0.167
TW(g)	-0.331	-0.007	0.077	0.018	<b>0.422</b>	0.154	-0.060	-0.045	0.008	-0.017	<b>0.179</b>	0.154
GYP Plant (g)												
	Residual Effect = 0.346						Residual Effect = 0.058					

**Table-4.5c: Correlation coefficient between six characters of F<sub>2</sub> plants (BG102/Reshmi (Commercial pvt. hybrid victory seeds) of various population size 1000, 50 and 48**

Correlation between six characters of 1000 F <sub>2</sub> plants					
	PH (cm)	PPP	GPP	TW (g)	GYP Plant (g)
DFF	0.043	0.004	0.041	0.034	0.012
PH (cm)		0.147**	0.172**	0.047	0.067**
PPP			-0.012	0.034	0.335**
GPP				0.039	0.254**
TW(g)					0.135**
GYP Plant (g)					
Correlation coefficient between six characters of 50 F <sub>2</sub> selected plant					
1 <sup>st</sup> method of selection (HY)					
DFF	-0.009	0.281*	-0.092	-0.100	-0.331*
PH (cm)		0.163	0.152	0.203	0.014
PPP			-0.012	0.161	0.199
GPP				0.001	0.171
TW (g)					0.006
GYP Plant (g)					
2 <sup>nd</sup> method of selection (LY)					
	0.231*	-0.045	0.109	0.196	0.053
		0.086	0.152	0.151	0.218
			0.281*	-0.141	0.342*
				-0.135	-0.065
					-0.024
Correlation coefficient between six characters of 48 F <sub>2</sub> plants					
3 <sup>rd</sup> method of selection (MTL)					
DFF	0.055	0.028	-0.174	0.064	0.131
PH (cm)		-0.047	-0.018	0.043	0.337*
PPP			0.179	0.154	0.045
GPP				0.236	0.198
TW (g)					0.132
GYP Plant (g)					
Correlation coefficient between six characters of 50 F <sub>2</sub> plants					
4 <sup>th</sup> method of selection (RPS)					
	0.058	0.075	0.129	0.011	-0.034
		-0.041	0.064	-0.161	-0.220
			-0.152	-0.184	0.156
				0.095	0.103
					0.078

**Table 4.5.2c: Phenotypic (Upper value) and Genotypic (Lower value) Correlation Coefficient between different character Combination among six Characters in F<sub>3</sub> progeny of (BG102/Reshmi (Commercial pvt. hybrid victory seeds) under different methods of selection followed by two methods and date of sowing**

First method of selection (HY)											
		First date of DS					First date of TP				
		Ch-2	Ch-3	Ch-4	Ch-5	Ch-6	Ch-2	Ch-3	Ch-4	Ch-5	Ch-6
DFF	P	0.108	0.007	-0.043	0.034	0.143	-0.024	0.020	-0.082	0.048	0.152
	G	-0.047	0.023	-0.024	0.047	0.025	-0.105	-0.034	-0.020	0.068	0.118
PH (cm)	P		0.005	-0.063	0.222	-0.015		0.159	-0.133	0.434	0.146
	G		0.029	-0.049	0.262	-0.182		0.210	-0.171	0.354	0.086
PPP	P			-0.039	0.166	0.062			-0.058	0.217	0.018
	G			-0.067	0.178	0.082			-0.277	0.245	0.006
GPP	P				-0.398	0.077				-0.279	-0.096
	G				-0.419	0.113				-0.331	-0.153
TW(g)	P					0.214					0.245*
	G					0.239					0.311
Second date of DS											
DFF	P	0.024	0.014	-0.030	0.018	0.050	Second date of TP				
	G	0.085	-0.011	-0.031	0.062	0.019	-0.237	0.5952**	-0.059	-0.028	-0.014
PH (cm)	P		0.038	-0.044	0.204	-0.117		0.172	-0.094	-0.033	-0.017
	G		0.029	-0.048	0.231	-0.155		0.4750**	0.3261**	0.240	0.212
PPP	P			-0.044	0.163	0.045		0.330	0.325	0.235	0.218
	G			-0.050	0.196	0.062			0.058	0.014	0.383**
GPP	P				-0.413	0.097				0.071	0.257
	G				-0.434	0.081				0.474	0.108
TW(g)	P					0.230					0.157
	G					0.261					0.150
Second method of selection (LY)											
DFF	First date of DS					First date of TP					
	P	-0.040	-0.258	0.170	-0.150	-0.193	-0.031	-0.237	0.039	-0.131	-0.039
PH (cm)	G	-0.066	-0.337	0.240	-0.192	-0.312	-0.120	-0.328	-0.036	-0.213	-0.128
	P		-0.049	-0.086	0.149	0.036		0.047	0.088	0.053	0.999**
PPP	G		-0.049	-0.106	0.160	0.019		-0.206	0.123	0.062	0.997
	P			0.061	-0.078	0.265			-0.108	-0.090	0.045
GPP	G			0.124	-0.076	0.290			-0.140	-0.107	-0.209
	P				0.033	-0.017				0.037	0.094
TW(g)	G				0.034	-0.066				-0.141	0.125
	P					0.023					0.047
	G					0.038					0.049
		* Significant at P = 0.05					** Significant at P = 0.01				
Second date of DS											
DFF	P	0.126	-0.184	0.3661**	-0.171	-0.141	Second date of TP				
	G	-0.225	-0.481	0.198	-0.184	-0.410	-0.041	-0.256	0.036	-0.149	-0.223
PH (cm)	P		0.067	0.071	0.139	0.160	-0.121	-0.357	-0.032	-0.190	-0.307
	G		-0.163	-0.185	0.191	-0.031		0.048	0.095	0.078	0.233
PPP	P			0.054	-0.061	0.301		-0.197	0.121	0.011	0.093
	G			-0.106	-0.053	0.201			-0.102	-0.053	0.270
GPP	P				0.061	0.081			-0.129	-0.101	0.193
	G				0.081	-0.066				-0.040	0.015
TW(g)	P					0.041				-0.047	0.010
	G					0.059					0.060
		* Significant at P = 0.05					** Significant at P = 0.01				
Third method of selection (MTL)											
DFF	First date of DS					First date of TP					
	P	-0.008	0.006	-0.007	0.001	0.023	-0.006	-0.002	-0.002	0.028	0.028
PH (cm)	G	-0.013	0.002	-0.007	-0.001	0.020	-0.010	-0.006	-0.002	0.026	0.025
	P		0.012	-0.013	0.000	0.029		0.064	0.002	-0.009	-0.009
PPP	G		-0.001	-0.013	-0.005	0.020		0.053	0.003	-0.018	-0.019
	P			0.006	0.001	0.005			0.003	0.013	0.014
GPP	G			0.006	-0.005	-0.004			0.004	0.005	0.004
	P				-0.041	-0.121				0.005	0.005
TW(g)	G				-0.041	-0.122				0.006	0.006
	P					0.030					0.267
	G					0.026					0.262

Cont.....

		Second date of DS					Second date of TP				
		Ch-2	Ch-3	Ch-4	Ch-5	Ch-6	Ch-2	Ch-3	Ch-4	Ch-5	Ch-6
DFF	P	-0.007	0.007	-0.001	0.023	0.024	-0.006	0.002	0.000	0.001	0.019
	G	-0.013	0.001	-0.007	0.021	0.020	-0.009	-0.001	-0.004	-0.001	0.020
PH (cm)	P		0.013	0.007	-0.013	-0.011		0.017	0.010	0.008	-0.011
	G		0.001	-0.008	-0.020	-0.022		0.006	-0.006	0.003	-0.012
PPP	P			0.014	0.034	0.036			0.008	0.004	0.046
	G			-0.001	0.027	0.025			-0.009	-0.002	0.047
GPP	P				-0.032	-0.030				-0.012	-0.015
	G				-0.040	-0.043				-0.021	-0.017
TW(g)	P					0.346					0.002
	G					0.343					0.002
Forth method of selection (RPS)											
		First date of DS					First date of TP				
DFF	P	0.9970**	0.8642**	0.7124**	0.8312**	0.5490**	0.037	-0.161	0.377**	0.228	-0.223
	G	0.814	0.687	0.890	0.698	0.210	0.121	0.183	-0.228	0.057	-0.250
PH (cm)	P		0.8871**	0.6742**	0.65621**	0.386**		0.229	0.252	-0.353	-0.232
	G		0.647	0.941	0.971	0.383		0.253	0.252	-0.293	0.340
PPP	P			0.568**	0.495**	0.205			0.382**	0.057	0.342
	G			0.785	0.875	0.426			0.288	0.097	0.282
GPP	P				0.644**	0.190				0.227	0.326
	G				0.742	0.484				0.262	0.443
TW(g)	P					-0.226					-0.319
	G					0.457					-0.420
		Second date of DS					Second date of TP				
DFF	P	0.208	0.670**	0.822**	0.860**	0.525**	-0.006	0.004	0.001	0.001	0.018
	G	0.718	0.549	0.699	0.727	0.142	-0.009	-0.002	-0.004	-0.001	0.019
PH (cm)	P		0.833**	0.692**	0.744**	0.667**		0.016	0.007	0.007	-0.009
	G		0.740	0.859	0.656	0.196		0.007	-0.002	0.004	-0.012
PPP	P			0.613**	0.575**	0.122			0.008	0.004	0.057
	G			0.928	0.753	0.565			-0.009	-0.003	0.059
GPP	P				0.443**	0.326*				-0.013	-0.015
	G				0.458	0.517				-0.020	-0.015
TW(g)	P					-0.323					0.005
	G					-0.530					0.005
* Significant at P = 0.05						** Significant at P = 0.01					

**Table 4.6c: Genotypic Direct (Diagonal) and Indirect Effect of Six Characters on Yield of (BG102/Reshmi (Commercial pvt. hybrid victory seeds) in DS and TP as well as two date of sowing followed by different methods of selection**

First method of selection (HY)												
Characters	First date of DS						First date of TP					
	Ch-1	Ch-2	Ch-3	Ch-4	Ch-5	Correlation with GYP plant	Ch-1	Ch-2	Ch-3	Ch-4	Ch-5	Correlation with GYP plant
DFE	<b>-0.002</b>	0.013	0.001	-0.007	0.020	0.143	<b>0.099</b>	-0.004	0.003	0.001	0.019	0.152
PH (cm)	0.011	<b>-0.281</b>	0.001	-0.014	0.111	-0.015	-0.010	<b>0.038</b>	-0.019	0.013	0.123	0.146
PPP	-0.053	-0.008	<b>0.034</b>	-0.019	0.075	0.062	-0.003	0.008	<b>-0.089</b>	0.021	0.070	0.018
GPP	0.056	0.014	-0.002	<b>0.279</b>	-0.177	0.077	-0.002	-0.007	0.025	<b>-0.075</b>	-0.094	-0.096
TW(g)	-0.011	-0.074	0.006	-0.117	<b>0.423</b>	<b>0.214</b>	0.007	0.017	-0.022	0.025	<b>0.285</b>	0.245*
GYP Plant (g)	Residual Effect = 0.186						Residual Effect = 0.116					
Second date of DS												
Second date of TP												
DFE	<b>0.021</b>	-0.021	0.022	-0.008	0.027	0.050	<b>-2.214</b>	0.686	1.544	-0.026	-0.007	-0.014
PH (cm)	0.002	<b>-0.243</b>	-0.058	-0.012	0.099	-0.117	0.781	<b>-1.943</b>	1.235	0.091	0.054	0.212
PPP	0.020	-0.007	<b>-0.002</b>	-0.013	0.084	0.045	-0.032	-0.925	<b>2.594</b>	0.016	0.016	0.383**
GPP	-0.070	0.012	0.010	<b>0.256</b>	-0.186	0.097	0.208	-0.635	0.151	<b>0.278</b>	0.110	0.108
TW(g)	0.013	-0.056	-0.032	-0.111	<b>0.428</b>	0.230	0.072	-0.467	0.184	0.135	<b>0.225</b>	0.157
GYP Plant (g)	Residual Effect = 0.170						Residual Effect = 0.431					
Second method of selection (LY)												
First date of DS												
First date of TP												
DFE	<b>-0.227</b>	-0.001	-0.074	-0.009	-0.002	-0.193	<b>-0.015</b>	-0.120	0.003	0.000	0.004	-0.039
PH (cm)	0.015	<b>0.009</b>	-0.011	0.004	0.002	0.036	0.002	<b>0.997</b>	0.002	0.000	-0.001	0.999**
PPP	0.076	0.000	<b>0.220</b>	-0.005	-0.001	0.265	0.005	-0.206	<b>-0.010</b>	0.000	0.002	0.045
GPP	-0.054	-0.001	0.027	<b>-0.038</b>	0.000	-0.017	0.001	0.122	0.001	<b>-0.002</b>	0.002	0.094
TW(g)	0.043	0.001	-0.017	-0.001	<b>0.011</b>	0.023	0.003	0.062	0.001	0.000	<b>-0.017</b>	0.047
GYP Plant (g)	Residual Effect = 0.137						Residual Effect = 0.439					
Second date of DS												
Second date of TP												
DFE	<b>-0.464</b>	0.032	0.022	-0.001	0.760	-0.141	<b>-0.256</b>	-0.010	-0.042	-0.021	0.002	-0.223
PH (cm)	0.104	<b>-0.144</b>	0.007	0.001	-0.780	0.160	0.031	<b>0.085</b>	-0.023	0.001	-0.099	0.233
PPP	0.223	0.023	<b>-0.046</b>	0.001	0.021	0.301	0.091	-0.017	<b>0.119</b>	-0.001	0.001	0.270
GPP	-0.092	0.027	0.005	<b>-0.005</b>	-0.033	0.081	0.008	0.010	-0.015	<b>0.007</b>	0.041	0.015
TW(g)	0.085	-0.027	0.002	-0.042	<b>-0.041</b>	0.041	0.049	0.001	-0.012	-0.032	<b>-0.009</b>	0.060
GYP Plant (g)	Residual Effect = 0.185						Residual Effect = 0.109					
Third method of selection (MTL)												
First date of DS												
First date of TP												
DFE	<b>-0.893</b>	0.466	0.368	0.552	-0.283	0.023	<b>0.019</b>	0.000	0.000	0.000	0.007	0.028
PH (cm)	-0.727	<b>0.573</b>	0.347	0.583	-0.394	0.029	0.000	<b>-0.014</b>	0.000	0.000	-0.005	-0.009
PPP	-0.613	0.371	<b>0.536</b>	0.487	-0.355	0.005	0.000	-0.001	<b>0.004</b>	0.000	0.001	0.014
GPP	-0.795	0.539	0.421	<b>0.620</b>	-0.301	-0.121	0.000	0.000	0.000	<b>0.004</b>	0.001	0.005
TW(g)	-0.623	0.556	0.469	0.460	<b>-0.405</b>	0.030	0.000	0.000	0.000	0.000	<b>0.261</b>	0.267
GYP Plant (g)	Residual Effect = 0.374						Residual Effect = 0.069					
Second date of DS												
Second date of TP												
DFE	<b>0.012</b>	0.020	0.019	0.021	0.007	0.024	<b>0.020</b>	0.011	-0.027	0.100	-0.140	0.019
PH (cm)	-0.015	<b>-0.016</b>	0.037	0.021	-0.007	-0.011	-0.017	<b>-0.013</b>	0.030	0.012	0.370	-0.011
PPP	0.012	-0.145	<b>0.016</b>	0.017	0.009	0.036	-0.011	-0.012	<b>0.047</b>	0.010	-0.800	0.046
GPP	-0.089	0.010	-0.056	<b>-0.029</b>	-0.014	-0.030	-0.011	0.010	-0.040	<b>-0.016</b>	-0.033	-0.015
TW(g)	0.025	0.030	0.042	0.001	<b>0.340</b>	0.346	0.000	-0.032	-0.011	0.000	<b>0.001</b>	0.002
GYP Plant (g)	Residual Effect = 0.118						Residual Effect = 0.003					

Cont....

Forth method of selection (RPS)												
First date of DS							First date of TP					
DFP	<b>-0.696</b>	-0.949	-0.739	2.247	0.279	0.549**	<b>-0.536</b>	-0.002	0.042	0.281	-0.035	-0.223
PH (cm)	-0.500	<b>1.321</b>	-0.996	2.761	0.252	0.386**	-0.065	<b>-0.020</b>	0.058	0.188	0.179	-0.232
PPP	-0.382	-0.978	<b>-1.346</b>	2.982	0.289	0.205	-0.098	-0.005	<b>0.231</b>	0.214	-0.059	0.342
GPP	-0.487	-1.136	-1.249	<b>3.213</b>	0.176	0.190	-0.202	-0.005	0.066	<b>0.744</b>	-0.161	0.326
TW(g)	-0.506	-0.867	-1.014	1.473	<b>0.384</b>	-0.226	-0.030	0.006	0.022	0.195	<b>-0.613</b>	-0.319
GYP Plant (g)	Residual Effect = 0.340						Residual Effect = 0.470					
Second date of DS							Second date of TP					
DFP	<b>0.019</b>	0.230	0.072	0.030	0.056	0.525**	<b>0.019</b>	0.000	-0.001	0.060	-0.052	0.018
PH (cm)	-0.020	<b>0.205</b>	-0.668	0.039	0.059	0.667**	-0.016	<b>-0.012</b>	0.043	0.025	0.018	-0.009
PPP	0.010	0.011	<b>0.025</b>	0.094	0.071	0.122	-0.032	-0.059	<b>0.059</b>	0.012	-0.013	0.057
GPP	-0.001	0.145	-0.044	<b>0.537</b>	0.046	0.326*	-0.081	0.021	-0.050	<b>-0.014</b>	-0.015	-0.015
TW(g)	-0.340	0.096	-0.016	0.002	<b>-0.001</b>	-0.323	0.000	-0.043	-0.016	0.028	<b>0.005</b>	<b>0.005</b>
GYP Plant (g)	Residual Effect = 0.004						Residual Effect = 0.004					

**Table-4.5.1c: Estimates of correlation coefficients between F<sub>2</sub> and F<sub>3</sub> generation of (BG102/Reshmi (Commercial pvt. hybrid victory seeds) for six characters in two Date and methods of sowing followed by different method of selection.**

	F <sup>1</sup> Date of sowing												2 <sup>nd</sup> Date of sowing											
	DS						TP						DS						TP					
	HY	LY	MTL	RPS	HY	LY	MTL	RPS	HY	LY	MTL	RPS	HY	LY	MTL	RPS	HY	LY	MTL	RPS				
DFP	0.028	0.215	-0.149	0.107	0.029	0.216	-0.144	0.107	0.029	0.215	-0.144	0.107	0.028	0.210	-0.144	0.107								
PH	0.043	-0.044	0.104	0.058	0.176	0.153	0.157	0.206	-0.062	0.010	0.115	0.206	0.051	0.162	0.157	0.206								
PPP	0.616**	0.519**	0.636**	0.715**	0.609**	0.541**	0.616**	0.727**	0.619**	0.516**	0.629**	0.715**	0.086	0.510**	0.618**	0.733**								
GPP	0.389**	0.138	0.276*	0.304*	0.242*	0.055	0.287*	0.271*	0.387**	0.234*	0.308*	0.313*	0.349**	0.055	0.287*	0.268*								
Tw	0.308*	0.304*	0.150	0.233*	0.301*	0.281*	0.148	0.236*	0.303*	0.304*	0.150	0.234*	0.296*	0.292*	0.215	0.208								
GYP plant	0.998**	0.997**	0.998**	0.999**	0.851**	0.480**	0.589**	0.692**	0.948**	0.939**	0.701**	0.786**	-0.024	0.085	0.491**	0.745**								

HY= High yield, LY = Low yield, MTL = Multi trait limit, RPS = Random Plant selection

**Table-4.5a: Correlation coefficient between six characters of F<sub>2</sub> plants (BG102/BPT5204) of various population size 1000, 50 and 48**

Correlation between six characters of 1000 F <sub>2</sub> plants					
	PH (cm)	PPP	GPP	TW (g)	GYP Plant (g)
DFP	-0.001	0.030	-0.015	0.020	0.034
PH (cm)		0.149	0.175*	-0.017	0.228**
PPP			0.057	-0.057	0.503**
GPP				-0.034	0.439**
TW(g)					0.012
GYP Plant (g)					

Correlation coefficient between six characters of 50 F <sub>2</sub> selected plant										
	1 <sup>st</sup> method of selection (HY)					2 <sup>nd</sup> method of selection (LY)				
	DFP	0.2463*	0.163	-0.244**	0.294*	0.094	0.106	0.222	-0.073	0.153
PH (cm)		0.051	-0.124	0.153	0.099		0.232	-0.006	0.282*	-0.144
PPP			-0.351	0.342**	0.146			-0.062	0.404**	-0.452
GPP				0.116	-0.202				0.042	0.033
TW (g)					0.123					-0.231
GYP Plant (g)										
Correlation coefficient between six characters of 48 F <sub>2</sub> plants						Correlation coefficient between six characters of 50 F <sub>2</sub> plants				
	3 <sup>rd</sup> method of selection (MTL)					4 <sup>th</sup> method of selection (RPS)				
	DFP	0.264*	-0.089	-0.093	-0.173	0.152	0.069	-0.201	0.021	0.018
PH (cm)		0.320*	0.068	0.012	0.057		-0.217	0.278*	0.033	-0.056
PPP			-0.109	0.073	0.206			-0.427**	0.200	-0.071
GPP				0.307*	-0.024				0.034	0.118
TW (g)					0.119					0.185

**Table-4.5.1a: Estimates of correlation coefficients between F<sub>2</sub> and F<sub>3</sub> generation of BG102/BPT 5204 for six characters in two Date and methods of sowing followed by different method of selection.**

	1 <sup>st</sup> Date of sowing												2 <sup>nd</sup> Date of sowing											
	DS						TP						DS						TP					
	HY	LY	MTL	RPS	HY	LY	MTL	RPS	HY	LY	MTL	RPS	HY	LY	MTL	RPS	HY	LY	MTL	RPS				
DFP	0.243*	0.386**	0.3014*	0.518**	0.273*	0.370**	0.122	0.478**	0.273*	0.370**	0.122	0.478**	0.273*	0.375**	0.122	0.478**								
PH	-0.103	-0.266*	-0.031	-0.013	-0.07	-0.039	0.127	-0.108	-0.055	-0.3043*	0.064	-0.002	-0.055	-0.253*	0.064	-0.01								
PPP	0.781**	0.193	0.3407**	0.213	0.415**	0.112	0.148	0.544**	0.126	0.091	-0.183	-0.187	-0.137	0.193	-0.148	-0.116								
GPP	0.000	0.064	0.401**	0.434**	0.682**	0.482**	0.115	0.073	0.709**	0.509**	0.614**	0.454**	0.198	0.509**	0.129	0.050								
Tw	0.019	0.610**	0.668**	0.543**	0.165	0.120	0.414**	0.044	0.466**	0.164	0.073	0.578**	0.113	0.073	0.317*	0.578**								
GYP plant	0.934**	0.993**	0.9974**	0.967**	0.963**	0.164	0.997**	0.173	0.905**	0.198	-0.181	-0.2574*	0.107	0.993**	-0.084	0.127								

HY= High yield, LY = Low yield, MTL = Multi trait limit, RPS = Random Plant selection

**Table-4.5.2a: Phenotypic (Upper value) and Genotypic (Lower value) Correlation Coefficient between different character Combination among six Characters in F<sub>3</sub> progeny of BG102/BPT5204 under different methods of selection followed by two methods and date of sowing**

<b>1<sup>st</sup> method of selection (HY)</b>											
		<b>1<sup>st</sup> Date DS</b>					<b>1<sup>st</sup> Date TP</b>				
		<b>Ch-2</b>	<b>Ch-3</b>	<b>Ch-4</b>	<b>Ch-5</b>	<b>Ch-6</b>	<b>Ch-2</b>	<b>Ch-3</b>	<b>Ch-4</b>	<b>Ch-5</b>	<b>Ch-6</b>
DFF	P	-0.256	0.140	-0.014	-0.128	0.155	-0.273	0.335*	-0.096	0.050	0.226
	G	-0.346	0.104	-0.201	-0.155	0.017	-0.627	0.215	-0.311	0.015	0.041
PH (cm)	P		0.084	0.188	0.059	0.041		-0.096	-0.074	0.090	0.027
	G		0.018	0.249	0.029	-0.041		-0.151	-0.085	0.178	0.163
PPP	P			-0.034	0.437**	0.266			-0.226	0.215	0.110
	G			-0.086	0.324	0.248			-0.376	0.210	-0.025
GPP	P				-0.121	0.371**				0.054	0.129
	G				-0.135	0.329				0.030	-0.006
TW(g)	P					0.002					0.069
	G					0.0019					0.041
<b>2<sup>nd</sup> method of selection (LY)</b>											
		<b>2<sup>nd</sup> Date DS</b>					<b>2<sup>nd</sup> Date TP</b>				
		<b>Ch-2</b>	<b>Ch-3</b>	<b>Ch-4</b>	<b>Ch-5</b>	<b>Ch-6</b>	<b>Ch-2</b>	<b>Ch-3</b>	<b>Ch-4</b>	<b>Ch-5</b>	<b>Ch-6</b>
DFF	P	-0.167	-0.045	-0.135	-0.110	0.027	-0.004	0.084	0.038	-0.013	0.118
	G	-0.601	-0.098	-0.242	-0.207	0.042	-0.785	-0.182	-0.215	-0.050	-0.084
PH (cm)	P		0.570**	0.292*	0.017	0.170		0.517	0.401**	0.218	0.380**
	G		0.412	0.104	0.039	-0.278		0.368	0.216	0.279	0.222
PPP	P			0.339*	0.191	0.209			0.659**	0.626**	0.408**
	G			0.249	0.230	0.060			0.604	0.671	0.323
GPP	P				-0.098	0.238				0.470	0.261
	G				-0.105	0.152				0.493	0.165
TW(g)	P					0.011					0.338*
	G					0.014					0.349
<b>2<sup>nd</sup> method of selection (LY)</b>											
		<b>1<sup>st</sup> Date DS</b>					<b>1<sup>st</sup> Date TP</b>				
		<b>Ch-2</b>	<b>Ch-3</b>	<b>Ch-4</b>	<b>Ch-5</b>	<b>Ch-6</b>	<b>Ch-2</b>	<b>Ch-3</b>	<b>Ch-4</b>	<b>Ch-5</b>	<b>Ch-6</b>
DFF	P	-0.078	-0.020	0.020	0.157	0.098	-0.078	-0.020	0.020	0.157	0.098
	G	-0.279	-0.253	-0.140	0.280	0.019	-0.279	-0.253	-0.140	0.280*	-0.019
PH (cm)	P		-0.135	0.080	0.103	-0.068		-0.135	0.080	0.103	-0.068
	G		-0.463	0.103	0.255	-0.226		-0.463	0.103	0.255	-0.139
PPP	P			0.149	0.103	-0.141			0.149	0.103	-0.141
	G			0.051	0.137	-0.317			0.051	0.137	-0.280
GPP	P				-0.086	0.130				-0.086	0.130
	G				-0.075	0.024				-0.075	0.041
TW(g)	P					0.000					0.000
	G					0.002					0.028
* Significant at P = 0.05						** Significant at P = 0.01					
		<b>2<sup>nd</sup> Date DS</b>					<b>2<sup>nd</sup> Date TP</b>				
		<b>Ch-2</b>	<b>Ch-3</b>	<b>Ch-4</b>	<b>Ch-5</b>	<b>Ch-6</b>	<b>Ch-2</b>	<b>Ch-3</b>	<b>Ch-4</b>	<b>Ch-5</b>	<b>Ch-6</b>
DFF	P	-0.077	-0.100	-0.007	-0.050	0.118	0.151	-0.066	0.019	-0.145	0.089
	G	-0.485	-0.372	-0.050	-0.237	0.571	-0.389	-0.317	-0.228	-0.287	-0.430
PH (cm)	P		0.172	0.184	0.331*	0.114		0.283*	-0.050	0.152	0.233
	G		0.175	0.186	0.341	0.189		0.146	-0.367	0.247	-0.261
PPP	P			-0.117	0.140	-0.106			0.406	0.491**	0.182
	G			-0.117	0.149	-0.186			0.348	0.350	0.003
GPP	P				0.137	0.106				0.425	0.141
	G				0.142	0.150				0.158	-0.073
TW(g)	P					0.012					0.209
	G					-0.066					0.232
* Significant at P = 0.05						** Significant at P = 0.01					

3 <sup>rd</sup> method of selection (MTL)											
		1 <sup>st</sup> Date DS					1 <sup>st</sup> Date TP				
		Ch-2	Ch-3	Ch-4	Ch-5	Ch-6	Ch-2	Ch-3	Ch-4	Ch-5	Ch-6
DFF	P	-0.088	0.053	0.090	-0.074	0.059	0.229	-0.098	-0.014	0.187	-0.248
	G	-0.810	-0.252	0.085	-0.124	-0.060	-0.171	-0.169	-0.172	0.231	-0.357
PH (cm)	P		0.106	-0.026	0.162	0.178		-0.425	0.099	0.082	0.066
	G		-0.234	-0.084	0.192	0.081		-0.920	-0.931	0.206	-0.140
PPP	P			-0.044	-0.276	-0.132			0.093	-0.041	-0.085
	G			-0.076	-0.330	-0.225			1.000	-0.039	-0.115
GPP	P				0.009	0.183				0.052	0.110
	G				0.002	0.191				-0.039	-0.117
TW(g)	P					0.155					0.084
	G					0.157					0.098
2 <sup>nd</sup> Date DS											
DFF	P	0.122	-0.080	0.218	-0.167	-0.051	-0.073	-0.016	0.093	-0.203	0.110
	G	-0.617	-0.260	0.006	-0.202	-0.245	-0.326	-0.191	-0.046	-0.248	-0.102
PH (cm)	P		0.034	0.037	0.366*	0.064		0.214	0.013	-0.107	0.125
	G		-0.209	-0.405	0.215	-0.195		-0.056	-0.159	0.043	-0.125
PPP	P			0.356*	0.073	0.546**			0.452**	0.575**	0.202
	G			0.305	0.061	0.522			0.376	0.547	0.028
GPP	P				-0.084	0.247				0.527**	0.200
	G				-0.085	0.175				0.552	0.040
TW(g)	P					-0.079					0.216
	G					-0.074					0.230
4 <sup>th</sup> method of selection (RPS)											
		1 <sup>st</sup> Date DS					1 <sup>st</sup> Date TP				
		Ch-2	Ch-3	Ch-4	Ch-5	Ch-6	Ch-2	Ch-3	Ch-4	Ch-5	Ch-6
DFF	P	-0.241	-0.045	-0.149	-0.192	-0.228	-0.191	0.095	0.020	-0.075	-0.287
	G	-0.321	-0.065	-0.154	-0.178	-0.238	-0.279	-0.253	-0.140	0.280	-0.019
PH (cm)	P		-0.026	0.094	0.204	-0.077		-0.299	0.131	-0.012	-0.025
	G		-0.088	0.142	0.251	-0.089		-0.463	0.103	0.255	-0.139
PPP	P			-0.279	0.113	0.005			-0.064	-0.199	0.096
	G			-0.304	0.132	0.006			0.051	0.137	-0.280
GPP	P				-0.259	0.048				0.003	0.137
	G				-0.270	0.049				-0.075	0.041
TW(g)	P					0.214					-0.018
	G					0.226					0.028
2 <sup>nd</sup> Date DS											
DFF	P	-0.336	-0.174	-0.167	-0.225	-0.116	-0.121	-0.188	0.160	-0.198	-0.058
	G	-0.378	-0.280	-0.188	-0.279	-0.092	-0.509	-0.332	0.065	-0.177	-0.449
PH (cm)	P		0.365**	0.108	0.305*	0.085		0.549**	-0.110	0.398**	0.307*
	G		0.497	0.106	0.292	0.131		0.530	-0.397	0.398	-0.311
PPP	P			0.182	0.076	0.438**			0.084	0.019	0.090
	G			0.246	0.121	0.040			0.004	0.056	-0.136
GPP	P				0.070	0.088				-0.242	0.130
	G				0.078	0.143				-0.230	-0.073
TW(g)	P					0.392**					0.268
	G					0.240					0.268
* Significant at P = 0.05						** Significant at P = 0.01					

**Table-4.6a: Genotypic Direct (Diagonal) and Indirect Effect of Six Characters on Yield of BG102/BPT5204 in DS and TP as well as two Date of sowing followed by different methods of selection**

<b>1<sup>st</sup> method of selection (HY)</b>												
	<b>1<sup>st</sup> Date DS</b>					<b>Correlation with GYP Plant</b>	<b>1<sup>st</sup> Date TP</b>					<b>Correlation with GYP Plant</b>
	1	2	3	4	5		1	2	3	4	5	
DFF	-0.060	0.048	0.033	-0.076	0.013	0.155	0.321	-0.243	0.005	-0.043	-0.001	0.226
PH (cm)	0.020	-0.138	0.006	0.094	-0.002	0.041	-0.202	0.387	-0.004	-0.012	-0.008	0.027
PPP	0.010	-0.003	0.320	-0.033	-0.037	0.266	0.069	-0.059	0.025	-0.052	-0.009	0.110
GPP	0.020	-0.034	-0.027	0.379	0.011	0.371	-0.100	-0.033	-0.010	0.138	-0.001	0.129
TW(g)	0.040	-0.004	0.140	-0.051	-0.085	0.002	0.005	0.069	0.005	0.004	-0.042	0.069
GYP Plant (g)												
Residual Effect = 0.209							Residual Effect = 0.072					
<b>1<sup>st</sup> method of selection (HY)</b>												
	<b>2<sup>nd</sup> Date DS</b>						<b>2<sup>nd</sup> Date TP</b>					
	1	2	3	4	5		1	2	3	4	5	
DFF	-0.271	0.341	-0.026	-0.017	0.015	0.027	0.081	-0.139	-0.029	0.014	-0.011	0.118
PH (cm)	0.163	-0.567	0.110	0.007	-0.003	0.170	-0.064	0.177	0.059	-0.014	0.064	0.380
PPP	0.026	-0.233	0.267	0.018	-0.017	0.209	-0.015	0.065	0.160	-0.039	0.153	0.408
GPP	0.066	-0.059	0.066	0.071	0.008	0.238	-0.017	0.038	0.096	-0.065	0.113	0.261
TW(g)	0.056	-0.022	0.061	-0.007	-0.074	0.011	-0.004	0.049	0.107	-0.032	0.228	0.338
GYP Plant (g)												
Residual Effect = 0.172							Residual Effect = 0.152					
<b>2<sup>nd</sup> method of selection (LY)</b>												
	<b>1<sup>st</sup> Date DS</b>						<b>1<sup>st</sup> Date TP</b>					
	1	2	3	4	5		1	2	3	4	5	
DFF	0.144	-1.817	-0.016	1.668	-0.004	0.098	-0.766	0.324	0.290	-0.020	0.191	0.098
PH (cm)	-0.088	2.984	-0.051	-3.041	-0.158	-0.068	0.214	-1.159	0.531	0.015	0.173	-0.068
PPP	-0.023	-1.457	0.105	1.353	-0.017	-0.141	0.194	0.536	-1.148	0.007	0.093	-0.141
GPP	-0.079	2.998	-0.047	-3.026	-0.150	0.130	0.107	-0.119	-0.059	0.146	-0.051	0.130
TW(g)	0.002	1.545	0.006	-1.484	-0.305	0.000	-0.215	-0.295	-0.157	-0.011	0.681	0.000
GYP Plant (g)												
Residual Effect = 0.479							Residual Effect = 0.384					
	<b>2<sup>nd</sup> Date DS</b>						<b>2<sup>nd</sup> Date TP</b>					
	1	2	3	4	5		1	2	3	4	5	
DFF	0.873	-0.298	-0.021	-0.005	0.022	0.118	-0.839	0.349	0.008	0.145	-0.092	0.089
PH (cm)	-0.423	0.615	0.010	0.018	-0.031	0.114	0.326	-0.896	-0.004	0.233	0.080	0.233
PPP	-0.325	0.108	0.056	-0.012	-0.014	-0.106	0.266	-0.130	-0.025	-0.221	0.113	0.182
GPP	-0.044	0.114	-0.007	0.099	-0.013	0.106	0.191	0.329	-0.009	-0.636	0.051	0.141
TW(g)	-0.207	0.210	0.008	0.014	-0.091	0.012	0.241	-0.222	-0.009	-0.100	0.322	0.209
GYP Plant (g)												
Residual Effect = 0.375							Residual Effect = 0.285					
<b>3<sup>rd</sup> method of selection (MTL)</b>												
	<b>1<sup>st</sup> Date DS</b>						<b>1<sup>st</sup> Date TP</b>					
	1	2	3	4	5		1	2	3	4	5	
DFF	-0.602	0.412	0.120	0.014	-0.003	0.059	-0.296	0.018	0.008	-0.001	0.023	-0.248
PH (cm)	0.487	-0.508	0.111	-0.014	0.004	0.178	-0.068	0.077	0.036	0.010	0.010	0.066
PPP	0.151	0.119	-0.475	-0.012	-0.008	-0.132	0.029	-0.033	-0.086	0.009	-0.005	-0.085
GPP	-0.051	0.043	0.036	0.163	0.000	0.183	0.004	0.008	-0.008	0.100	0.007	0.110
TW(g)	0.075	-0.098	0.157	0.000	0.023	0.155	-0.055	0.006	0.003	0.005	0.125	0.084
GYP Plant (g)												
Residual Effect = 0.479							Residual Effect = 0.121					
	<b>2<sup>nd</sup> Date DS</b>						<b>2<sup>nd</sup> Date TP</b>					
	1	2	3	4	5		1	2	3	4	5	
DFF	-0.391	0.233	-0.097	-0.001	0.010	-0.051	-0.115	0.070	0.034	0.007	-0.098	0.110
PH (cm)	0.241	-0.378	-0.078	0.038	-0.018	0.064	0.037	-0.214	0.010	0.024	0.017	0.125
PPP	0.101	0.079	0.374	-0.029	-0.004	0.546	0.022	0.012	-0.177	-0.057	0.228	0.202
GPP	-0.002	0.153	0.114	-0.094	0.004	0.247	0.005	0.034	-0.067	-0.152	0.218	0.200
TW(g)	0.079	-0.139	0.027	0.008	-0.050	-0.079	0.028	-0.009	-0.102	-0.084	0.396	0.216
GYP Plant (g)												
Residual Effect = 0.351							Residual Effect = 0.118					

<b>4<sup>th</sup> method of selection (RPS)</b>												
	<b>1<sup>st</sup> Date DS</b>							<b>1<sup>st</sup> Date TP</b>				
DFE	-0.258	0.084	0.002	-0.017	-0.050	-0.228	-0.689	0.268	0.250	-0.020	0.171	-0.287
PH (cm)	0.083	-0.261	0.003	0.016	0.071	-0.077	0.192	-0.959	0.458	0.014	0.156	-0.025
PPP	0.017	0.023	-0.037	-0.034	0.037	0.005	0.174	0.444	-0.989	0.007	0.084	0.096
GPP	0.040	-0.037	0.011	0.111	-0.076	0.048	0.096	-0.099	-0.051	0.140	-0.046	0.137
TW(g)	0.046	-0.066	-0.005	-0.030	0.281	0.214	-0.193	-0.244	-0.136	-0.010	0.612	-0.018
GYP Plant (g)												
	Residual Effect = 0.153							Residual Effect = 0.445				
	<b>2<sup>nd</sup> Date DS</b>							<b>2<sup>nd</sup> Date TP</b>				
DFE	0.091	0.085	-0.145	-0.004	-0.118	-0.116	-0.891	0.615	-0.061	-0.025	-0.087	-0.058
PH (cm)	-0.035	-0.224	0.258	0.002	0.129	0.085	0.453	-1.209	0.097	0.152	0.196	0.307
PPP	-0.026	-0.111	0.519	0.006	0.051	0.438	0.296	-0.641	0.184	-0.002	0.028	0.090
GPP	-0.017	-0.024	0.127	0.024	0.033	0.088	-0.058	0.480	0.001	-0.382	-0.114	0.130
TW(g)	-0.025	-0.068	0.063	0.002	0.422	0.392	0.158	-0.481	0.010	0.088	0.493	0.268
GYP Plant (g)												
	Residual Effect = 0.358							Residual Effect = 0.09				

**Table-4.2a: Statistical parameters of F<sub>2</sub> population of BG102/BPT5204 for different Traits**

	<b>DF</b>	<b>PH (cm)</b>	<b>PPP</b>	<b>GPP</b>	<b>GYP plant (g)</b>
Mean	83.97	116.16	8.08	78.48	10.12
Range	77- 98	73 - 158	2 - 20	12 - 176	0.50 - 36.40
Variance	16.24	169.44	9.04	736.40	32.36
SD	4.03	13.02	3.01	27.14	5.69
S.E.	0.13	0.41	0.10	0.86	0.18
Median	-	117	8.00	76.00	9.10
Mode	-	100	7.00	70.00	8.90
Kurtosis	-	0.21	0.67	0.18	1.88
Skewness	-	-0.07	0.75	0.55	1.18
CV %	4.79	11.21	37.21	34.58	56.21
n	1000	1000	1000	1000	1000

DF - Days to flowering, PH – Plant height, PPP – Panicle per plant, GPP – Grain per panicle, GYP plant – Grain yield per plant

**Table-4.2b: Statistical parameters of F<sub>2</sub> population of BG102/Naveen for different Traits**

	<b>DF</b>	<b>PH (cm)</b>	<b>PPP</b>	<b>GPP</b>	<b>GYP plant (g)</b>
Mean	84	115.37	8	69.60	10.01
Range	79-92	68 - 150	1 - 19	12 - 150	0.10 - 33.70
Variance	4.00	100.41	8.46	635.44	28.22
SD	2.00	2.91	2.67	5.31	5.31
S.E.	0.06	0.09	0.08	0.17	0.17
Median	-	115.00	7.00	67.50	9.20
Mode	-	115.00	7.00	60.00	6.50
Kurtosis	-	1.58	0.45	-0.28	0.46
Skewness	-	-0.44	0.79	0.45	0.74
CV %	2.00	2.52	35.18	7.63	53.03
n	1000	1000	1000	1000	1000

DF - Days to flowering, PH – Plant height, PPP – Panicle per plant, GPP – Grain per panicle, GYP plant – Grain yield per plant

**Table-4.2c: Statistical parameters of F<sub>2</sub> population of BG102/Reshmi (Commercial pvt. hybrid victory seeds) for different Traits**

	<b>DF</b>	<b>PH (cm)</b>	<b>PPP</b>	<b>GPP</b>	<b>GYP plant (g)</b>
Mean	89	115.22	6.82	80.22	9.41
Range	82-100	82 – 195	2 - 19	16 - 150	0.50 - 31.50
Variance	26.00	125.84	7.27	734.44	16.19
SD	5.00	11.22	2.70	27.10	4.02
S.E.	0.16	0.35	0.09	0.86	0.13
Median	-	115.00	6.00	80.00	9.10
Mode	-	100.00	5.00	40.00	10.00
Kurtosis	-	4.21	1.02	-0.79	2.41
Skewness	-	0.61	0.85	0.01	0.89
CV %	6.00	9.74	39.53	33.78	42.76
n	1000	1000	1000	1000	1000

DF - Days to flowering, PH – Plant height, PPP – Panicle per plant, GPP – Grain per panicle, GYP plant – Grain yield per plant

Table-4.3b: DFF of F<sub>3</sub> progeny, of various F<sub>2</sub>BG102/Navreen plants selected on different methods of selection and grown under different crop ecology

Sl. No.	F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2013				F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014							
		DFF	DS	TP	TP	1 <sup>st</sup> Date	2 <sup>nd</sup> Date	DS	TP		1 <sup>st</sup> Date	2 <sup>nd</sup> Date	DFF	DS		TP	TP	1 <sup>st</sup> Date	2 <sup>nd</sup> Date		DS	TP	1 <sup>st</sup> Date	2 <sup>nd</sup> Date	DFF	DS	TP	TP
1	183	87	75	85	90	167	86	74	84	78	89	98	82	72	83	76	87	651	84	75	85	79	90	84	75	85	79	90
2	187	85	75	86	90	175	84	81	91	84	96	20	82	72	83	76	87	18	83	72	82	76	87	83	72	82	76	87
3	645	84	74	85	89	135	87	81	91	85	96	61	61	71	82	75	86	435	82	73	83	77	88	82	73	83	77	88
4	621	84	72	83	87	173	85	74	84	78	89	87	81	73	84	77	88	445	87	75	86	79	90	87	75	86	79	90
5	629	83	72	82	87	130	82	75	86	79	90	535	87	76	87	80	91	418	83	75	85	79	90	83	75	85	79	90
6	887	83	77	88	92	168	83	76	86	80	91	77	85	75	85	79	90	414	82	72	82	76	87	82	72	82	76	87
7	846	82	75	86	90	191	85	76	86	80	91	554	84	72	83	76	87	438	85	77	87	81	92	85	77	87	81	92
8	882	84	74	84	89	151	82	78	88	82	93	381	82	72	83	76	87	450	85	75	85	79	90	85	75	85	79	90
9	375	85	73	83	88	131	82	74	84	78	89	57	82	73	83	77	88	473	82	79	90	83	94	82	79	90	83	94
10	976	83	79	89	94	164	88	78	88	82	93	97	82	73	83	77	88	497	82	74	85	78	89	82	74	85	78	89
11	166	86	73	84	77	188	87	76	86	80	91	26	82	73	84	77	88	750	82	74	84	78	89	82	74	84	78	89
12	597	87	72	82	87	139	85	78	89	82	93	46	82	75	85	76	90	407	83	77	87	81	92	83	77	87	81	92
13	814	86	72	82	87	157	87	73	84	77	88	69	84	72	83	76	87	171	82	77	88	81	92	82	77	88	81	92
14	11	79	72	82	87	141	86	72	82	76	87	60	85	75	85	79	90	71	82	72	82	76	87	82	72	82	76	87
15	110	82	76	86	91	662	85	72	82	76	87	229	83	75	85	79	90	403	84	75	86	79	90	84	75	86	79	90
16	132	85	77	87	92	177	87	76	88	79	90	2	82	72	82	76	87	409	81	72	83	76	87	81	72	83	76	87
17	927	81	78	88	93	480	85	72	82	76	87	448	82	72	83	76	87	479	84	72	82	73	87	84	72	82	73	87
18	560	82	72	82	87	500	82	79	89	83	94	147	82	74	85	78	89	486	82	74	85	78	89	82	74	85	78	89
19	256	82	73	83	88	152	83	74	84	78	89	180	87	74	85	78	89	481	83	71	82	75	86	83	71	82	75	86
20	740	81	74	85	89	185	83	75	83	79	90	226	84	72	83	76	87	447	82	74	84	78	89	82	74	84	78	89
21	788	81	77	87	92	314	85	75	87	79	90	643	90	74	85	78	89	432	82	71	82	75	86	82	71	82	75	86
22	153	85	74	85	89	320	85	76	86	80	91	468	86	72	82	76	87	477	89	71	82	75	86	89	71	82	75	86
23	713	84	74	85	89	321	83	80	89	84	95	190	86	75	85	79	90	145	84	74	84	78	89	84	74	84	78	89
24	170	87	70	80	85	325	83	73	85	77	88	470	85	74	85	78	89	462	82	72	82	76	87	82	72	82	76	87
25	396	89	72	83	87	311	82	75	85	79	90	890	82	73	83	77	88	467	82	72	82	76	87	82	72	82	76	87
26	161	86	74	84	89	316	84	74	84	78	89	280	82	74	85	78	89	96	84	73	83	77	88	84	73	83	77	88
27	246	81	77	87	92	323	84	73	83	77	88	272	82	72	82	76	87	460	87	75	85	79	90	87	75	85	79	90

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Sl. No.	F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014							
		1 <sup>st</sup> method of selection (HY)		2 <sup>nd</sup> Date			1 <sup>st</sup> Date		2 <sup>nd</sup> Date			1 <sup>st</sup> Date		2 <sup>nd</sup> Date			1 <sup>st</sup> Date		2 <sup>nd</sup> Date			1 <sup>st</sup> Date		2 <sup>nd</sup> Date		1 <sup>st</sup> Date		2 <sup>nd</sup> Date	
		DS	TP	DS	TP		DS	TP	DS	TP		DS	TP	DS	TP		DS	TP	DS	TP		DS	TP	DS	TP	DS	TP	DS	TP
28	718	83	74	84	78	89	144	85	73	83	77	88	261	87	72	82	76	87	420	82	72	83	87						
29	121	90	78	88	82	93	313	82	78	88	82	93	874	84	72	83	73	87	408	82	73	83	87						
30	284	82	78	88	82	93	327	83	72	82	76	87	441	83	73	84	77	88	415	82	73	84	88						
31	937	84	76	86	80	91	186	82	75	85	79	90	528	85	72	82	76	87	476	84	75	86	87						
32	929	81	72	82	76	87	310	85	79	91	83	94	504	82	72	82	76	87	75	82	72	82	87						
33	165	83	73	83	77	88	305	82	74	83	78	89	431	82	73	84	77	88	660	82	75	85	89						
34	286	84	76	86	80	91	399	85	77	89	81	92	532	83	72	83	76	87	733	82	71	82	86						
35	821	88	78	88	82	93	378	81	76	86	80	91	335	85	72	82	76	87	33	83	74	85	89						
36	466	86	77	87	81	92	350	85	73	82	77	88	210	89	72	82	76	87	133	84	72	82	87						
37	122	84	75	85	79	90	303	87	76	87	80	91	27	82	72	83	76	87	23	82	69	80	84						
38	322	82	77	88	81	92	353	82	77	87	81	92	959	82	72	82	73	87	181	84	71	82	86						
39	642	83	77	87	81	92	351	85	74	85	78	89	988	82	72	82	76	87	196	83	71	82	86						
40	659	82	74	84	78	89	383	84	74	84	78	89	968	84	72	82	76	87	179	85	72	82	87						
41	456	85	78	88	82	93	357	82	77	87	81	92	923	82	73	83	77	88	455	90	71	82	86						
42	696	85	78	89	82	93	371	87	73	84	77	88	986	86	73	84	77	88	194	82	72	82	87						
43	172	84	74	84	78	89	381	87	75	85	79	90	690	83	74	84	78	89	68	82	72	82	87						
44	107	85	77	87	81	92	391	82	76	86	80	91	682	85	71	82	75	86	31	82	73	83	88						
45	312	83	72	82	76	87	329	82	75	86	79	90	720	85	72	82	73	87	683	84	74	84	89						
46	50	83	82	93	86	97	393	86	74	84	78	89	724	82	72	82	76	87	797	85	76	86	91						
47	370	82	72	82	76	87	389	85	77	87	81	92	786	82	72	82	76	87	772	86	72	82	87						
48	74	82	75	85	79	90	395	81	74	84	78	89	782	81	73	83	77	88	780	84	72	82	87						
49	220	82	72	82	76	87	331	82	74	84	78	89	884	87	71	82	75	86	671	85	74	85	89						
50	495	84	75	85	79	90	384	84	75	85	79	90							91	81	72	82	87						
Mean		84	75	85	79	90		84	75	86	79	90		83	73	76	83	88		83	73	77	83	88					
Range		Min.	79	80	74	85		81	72	82	76	87		61	71	73	82	86		81	69	72	80	84					
		Max.	90	82	93	86		88	81	91	85	96		90	76	80	87	91		90	79	83	90	94					
Sem(±)			1	1	2	1		1	1	1	1	1			1	1	1	2			1	1	2	1					
CD at 0.05			3	3	5	2		3	3	3	4	4			3	2	4	5			2	3	3	3					
CV %			3	2	3	1		2	2	2	2	2			2	1	3	3			2	2	3	2					

Table-4.3.1b: PH (cm) of F<sub>3</sub> progeny, of various F<sub>2</sub> BG102/Naveen plants selected on different methods of selection and grown under different crop ecology

Sl. No	F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014						F <sub>2</sub> Plan t No.	F <sub>3</sub> Progeny 2014						F <sub>2</sub> Plan t No.	F <sub>3</sub> Progeny 2014						F <sub>2</sub> Plan t No.	F <sub>3</sub> Progeny 2014													
		F <sub>2</sub> 2013		F <sup>st</sup> method of selection (HY)		2 <sup>nd</sup> Date			F <sub>2</sub> 2013		2 <sup>nd</sup> method of selection (LY)		F <sup>st</sup> Date			F <sub>2</sub> 2013		3 <sup>rd</sup> method of selection (MTL)		2 <sup>nd</sup> Date			F <sub>2</sub> 2013		F <sup>st</sup> Date		2 <sup>nd</sup> Date		F <sub>2</sub> 2013		4 <sup>th</sup> method of selection (RPS)		2 <sup>nd</sup> Date			
		PH (cm)	DS	TP	DS	TP		PH (cm)	DS	TP	DS	TP		PH (cm)	DS	TP	DS	TP		PH (cm)	DS	TP	DS	TP		PH (cm)	DS	TP	DS	TP		PH (cm)	DS	TP	DS	TP
1	183	124	112	117	111	123	167	124	115	119	118	123	98	110	112	95	95	99	651	109	115	117	120	119		109	115	117	120	119		109	117	122	120	119
2	187	119	114	119	118	126	175	128	127	130	129	126	20	110	121	103	105	98	18	107	117	122	120	119		107	117	122	120	119		107	117	122	120	119
3	645	127	117	124	122	124	135	112	121	125	124	124	61	108	109	89	97	97	435	110	115	117	119	117		110	115	117	119	117		110	117	122	120	119
4	621	115	123	129	128	124	173	114	123	126	125	124	87	108	119	99	103	96	445	109	114	119	117	118		109	114	119	117	118		109	117	122	120	119
5	629	111	115	121	119	123	130	119	122	126	124	123	535	100	109	92	91	93	418	109	117	119	120	120		109	117	119	120	120		109	117	122	120	119
6	887	120	106	109	108	119	168	102	119	124	122	119	77	101	115	95	97	98	414	107	115	120	119	117		107	115	120	119	117		107	119	122	120	119
7	846	123	113	119	117	121	191	121	113	118	116	121	554	108	114	94	100	100	438	127	111	119	117	115		127	111	119	117	115		127	119	122	120	119
8	882	112	122	127	126	125	151	111	123	127	126	125	381	104	118	96	101	94	450	115	112	117	117	118		115	112	117	117	118		115	117	122	120	119
9	375	112	114	120	119	124	131	100	123	126	125	124	57	109	106	87	89	95	473	105	117	120	123	120		105	117	120	123	120		105	117	122	120	119
10	976	110	122	127	126	124	164	119	122	125	124	124	97	109	120	97	103	100	497	110	116	118	120	119		110	116	118	120	119		110	116	118	120	119
11	166	118	122	127	126	121	188	129	121	125	124	121	26	99	116	98	99	750	127	114	120	117	120		127	114	120	117	120		127	119	122	120	119	
12	597	119	122	127	126	118	139	118	116	121	120	118	46	100	117	96	100	96	407	108	119	121	124	119		108	119	121	124	119		108	119	122	120	119
13	814	118	130	136	135	123	157	115	115	118	107	123	69	109	114	92	99	92	171	125	111	115	115	119		125	111	115	115	119		125	119	122	120	119
14	11	120	126	132	130	129	141	107	126	130	129	129	60	109	108	91	91	71	122	120	120	123	124	121		122	120	123	124	121		122	120	123	124	121
15	110	110	124	130	129	123	662	118	128	132	131	123	229	107	111	91	93	89	403	107	118	119	120	121		107	118	119	120	121		107	118	119	120	121
16	132	134	118	123	122	118	177	122	118	118	117	118	2	107	104	88	85	87	409	107	116	118	121	120		107	116	118	121	120		107	116	118	121	120
17	927	121	119	127	126	121	480	96	117	120	119	121	448	110	109	92	91	91	479	112	118	121	122	122		112	118	121	122	122		112	118	121	122	122
18	560	114	124	130	129	121	500	125	120	124	123	121	147	74	111	91	93	92	486	113	119	124	122	119		113	119	124	122	119		113	119	124	122	119
19	256	117	124	129	128	121	152	121	119	122	121	121	180	102	109	90	92	87	481	108	113	119	118	121		108	113	119	118	121		108	113	119	118	121
20	740	137	119	125	124	121	185	119	120	124	123	121	226	110	102	84	87	90	447	105	121	126	125	123		105	121	126	125	123		105	121	126	125	123
21	788	113	121	127	125	120	314	124	117	121	120	120	643	108	114	93	97	94	432	130	118	119	122	124		130	118	119	122	124		130	118	119	122	124
22	153	117	114	120	119	121	320	109	118	122	121	121	468	100	108	91	92	90	477	112	120	122	125	124		112	120	122	125	124		112	120	122	125	124
23	713	119	120	126	125	120	321	114	120	124	123	120	190	110	105	87	88	90	145	114	118	125	127	124		114	118	125	127	124		114	118	125	127	124
24	170	123	118	124	123	118	325	139	118	120	119	118	470	103	111	92	92	90	462	111	114	116	118	117		111	114	116	118	117		111	114	116	118	117
25	396	111	118	123	122	118	311	110	108	119	118	118	890	109	108	92	89	90	467	106	112	116	117	120		106	112	116	117	120		106	112	116	117	120
26	161	113	115	121	120	116	316	126	114	119	118	116	280	108	110	92	92	85	96	124	120	122	125	126		124	120	122	125	126		124	120	122	125	126
27	246	111	117	122	121	119	323	115	112	115	114	119	272	108	98	80	80	86	460	120	125	125	130	123		120	125	125	130	123		120	125	125	130	123

Contd.....

Sl. No.	F <sub>2</sub> Plant No.	F <sub>2</sub> 2013 PH (cm)	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013 PH (cm)	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013 PH (cm)	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013 PH (cm)	F <sub>3</sub> Progeny 2014							
			1 <sup>st</sup> method of selection (HY)		2 <sup>nd</sup> method of selection (HY)				2 <sup>nd</sup> method of selection (LY)		3 <sup>rd</sup> method of selection (MTL)				4 <sup>th</sup> method of selection (RPS)		1 <sup>st</sup> method of selection (MTL)				2 <sup>nd</sup> method of selection (RPS)							
			DS	TP	DS	TP			DS	TP	DS	TP			DS	TP	DS	TP	DS	TP	DS	TP			DS	TP	DS	TP
28	718	126	115	121	120	120	144	88	122	127	125	120	261	109	111	97	94	95	420	110	113	116	118	114				
29	121	120	115	121	120	120	313	96	112	116	115	120	874	110	114	96	97	98	408	107	108	113	113	118				
30	284	123	113	119	118	121	327	113	121	126	125	121	441	103	117	96	99	95	415	107	120	122	123	122				
31	937	92	115	121	120	118	186	120	114	119	117	118	528	110	111	93	93	93	476	122	120	123	126	122				
32	929	119	121	126	125	122	310	110	117	120	119	122	504	110	111	92	94	93	75	134	120	124	123	124				
33	165	123	106	108	109	122	305	108	123	127	125	122	431	106	112	90	94	91	660	114	119	123	124	122				
34	286	126	106	111	110	113	399	90	118	121	120	113	532	107	108	91	89	88	733	112	121	124	124	125				
35	821	108	103	109	107	104	378	100	104	109	108	104	335	100	106	88	87	87	33	112	120	125	124	121				
36	466	117	116	121	120	107	350	110	97	102	100	107	210	110	107	93	89	86	133	125	114	118	119	117				
37	122	111	105	111	110	117	303	116	112	116	115	117	27	110	103	86	84	86	23	115	113	119	118	117				
38	322	134	120	126	125	120	353	114	116	121	120	120	959	110	107	88	88	90	181	120	112	117	117	117				
39	642	112	122	128	127	119	351	120	120	123	122	119	988	110	113	94	94	92	196	114	114	117	118	121				
40	659	102	110	115	114	117	383	126	116	119	118	118	968	100	111	90	92	94	179	126	119	123	124	122				
41	456	122	119	126	124	122	357	130	116	121	118	122	923	110	114	94	97	93	455	122	116	125	120	119				
42	696	110	115	120	119	119	371	120	124	123	127	119	986	106	110	89	90	92	194	115	115	120	119	119				
43	172	118	117	123	121	113	381	128	109	109	112	113	690	99	115	97	96	88	68	129	113	119	119	118				
44	107	114	115	122	120	119	391	119	111	115	114	119	682	97	100	82	81	85	31	130	114	121	119	123				
45	312	122	118	126	124	124	329	119	122	124	124	124	720	110	110	91	91	90	683	112	116	131	128	125				
46	50	124	116	121	120	124	393	115	122	124	125	124	724	106	107	90	90	93	797	116	114	123	121	113				
47	370	116	120	124	123	124	389	130	123	122	125	123	786	100	115	96	97	92	772	125	101	107	106	104				
48	74	121	119	124	123	123	395	113	122	125	125	123	782	108	107	89	89	89	780	121	99	105	102	108				
49	220	113	116	122	121	123	331	112	120	125	123	123	884	108	108	89	90	89	671	113	109	116	114	117				
50	495	115	123	128	126	124	384	100	123	126	125	124							91	128	109	123	120	121				
Mean		118	117	117	116	117	115	115	115	114	116	117		106	104	93	92	92		116	115	115	114	114				
Range		92	103	108	107	104	88	97	102	100	100	104		74	98	80	80	85		105	99	105	105	104				
Semi(±)		137	130	136	135	129	139	128	132	131	129		110	121	105	103	100		134	125	131	131	126					
CD at 0.05			5	5	5	4		5	5	5	4				5	3	5	7			4	4	4	4				
CV %			13	15	15	11		15	14	15	10				13	10	14	19			13	12	12	10				
		7	6	6	6	5		6	6	6	4			6	6	5	7	11		7	5	5	5	4				

**Table-4.3.2b: PPP of F<sub>3</sub> progeny, of various F<sub>2</sub> BG102/Naveen plants selected on different methods of selection and grown under different crop ecology**

Sl. No.	F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014			
		F <sub>2</sub> 2013		1 <sup>st</sup> method of selection (HY)			F <sub>2</sub> 2013		2 <sup>nd</sup> method of selection (LY)			F <sub>2</sub> 2013		3 <sup>rd</sup> method of selection (MTT)			F <sub>2</sub> 2013		4 <sup>th</sup> method of selection (RPS)	
	PPP	DS	TP	DS	TP	PPP	DS	TP	DS	TP	PPP	DS	TP	DS	TP	PPP	DS	TP	DS	TP
1	183	15	12	13	12	167	5	9	8	8	98	7	9	15	9	651	6	9	8	9
2	187	13	9	10	8	175	8	7	6	7	20	10	8	14	9	18	11	8	8	9
3	645	15	9	10	8	135	7	7	7	8	61	12	9	15	9	435	5	7	8	10
4	621	7	9	9	7	173	8	8	7	7	87	8	9	16	10	445	5	6	6	8
5	629	13	8	9	7	130	8	8	8	7	535	7	9	15	9	418	4	9	9	10
6	887	11	10	11	9	168	9	7	6	7	77	14	8	15	9	414	5	9	10	10
7	846	15	11	12	10	191	8	7	7	7	554	7	9	15	9	438	10	9	10	11
8	882	12	8	10	7	151	6	7	7	6	381	6	9	15	10	450	11	9	10	9
9	375	11	9	9	7	131	8	8	8	9	57	8	8	15	9	473	11	9	10	10
10	976	5	8	9	6	164	13	8	7	7	97	6	8	15	9	497	9	9	11	11
11	166	13	9	10	9	188	7	7	6	7	26	8	9	15	9	750	12	9	10	10
12	597	7	10	10	8	139	9	7	7	7	46	7	9	15	9	407	12	9	9	9
13	814	12	9	10	8	157	6	8	7	8	69	7	8	14	10	171	8	7	8	9
14	11	11	9	9	8	141	7	7	7	7	60	8	9	15	10	71	7	9	10	10
15	110	13	10	10	8	662	9	7	7	7	229	10	9	16	10	403	5	7	8	9
16	132	14	9	10	8	177	9	7	7	7	2	12	9	15	10	409	7	8	9	9
17	927	14	11	11	9	480	8	10	10	10	448	6	7	13	8	479	6	9	10	10
18	560	5	9	9	7	500	3	9	9	9	147	6	7	13	9	486	11	8	9	9
19	256	17	11	10	9	152	5	8	8	8	180	11	9	15	10	481	11	7	8	9
20	740	16	11	10	9	185	5	8	9	8	226	16	10	17	11	447	8	9	9	9
21	788	11	10	10	8	314	9	9	8	8	643	12	11	17	11	432	8	8	8	9
22	153	9	10	10	8	320	5	8	9	8	468	12	10	16	11	477	5	8	8	9
23	713	10	11	11	9	321	14	9	9	8	190	9	9	15	10	145	8	8	8	9
24	170	8	12	11	10	325	7	11	10	11	470	12	9	15	10	462	9	8	8	8
25	396	13	12	11	10	311	4	9	8	9	890	8	7	14	8	467	9	8	9	9
26	161	10	10	10	8	316	8	7	7	7	280	8	10	16	10	96	23	9	10	10
27	246	9	9	9	7	323	6	8	7	8	272	9	8	14	8	460	8	8	9	9

Contd....

Sl. No.	F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2013				F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2013				F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2013				F <sub>3</sub> Progeny 2014			
		2013	1 <sup>st</sup> Date	2 <sup>nd</sup> Date	TP	2013	1 <sup>st</sup> Date	2 <sup>nd</sup> Date	TP		2013	1 <sup>st</sup> Date	2 <sup>nd</sup> Date	TP	2013	1 <sup>st</sup> Date	2 <sup>nd</sup> Date	TP		2013	1 <sup>st</sup> Date	2 <sup>nd</sup> Date	TP	2013	1 <sup>st</sup> Date	2 <sup>nd</sup> Date	TP
28	718	7	9	9	7	144	10	8	7	261	7	7	14	8	7	420	10	8	8	8	9	9	9	9	9		
29	121	10	10	10	8	313	6	7	7	874	15	10	17	11	9	408	8	7	8	8	8	8	8	8	8		
30	284	8	9	9	7	327	14	9	8	441	8	7	13	8	7	415	11	9	9	10	9	9	9	9			
31	937	8	9	10	7	186	7	8	8	528	7	6	12	7	6	476	12	7	8	8	8	8	8	8			
32	929	8	9	10	7	310	7	8	7	504	14	11	17	12	12	75	9	8	9	9	8	9	9	9			
33	165	9	9	10	8	305	7	8	7	431	7	7	13	8	8	660	7	8	9	9	9	9	9	9			
34	286	9	8	8	7	399	4	9	8	532	10	9	14	9	9	733	8	8	9	10	10	10	10	10			
35	821	15	10	10	9	378	3	8	8	335	7	7	14	9	8	33	6	7	7	8	8	8	8	8			
36	466	8	9	10	8	350	8	8	7	210	13	12	21	13	11	133	11	9	9	10	9	9	9	9			
37	122	6	9	10	8	303	11	10	9	27	13	12	18	12	11	23	14	9	9	9	9	9	11	11			
38	322	8	8	9	7	353	9	8	8	959	6	8	14	9	8	181	8	7	8	8	9	10	10	10			
39	642	13	9	9	7	351	11	9	8	988	7	8	14	9	8	196	8	8	9	9	9	10	11	11			
40	659	6	10	10	10	383	10	9	9	968	13	10	16	11	10	179	8	7	7	7	8	9	9	9			
41	456	11	9	10	8	357	8	8	8	923	10	8	14	9	8	455	6	7	7	7	8	8	8	8			
42	696	5	8	9	6	371	8	8	8	986	11	7	13	8	7	194	7	7	7	7	8	8	8	8			
43	172	4	8	8	6	381	5	8	8	690	7	9	15	9	8	68	7	7	7	7	7	7	7	7			
44	107	6	8	9	7	391	4	8	8	682	6	8	14	9	8	31	12	7	8	8	8	9	9	9			
45	312	8	8	9	6	329	9	8	8	720	9	6	12	7	7	683	9	9	10	10	10	10	10	10			
46	50	13	8	9	7	393	8	8	9	724	8	7	14	8	7	797	12	9	9	9	9	9	9	9			
47	370	10	9	10	8	389	7	8	8	786	9	9	15	9	8	772	10	8	8	8	8	8	8	8			
48	74	3	9	9	8	395	5	9	8	782	7	9	15	9	8	780	6	7	7	7	7	7	7	7			
49	220	4	8	9	6	331	6	11	11	884	8	9	16	9	7	671	7	7	8	8	8	9	9	9			
50	495	11	8	9	6	384	6	9	9						91	8	8	8	5	7	7	7	7	7			
Mean		10	9	10	8		7	8	8			9	9	7	8		9	8	8	9	9	9	9	9			
Range		3	8	8	6		3	7	6		6	6	6	6	6		4	6	6	7	7	5	7	7			
Sem(±)		17	12	13	12		14	11	11		16	12	13	21	12		23	9	9	10	10	10	11	11			
CD at 0.05		1	1	1	1		1	1	1			1	1	1	1			1	1	2	2	1	1	1			
CV %		3	3	2	3		3	3	1		3	3	3	4	3		3	2	2	5	2	2	2	2			
		35	15	12	17		35	15	9		29	19	15	13	14		36	13	16	16	14	10	10	10			

**Table-4.3.3b: GPP of F<sub>3</sub> progeny, of various F<sub>2</sub> BG102/Naveen plants selected on different methods of selection and grown under different crop ecology**

Sl. No.	F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014						F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014						F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014						F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014					
		F <sup>st</sup> method of selection (HY)			2 <sup>nd</sup> Date				2 <sup>nd</sup> method of selection (LY)			2 <sup>nd</sup> Date				3 <sup>rd</sup> method of selection (MTL)			2 <sup>nd</sup> Date				4 <sup>th</sup> method of selection (RPS)			2 <sup>nd</sup> Date		
		GPP	DS	TP	DS	TP	DS		GPP	DS	TP	DS	TP	DS		TP	DS	TP	DS	TP	DS		TP	DS	TP	DS	TP	DS
1	183	64	71	67	60	98	167	98	101	82	98	98	98	98	98	105	92	76	87	87	651	46	81	81	73	73		
2	187	88	77	79	68	69	175	109	75	71	68	69	20	77	89	77	89	73	81	82	18	58	76	79	69	74		
3	645	75	77	76	69	67	135	105	76	63	66	67	61	80	77	80	77	77	69	70	435	97	81	56	84	81		
4	621	78	76	78	67	75	173	70	80	69	74	75	87	81	72	81	79	61	62	445	75	80	61	88	85			
5	629	46	85	72	74	63	130	101	73	64	62	62	535	99	72	72	59	67	68	418	32	73	62	74	71			
6	887	78	93	81	86	74	168	80	94	72	73	74	77	76	77	74	74	68	68	414	84	81	74	79	76			
7	846	105	83	65	66	85	191	95	95	69	84	85	554	79	79	75	75	72	73	438	115	72	68	70	67			
8	882	70	107	98	103	95	151	74	103	100	95	95	381	75	73	87	79	68	63	450	55	106	88	107	103			
9	375	65	77	60	64	59	131	98	67	75	58	59	57	80	70	61	59	61	473	67	72	64	76	75				
10	976	90	72	62	64	77	164	43	80	75	77	77	97	106	78	64	67	68	497	42	72	62	72	69				
11	166	115	102	90	94	64	188	72	71	65	63	64	26	75	70	68	69	70	750	65	72	71	75	72				
12	597	25	70	60	61	71	139	116	77	70	70	71	46	96	70	68	61	61	407	70	75	78	73	70				
13	814	75	72	59	62	78	157	74	94	91	88	78	69	80	69	66	63	64	171	57	77	77	76	73				
14	11	66	80	66	69	66	141	88	72	66	65	66	60	87	79	85	70	71	71	85	85	74	57	74	71			
15	110	103	86	70	71	62	662	99	66	65	61	61	229	91	75	74	67	67	403	90	76	63	79	76	76			
16	132	71	83	75	74	61	177	111	68	64	60	61	2	77	74	79	65	65	409	40	78	77	84	81				
17	927	71	69	68	60	65	480	70	70	80	65	65	448	95	76	77	69	70	479	65	135	114	135	101				
18	560	50	79	82	71	73	500	78	75	65	72	72	147	95	82	80	73	73	486	85	69	62	72	69				
19	256	110	89	73	68	93	152	130	100	102	92	92	180	78	78	75	72	72	481	60	68	75	65	62				
20	740	85	85	70	75	72	185	88	86	76	71	72	226	120	100	96	91	91	447	65	79	69	83	80				
21	788	120	116	94	96	62	314	90	67	73	61	62	643	80	76	73	66	67	432	80	60	65	62	59				
22	153	98	85	88	77	62	320	105	66	77	61	62	468	121	87	73	66	66	477	47	71	72	72	68				
23	713	86	76	60	66	69	321	59	75	89	62	68	190	80	65	75	52	56	145	58	65	79	66	63				
24	170	69	84	76	73	83	325	101	82	66	81	83	470	110	93	65	71	72	462	113	63	76	61	59				
25	396	84	84	81	76	69	311	122	75	71	66	69	890	106	82	69	76	77	467	47	79	61	60	59				
26	161	85	72	70	65	78	316	49	82	77	75	78	280	88	91	86	79	82	96	91	73	67	72	69				
27	246	144	113	108	108	77	323	70	81	83	77	77	272	78	94	85	83	84	460	92	68	62	67	64				

Contd....

Sl. No.	F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				
		F <sub>2</sub> 2013		1 <sup>st</sup> method of selection (HY)			F <sub>2</sub> 2013		2 <sup>nd</sup> method of selection (LY)			F <sub>2</sub> 2013		3 <sup>rd</sup> method of selection (MTL)			F <sub>2</sub> 2013		4 <sup>th</sup> method of selection (RPS)							
	GPP	DS	TP	DS	TP	GPP	DS	TP	DS	TP	GPP	DS	TP	DS	TP	GPP	DS	TP	DS	TP	GPP	DS	TP	DS	TP	
28	718	69	68	64	56	72	144	115	97	71	71	72	261	77	77	71	71	71	71	71	420	40	57	54	59	57
29	121	60	71	81	65	68	313	72	76	86	68	874	130	108	88	84	84	86	86	86	408	52	60	66	60	57
30	284	113	90	78	78	81	327	45	86	88	81	441	102	76	72	68	68	68	68	68	415	65	70	71	69	68
31	937	45	81	60	68	71	186	40	75	65	71	528	87	84	87	73	74	74	74	476	70	67	66	70	69	
32	929	92	79	77	69	70	310	111	74	65	67	504	84	85	70	75	76	76	76	75	88	73	70	72	69	
33	165	70	68	65	63	75	305	70	81	72	75	431	78	69	61	66	67	67	67	660	51	67	63	67	64	
34	286	87	61	62	52	76	399	58	80	67	75	532	98	86	92	73	74	74	74	733	105	69	85	70	67	
35	821	60	75	69	65	61	378	80	65	70	60	335	99	69	75	61	61	61	61	33	91	70	92	74	71	
36	466	120	105	93	95	98	350	82	104	102	97	210	103	74	83	66	67	67	67	133	67	71	82	70	69	
37	122	40	81	79	76	65	303	48	70	76	65	27	110	76	80	70	71	71	71	23	79	63	68	63	60	
38	322	120	101	88	93	87	353	88	93	101	87	959	105	79	72	67	67	67	67	181	50	74	77	72	69	
39	642	115	70	67	63	81	351	49	86	90	80	988	88	80	68	75	76	76	76	196	80	59	62	63	61	
40	659	49	66	66	57	65	383	112	71	62	64	968	80	77	69	67	68	68	68	179	57	60	66	62	59	
41	456	76	74	66	66	75	357	112	82	80	75	923	75	71	66	66	66	66	66	455	58	70	86	69	68	
42	696	120	99	87	87	57	371	77	61	62	56	986	76	66	65	50	53	53	53	194	60	60	72	58	57	
43	172	75	77	71	71	76	381	98	81	75	75	690	88	80	74	74	75	75	75	68	70	67	79	70	67	
44	107	60	70	75	64	67	391	77	76	72	66	682	96	86	71	79	79	79	79	31	112	63	61	58	54	
45	312	40	66	81	68	79	329	57	80	73	78	720	80	82	74	73	74	74	74	683	55	73	77	75	72	
46	50	61	74	78	64	64	393	116	69	59	63	724	91	78	52	67	68	68	68	797	115	71	77	74	71	
47	370	105	67	72	60	74	389	140	81	76	71	786	104	101	87	94	94	94	94	772	125	75	85	68	65	
48	74	70	68	68	59	81	395	99	85	70	80	782	103	87	85	80	80	80	80	780	105	83	86	68	64	
49	220	63	73	72	66	77	331	70	87	85	76	884	71	81	81	73	73	73	73	671	73	76	78	73	70	
50	495	103	66	63	57	85	384	80	91	64	85	85	91	80	71	71	72	72	72	91	122	71	71	76	72	
Mean		81	80	74	71	73		86	80	75	73	73	91	80	71	74	72	72	72		73	73	73	72	69	
Range		25	61	59	52	57		40	61	59	56	56	71	65	52	52	53	53	53		32	57	54	54	54	
Max.		144	116	108	108	98		140	104	102	98	98	130	108	92	96	94	94	94		125	135	114	114	103	
Semi(±)			7	7	8	7			9	6	8	8		7	7	7	8	8	8			8	7	7	6	
CD at 0.05			20	20	23	19			25	16	24	23		21	20	20	23	23	23			21	20	19	17	
CV %			31	13	14	13			30	16	11	16		13	13	14	16	16	16			31	15	14	13	12

**Table-4.3.4b: TW (g) of F<sub>3</sub> progeny, of various F<sub>2</sub> BG102/Naveen plants selected on different methods of selection and grown under different crop ecology**

Sl. No	F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014							
		F <sub>2</sub> 2013		F <sub>3</sub> Progeny 2014			F <sub>2</sub> 2013		F <sub>3</sub> Progeny 2014			F <sub>2</sub> 2013		F <sub>3</sub> Progeny 2014			F <sub>2</sub> 2013		F <sub>3</sub> Progeny 2014					
		TW (g)	DS	TP	DS		TW (g)	DS	TP	DS		TW (g)	DS	TP	DS		TW (g)	DS	TP	DS	TP			
1	183	2.5	21.6	20.6	19.2	23.5	167	2.5	23.7	23.73	22.1	23.55	98	2.3	23	23.1	21.6	23.2	651	2.4	21	21	19	21
2	187	2.3	24.2	23.2	21.9	23.43	175	2.4	23.6	23.61	23.5	23.43	20	2.2	25.2	25.3	25.5	25.45	18	1.9	21	21	22	22
3	645	2.5	26.9	25.9	24.5	25.45	135	2.5	25.6	25.63	25.5	25.45	61	2.5	25.7	25.8	25.8	25.87	435	2.1	26	26	26	26
4	621	2.2	26.5	25.5	24.1	23.4	173	2.3	23.5	23.58	23.5	23.4	87	2.2	25.5	25.6	25.9	25.7	445	2.7	21	21	22	22
5	629	2.4	26.5	25.5	24.1	23.65	130	3	23.8	23.83	23.7	23.65	535	2.4	26.4	26.5	26.4	26.57	418	2.6	21	21	21	21
6	887	2.4	22.8	21.8	20.4	23.4	168	2.5	23.5	23.58	23.5	23.4	77	2.6	21.2	21.3	21.3	21.4	414	2.6	21	21	21	21
7	846	2.3	26.1	25.1	23.7	25.93	191	2.5	26.1	26.11	26	25.93	554	2.3	17.8	17.9	18.2	18.02	438	2.1	27	27	27	27
8	882	2.1	24.1	23.1	21.7	26.35	151	2.3	26.5	26.54	26.4	26.35	381	2.2	25.7	25.8	25.7	25.87	450	2.2	26	26	26	26
9	375	2.8	26	25	23.6	17.03	131	2.3	17.2	17.21	17.1	17.03	57	2.5	22.2	22.3	21.9	22.4	473	2.4	26	26	26	26
10	976	2.5	23.9	22.9	21.5	23.43	164	2.2	23.6	23.61	23.5	23.43	97	2.3	20.5	20.6	20.4	20.75	497	2.6	23	23	23	24
11	166	2.2	21.9	20.9	19.5	20.93	188	3.1	21.1	21.11	21	20.93	26	2.7	20.8	20.9	21.1	21	750	2.5	27	27	27	27
12	597	2.5	23.6	22.6	21.2	18.43	139	2.6	18.6	18.61	18.5	18.43	46	2.2	30	30.1	30	30.2	407	2.5	26	26	26	26
13	814	2.3	24	23	21.6	20.68	157	2.5	20.8	20.86	20.8	20.68	69	2.4	21.1	21.2	21	21.35	171	2.4	26	26	26	26
14	11	3	27.4	26.4	25	23.53	141	2.5	23.7	23.71	23.6	23.53	60	2.4	21.4	21.5	21.7	21.65	71	2.2	26	26	26	26
15	110	2.6	26.3	25.3	24	26.08	662	2.3	26.2	26.26	26.2	26.08	229	2.4	25.8	25.9	25.8	26.02	403	2.6	26	26	26	26
16	132	2.6	23.5	22.5	21.1	26.45	177	2.3	27.2	27.05	26.5	26.45	2	2.4	25.9	26	25.7	26.1	409	2.2	21	21	21	21
17	927	2.4	24.1	23.1	21.7	25.98	480	3.2	26.1	26.16	26.1	25.98	448	2.5	25.2	25.3	25.4	25.4	479	2.1	21	21	22	22
18	560	1.9	23.9	22.9	21.5	25.83	500	2.5	26	26.01	25.9	25.83	147	2.7	23.7	23.8	23	23.9	486	2.4	26	26	27	27
19	256	2.2	21.6	20.6	19.3	26.13	152	3.2	26.3	26.31	26.2	26.13	180	2.2	20.5	20.6	20.6	20.7	481	2.1	21	21	21	21
20	740	2.4	23.6	22.6	21.2	21.18	185	3.1	21.3	21.36	21.3	21.18	226	2	25.4	25.5	25.6	25.65	447	2.2	25	25	26	26
21	788	2.3	24.3	23.3	21.9	22.28	314	2.5	22.4	22.46	22.4	22.28	643	2.1	25.8	25.9	25.7	26	432	2.3	25	25	25	25
22	153	2.5	26.6	25.6	24.2	18.45	320	2.7	18.6	18.63	18.5	18.45	468	2.6	25.6	25.7	25.8	25.85	477	2.1	21	21	21	21
23	713	2.6	26.5	25.5	24.1	21.43	321	2.5	21.6	21.61	21.5	21.43	190	2.5	25.7	25.8	26.2	25.87	145	2.3	26	26	26	26
24	170	2.5	21.6	20.6	19.2	21.88	325	2.8	22	22.06	22	21.88	470	2.7	26.1	26.2	26.5	26.3	462	2.6	21	21	21	21
25	396	2.3	24.5	23.5	22.1	22.68	311	2.9	22.8	22.86	22.8	22.68	890	2.2	27.1	27.2	26.9	27.35	467	2.4	21	21	22	22
26	161	2.4	24.1	23.1	21.7	22.13	316	2.5	22.3	22.31	22.2	22.13	280	2.3	25.7	25.8	25.7	25.9	96	2.5	26	26	26	26
27	246	2.6	24.3	23.3	21.9	25.95	323	2.1	26.1	26.13	26	25.95	272	2.6	25.4	25.5	25.9	25.65	460	2.7	27	27	28	28

Contd....

Sl. No.	F <sub>2</sub> Plant No.	F <sub>2</sub> 2013 TW (g)	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013 TW (g)	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013 TW (g)	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013 TW (g)	F <sub>3</sub> Progeny 2014			
			1 <sup>st</sup> method of selection (HY)		2 <sup>nd</sup> Date				1 <sup>st</sup> method of selection (LY)		2 <sup>nd</sup> Date				3 <sup>rd</sup> method of selection (MTL)		2 <sup>nd</sup> Date				4 <sup>th</sup> method of selection (RPS)			
			DS	TP	DS	TP			DS	TP	DS	TP			DS	TP	DS	TP			DS	TP	DS	TP
28	718	2.6	24	23	22	26	144	2.0	26	26	26	26	261	2.2	20	21	21	21	420	2.5	26	26	26	26
29	121	2.6	27	26	25	23	313	2.8	23	23	23	23	874	2.4	26	26	26	26	408	2.3	21	21	21	21
30	284	2.5	27	26	24	22	327	2.6	22	22	22	22	441	2.3	23	23	23	23	415	2.6	26	26	26	26
31	937	2.2	27	26	24	23	186	2.7	23	23	23	23	528	2.5	26	26	26	26	476	2.3	26	26	26	26
32	929	2.5	24	23	22	22	310	2.5	26	26	26	26	504	2.6	26	26	26	26	75	2.1	26	26	26	26
33	165	2.5	22	21	20	30	305	3.0	30	30	30	30	431	2.1	21	21	22	21	660	2.7	26	26	26	26
34	286	2.2	24	23	21	26	399	2.6	26	26	26	26	532	2.4	17	17	17	17	733	2.2	21	21	21	21
35	821	3.2	24	23	22	26	378	2.7	26	26	26	26	335	2.4	22	22	22	22	33	2.6	26	26	26	26
36	466	2.5	24	23	22	21	350	2.4	21	22	21	21	210	2.6	21	21	21	21	133	2.5	26	26	26	26
37	122	2.4	24	23	22	27	303	2.8	27	27	27	27	27	2.5	25	25	26	26	23	2.4	21	21	21	21
38	322	2.7	27	26	25	26	353	2.5	26	26	26	26	959	2.6	26	26	26	26	181	2.8	23	23	24	24
39	642	2.8	26	25	24	21	351	2.3	21	21	21	21	988	2.1	26	26	27	26	196	2.1	16	16	17	17
40	659	2.8	27	26	25	25	383	2.1	21	21	21	21	968	2.4	23	23	23	23	179	2.5	22	22	22	22
41	456	2.3	27	26	25	26	357	2.5	26	26	26	26	923	2.7	26	26	26	26	455	2.2	26	26	26	26
42	696	2.8	24	23	21	26	371	3.1	26	26	26	26	986	2.3	22	22	22	22	194	2.8	26	26	26	26
43	172	2.7	24	23	22	27	381	2.3	27	27	27	27	690	2.5	21	21	21	21	68	2.8	21	21	21	21
44	107	2.5	24	23	22	26	391	2.6	26	26	26	26	682	2.3	26	26	25	26	31	2.3	28	28	28	28
45	312	2.1	27	26	24	21	329	2.5	21	21	21	21	720	2.2	26	26	26	26	683	2.2	21	21	21	21
46	50	2.2	27	26	24	26	393	2.5	26	26	26	26	724	2.5	25	26	26	26	797	2.5	26	26	26	26
47	370	2.5	27	26	25	23	389	2.5	24	24	24	24	786	2.2	26	26	25	26	772	2.3	27	27	27	27
48	74	2.8	24	23	21	26	395	3.0	26	26	26	26	782	2.4	26	26	26	26	780	2.5	26	26	26	26
49	220	2.3	27	26	24	26	331	2.7	26	26	26	26	884	2.4	21	21	20	21	671	2.1	26	26	26	26
50	495	2.4	22	21	20	26	384	2.1	26	26	26	26						91	2.2	21	21	21	21	
	Mean	25.0	24.8	23.8	22.4	23.9		26.0	24.1	24.1	24.0	23.9		24.0	23.9	24.0	24.0	24.1		24.0	23.9	24.1	23.9	24.2
	Range	19.0	21.6	20.6	19.2	17.0		20.0	17.2	17.2	17.1	17		20.0	16.6	16.6	16.7	16.9		19.0	16.3	16.6	16.4	16.6
	Max.	32.0	27.4	26.4	25.0	29.7		32.0	29.9	29.9	29.8	29.7		27.0	30.0	30.0	30.1	30.2		28.0	27.7	27.9	27.7	27.9
	SD at 0.05		1	0.4	0.5	0.5			1.2	0.4	0.5	0.4			0.8	0.5	0.5	0.7			0.6	0.4	0.6	0.4
	CV %	9	5	2	3	3		10	7	2	3	2		2	5	3	3	4		9.31	4	2	2	3

**Table-4.3.5b: GYP plant of F<sub>3</sub> progeny, of various F<sub>2</sub> BG102/Naveen plants selected on different methods of selection and grown under different crop ecology**

Sl. No.	F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014									
		1 <sup>st</sup> method of selection (HY)		2 <sup>nd</sup> method of selection (LY)			1 <sup>st</sup> method of selection (MTL)		2 <sup>nd</sup> method of selection (RRS)			1 <sup>st</sup> method of selection (HY)		2 <sup>nd</sup> method of selection (LY)			1 <sup>st</sup> method of selection (MTL)		2 <sup>nd</sup> method of selection (RRS)							
		DS	TP	DS	TP		DS	TP	DS	TP		DS	TP	DS	TP		DS	TP	DS	TP						
1	183	20	23	18	17	22	167	8	12	13	11	11	11	98	4	5	5	6	8	8	651	12	8	9	5	8
2	187	25	20	20	14	19	175	13	11	12	11	10	10	20	20	6	6	5	8	8	18	14	10	11	13	9
3	645	23	22	22	16	21	135	12	11	12	11	10	61	18	7	7	8	11	11	435	18	11	12	14	10	
4	621	25	19	20	14	18	173	12	9	10	9	8	87	9	6	6	5	6	6	445	16	11	12	14	10	
5	629	26	17	17	11	16	130	13	8	9	8	7	535	8	5	5	4	6	6	418	12	10	11	13	9	
6	887	22	19	19	13	18	168	8	11	12	11	10	77	7	5	6	5	8	8	414	11	12	13	15	11	
7	846	25	15	16	10	15	191	14	18	19	18	17	554	16	6	6	5	6	6	438	14	10	10	13	9	
8	882	23	17	17	12	16	151	6	15	15	15	14	381	11	5	5	5	5	5	450	15	10	11	13	9	
9	375	21	18	19	13	17	131	11	9	10	10	8	57	12	4	4	5	4	4	473	15	11	12	14	11	
10	976	24	17	18	12	16	164	13	12	12	12	11	97	11	4	5	4	5	5	497	16	12	13	15	11	
11	166	23	17	17	11	16	188	10	9	9	9	8	26	10	11	12	9	11	750	13	10	11	13	9		
12	597	21	20	20	14	19	139	12	13	14	14	12	46	10	9	10	7	10	407	15	10	11	13	9		
13	814	21	20	21	15	19	157	12	12	12	12	11	69	12	9	10	7	10	171	15	12	12	14	11		
14	11	24	19	19	13	18	141	12	10	10	10	9	60	15	11	12	9	13	71	9	13	14	16	12		
15	110	24	21	21	16	20	662	12	9	10	9	8	229	9	10	10	7	11	403	19	11	12	14	10		
16	132	23	8	8	5	8	177	13	11	12	10	9	2	7	8	9	6	9	409	12	13	13	16	12		
17	927	24	17	17	11	16	480	14	9	9	9	8	448	16	12	13	10	13	479	11	9	10	12	8		
18	560	25	20	20	14	19	500	13	14	14	14	13	147	6	9	10	7	10	486	18	15	15	17	14		
19	256	24	18	19	13	17	152	12	8	9	8	7	180	7	10	11	8	11	481	10	13	14	16	12		
20	740	25	18	19	13	17	185	12	14	14	14	13	226	9	9	9	6	10	447	12	8	9	11	7		
21	788	24	19	20	14	18	314	11	11	12	11	10	643	13	11	11	9	12	432	18	14	14	16	13		
22	153	25	19	19	13	18	320	10	14	14	14	13	468	12	10	11	8	11	477	12	11	11	14	10		
23	713	21	17	18	12	17	321	15	12	12	12	11	190	8	11	12	9	12	145	11	10	10	13	9		
24	170	21	15	16	10	14	325	14	8	9	9	7	470	15	12	12	10	13	462	18	12	13	15	11		
25	396	22	17	17	11	16	311	10	11	11	11	10	890	12	10	10	8	11	467	13	9	10	12	8		
26	161	20	16	16	11	15	316	10	12	13	12	11	280	6	9	9	6	10	96	10	15	16	18	14		
27	246	22	17	17	11	16	323	13	11	11	11	10	272	11	11	11	9	12	460	11	13	14	16	12		

Contd....

Sl. No.	F <sub>2</sub> Plant No.	F <sub>2</sub> 2013 GYP plant (g)	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013 GYP plant (g)	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013 GYP plant (g)	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013 GYP plant (g)	F <sub>3</sub> Progeny 2014				
			1 <sup>st</sup> method of selection (HY)		2 <sup>nd</sup> method of selection (LY)				1 <sup>st</sup> method of selection (LY)		2 <sup>nd</sup> method of selection (LY)				3 <sup>rd</sup> method of selection (MTL)		2 <sup>nd</sup> method of selection				4 <sup>th</sup> method of selection (RPS)				
			DS	TP	DS	TP		DS	TP	DS	TP			DS	TP	DS	TP	DS	TP	DS	TP	DS	TP	DS	TP
28	718	22	16	17	11	15	144	14	8	9	9	7	261	12	10	11	8	11	420	16	11	12	14	10	
29	121	22	16	16	10	15	313	10	8	8	8	7	874	17	12	12	9	12	408	18	14	15	17	13	
30	284	24	16	17	11	15	327	13	16	16	16	15	441	10	10	10	8	10	415	18	16	16	18	15	
31	937	20	20	20	14	19	186	11	9	10	10	8	528	8	9	10	7	10	476	14	14	14	17	13	
32	929	24	19	19	13	18	310	7	12	12	12	11	504	18	15	15	12	16	75	15	10	11	13	9	
33	165	22	19	19	13	18	305	11	12	13	12	11	431	11	11	12	9	11	660	14	11	12	14	10	
34	286	23	20	20	14	19	399	12	12	13	12	11	532	14	11	12	9	11	733	11	13	14	16	12	
35	821	22	18	18	12	17	378	13	10	11	11	9	335	8	10	10	8	10	33	18	14	14	17	13	
36	466	21	16	16	11	15	350	10	12	12	13	11	210	24	19	19	17	19	133	17	14	14	16	13	
37	122	20	16	17	11	15	303	14	9	10	9	8	27	6	19	20	17	20	23	13	15	15	18	14	
38	322	23	18	19	13	17	353	14	9	9	9	8	959	10	11	11	8	12	181	16	14	14	16	13	
39	642	25	22	22	16	21	351	13	8	9	8	7	988	15	11	11	9	12	196	11	8	9	11	8	
40	659	34	28	28	22	27	383	14	8	9	8	7	968	14	10	11	8	11	179	11	9	10	12	8	
41	456	22	16	17	11	15	357	12	8	9	8	7	923	9	10	10	7	10	455	14	9	9	11	8	
42	696	26	23	23	17	22	371	12	16	16	16	15	986	16	11	12	9	12	194	15	10	10	13	9	
43	172	21	18	18	12	17	381	15	15	16	15	14	690	9	10	11	8	11	68	7	9	9	12	8	
44	107	20	16	16	10	15	391	9	11	12	12	10	682	12	11	11	9	11	31	13	8	9	11	7	
45	312	21	17	17	11	16	329	10	9	10	9	8	720	14	10	11	8	11	683	13	8	8	11	7	
46	50	28	25	26	20	24	393	9	14	15	14	13	724	13	11	11	8	11	797	20	10	11	13	9	
47	370	26	22	22	16	21	389	11	9	9	8	8	786	7	9	9	6	9	772	14	10	10	13	9	
48	74	21	17	17	11	16	395	10	6	6	6	6	782	14	12	12	9	12	780	17	9	9	12	8	
49	220	23	18	19	13	17	331	11	4	5	4	4	884		9	10	7	10	671	17	12	12	15	11	
50	495	23	18	19	13	17	384	10	8	8	8	8							91	18	14	14	17	13	
	Mean	23	18	19	13	17		12	11	11	11	10		11	10	8	10	11		14	11	14	12	10	
	Range	20	8	8	5	8		6	4	5	4	4		4	4	4	4	4		7	8	8	5	7	
	Sem(±)	34	28	28	22	27		15	18	19	18	17		24	19	20	17	20		20	16	16	19	15	
	CD at 0.05		2	2	1	2			1	1	1	1			1	1	1	1		24	1	1	2	1	
	CV %		5	5	4	6			4	3	4	3			4	4	3	5		5	4	4	6	3	
		10	13	12	14	17		19	18	13	17	16		32	19	16	18	24		2	16	15	21	15	

**Table-4.3.6b: GYP plot (g) of F<sub>3</sub> progeny, of various F<sub>2</sub> BG102/Naveen plants selected on different methods of selection and grown under different crop ecology**

Sl. No.	F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny			
		1 <sup>st</sup> method of selection (HY)		2 <sup>nd</sup> Date			2 <sup>nd</sup> method of selection (LY)		2 <sup>nd</sup> Date			3 <sup>rd</sup> method of selection (MTL)		2 <sup>nd</sup> Date			4 <sup>th</sup> method of selection (RPS)		2 <sup>nd</sup> Date	
		DS	TP	DS	TP		DS	TP	DS	TP		DS	TP	DS	TP		DS	TP	DS	TP
1	183	208	197	194	203	167	217	206	203	203	98	246	235	232	232	651	215	204	201	201
2	187	216	205	202	196	175	210	199	196	196	20	225	214	211	210	18	230	219	216	215
3	645	243	232	229	198	135	212	201	198	198	61	208	197	194	193	435	242	231	228	228
4	621	212	201	198	198	173	213	202	199	198	87	230	219	216	216	445	221	210	207	207
5	629	214	203	200	189	130	203	192	189	189	535	222	211	208	208	418	220	209	206	206
6	887	250	239	236	195	168	209	198	195	195	77	221	210	207	206	414	225	214	211	211
7	846	229	218	215	185	191	199	188	185	185	554	216	205	202	202	438	225	214	211	211
8	882	242	231	228	195	151	209	198	195	195	381	207	196	193	192	450	205	194	191	190
9	375	234	223	220	191	131	206	195	192	191	57	208	197	194	193	473	210	199	196	195
10	976	249	238	235	199	164	213	202	199	199	97	227	216	213	212	497	214	203	200	200
11	166	250	239	236	183	188	198	187	184	183	26	237	226	223	222	750	205	194	191	191
12	597	240	229	226	191	139	205	194	191	191	46	226	215	212	212	407	208	197	194	194
13	814	219	208	205	181	157	196	185	182	181	69	220	209	206	205	171	221	210	207	207
14	11	211	200	197	187	141	202	191	188	187	60	228	217	214	213	71	207	196	193	193
15	110	224	213	210	189	662	203	192	189	189	229	222	211	208	207	403	209	198	195	195
16	132	242	231	228	180	177	203	184	181	180	2	215	204	201	200	409	221	210	207	214
17	927	221	210	207	188	480	202	191	188	188	448	250	239	236	236	479	210	199	196	196
18	560	235	224	221	208	500	223	212	209	208	147	231	220	217	217	486	211	200	197	197
19	256	235	224	221	187	152	201	190	187	187	180	238	227	224	223	481	222	211	208	208
20	740	243	232	229	202	185	217	206	203	202	226	235	224	221	221	447	208	197	194	193
21	788	243	232	229	192	314	206	195	192	192	643	249	238	235	234	432	207	196	193	193
22	153	242	231	228	191	320	205	194	191	191	468	244	233	230	229	477	218	207	204	204
23	713	229	218	215	206	321	220	209	206	206	190	240	229	226	226	145	227	216	213	213
24	170	229	218	215	223	325	237	226	223	223	470	252	241	238	238	462	217	206	203	203
25	396	249	238	235	212	311	227	216	213	212	890	236	225	222	222	467	217	206	203	202
26	161	219	208	205	215	316	229	218	215	215	280	216	205	202	201	96	205	194	191	191

Contd....

Sl. No.	F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny			
		1 <sup>st</sup> method of selection (HY)		2 <sup>nd</sup> Date			1 <sup>st</sup> Date		2 <sup>nd</sup> Date			1 <sup>st</sup> Date		2 <sup>nd</sup> Date			1 <sup>st</sup> Date		2 <sup>nd</sup> Date	
27	142	301	286	299	263	589	237	221	201	237	908	198	185	185	149	460	228	217	214	214
28	220	209	206	214	144	144	229	218	215	214	261	222	211	208	208	420	221	210	207	206
29	234	223	220	212	313	313	226	215	212	212	874	233	222	219	219	408	217	206	203	203
30	235	224	221	233	327	327	247	236	233	233	441	232	221	218	218	415	205	194	191	191
31	234	223	220	222	186	186	236	225	222	222	528	230	219	216	216	476	228	217	214	214
32	219	208	205	219	310	310	233	222	219	219	504	220	209	206	205	75	229	218	215	214
33	214	203	200	237	305	305	252	241	238	237	431	234	223	220	219	660	212	201	198	198
34	213	202	199	217	399	399	231	220	217	217	532	223	212	209	209	733	224	213	210	210
35	216	205	202	236	378	378	250	239	236	236	335	204	193	190	190	33	209	198	195	195
36	218	207	204	200	350	350	215	204	201	200	210	220	209	206	206	133	220	209	206	206
37	229	218	215	219	303	303	234	223	220	219	27	212	201	198	198	23	215	204	201	201
38	219	208	205	229	353	353	244	233	230	229	959	215	204	201	201	181	204	193	190	190
39	211	200	197	220	351	351	234	223	220	220	988	216	205	202	201	196	203	192	189	189
40	219	208	205	226	383	383	241	230	227	226	968	208	197	194	193	179	210	199	196	196
41	220	209	206	212	357	357	226	215	212	212	923	207	196	193	193	455	209	198	195	195
42	212	201	198	217	371	371	231	220	217	217	986	212	201	198	198	194	208	197	194	193
43	209	198	195	217	381	381	231	220	217	217	690	218	207	204	204	68	203	192	189	189
44	227	216	213	229	391	391	243	232	229	229	682	217	206	203	203	31	214	203	200	199
45	222	211	208	207	329	329	222	211	208	207	720	216	205	202	201	683	219	208	205	205
46	219	208	205	214	393	393	229	218	215	214	724	228	217	214	213	797	211	200	197	197
47	227	216	213	217	389	389	232	221	218	217	786	218	207	204	204	772	215	204	201	201
48	222	211	208	241	395	395	255	244	241	241	782	236	225	222	221	780	217	206	203	203
49	230	219	216	216	331	331	230	219	216	216	884	228	217	214	214	671	236	225	222	222
50	218	207	493	228	384	384	243	232	229	228					91	209	198	195	195	
	Mean	227	216	219	208		222	211	208	208		225	214	211	211		216	205	202	202
	Min.	200	197	194	180		198	184	185	180		198	185	185	149		202	192	189	189
	Max.	301	239	299	395		252	244	241	241		252	241	238	238		242	231	228	228
	Range	11	11	24	13		1	1	14	15		29	9	11	26		9	11	7	8
	CD at 0.05	31	30	69	37		3	3	40	42		83	25	30	73		25	31	21	23
	CV %	7	7	16	9		2	2	9	10		18	17	7	18		6	7	5	6

**Table-4.4a: Genetic Parameters of 50 F<sub>3</sub> progenies selected from F<sub>2</sub> population (BG102/BPT5204) based on different selection indices and grown under different crop ecology**

Characters	Genetic parameters	1 <sup>st</sup> method of selection (HY)				2 <sup>nd</sup> method of selection (LY)				3 <sup>rd</sup> method of selection (MTL)				4 <sup>th</sup> method of selection (RPS)			
		1 <sup>st</sup> Date		2 <sup>nd</sup> Date		1 <sup>st</sup> Date		2 <sup>nd</sup> Date		1 <sup>st</sup> Date		2 <sup>nd</sup> Date		1 <sup>st</sup> Date		2 <sup>nd</sup> Date	
Characters	parameters	DS	TP	DS	TP	DS	TP	DS	TP	DS	TP	DS	TP	DS	TP	DS	TP
DFF	h <sup>2</sup> (%)	74.59	76.75	42.53	67.64	73.21	22.03	9.60	64.28	65.43	84.12	65.98	84.26	91.13	71.48	78.87	86.18
	GA (%)	12.93	7.31	5.08	5.95	6.72	2.19	1.14	4.94	5.34	6.51	5.38	6.52	8.66	7.18	7.75	8.30
	GCV (%)	4.40	4.05	3.78	3.51	3.83	2.26	1.78	2.99	3.82	3.75	3.94	3.37	5.31	4.52	5.24	4.28
PH (cm)	PCV (%)	5.10	4.62	5.79	4.26	4.48	4.82	5.75	3.72	4.73	4.08	4.85	3.67	5.56	5.35	5.90	4.61
	h <sup>2</sup> (%)	5.35	16.38	10.45	3.73	11.07	18.69	34.66	37.65	15.98	11.21	12.78	27.98	11.34	10.35	70.42	13.12
	GA (%)	0.84	2.20	1.67	0.71	1.52	3.47	5.68	6.09	2.61	1.68	2.23	5.18	2.25	2.07	14.00	2.91
PPP	GCV (%)	1.75	2.63	2.50	1.78	2.22	3.89	4.68	4.82	3.11	2.39	2.97	4.66	3.23	3.11	8.09	3.90
	PCV (%)	7.59	6.50	7.73	9.22	6.69	9.01	7.95	7.85	7.78	7.12	8.32	8.81	9.61	9.69	9.65	10.76
	h <sup>2</sup> (%)	9.93	23.53	25.41	27.26	21.85	41.82	15.61	38.68	27.16	50.69	19.75	27.22	43.97	11.91	53.95	14.88
GPP	GA (%)	3.78	9.56	8.69	12.00	5.64	16.73	5.42	15.24	10.09	35.25	14.98	11.59	20.28	5.84	26.70	7.15
	GCV (%)	5.81	10.87	8.08	9.98	7.38	12.29	6.45	12.54	10.40	24.04	15.57	11.01	13.18	8.97	16.76	8.91
	PCV (%)	18.45	22.41	16.03	19.12	15.79	19.00	16.33	20.17	19.97	33.77	35.06	21.12	19.88	26.01	22.82	23.10
TW(g)	h <sup>2</sup> (%)	73.41	58.96	69.99	52.46	57.28	41.79	47.27	40.82	50.47	12.35	37.14	49.09	40.39	56.02	47.36	37.68
	GA (%)	39.07	25.91	30.92	21.59	24.72	17.22	20.21	15.90	24.26	6.24	15.43	20.71	18.54	22.30	23.37	16.06
	GCV (%)	22.13	16.38	17.94	14.46	15.85	12.92	14.26	12.27	16.28	8.47	12.08	14.10	14.16	14.46	14.60	12.70
GYP Plant (g)	PCV (%)	25.83	21.33	21.44	19.97	20.94	19.99	20.75	19.20	22.91	24.12	19.82	20.12	22.28	19.32	21.22	20.68
	h <sup>2</sup> (%)	76.00	84.77	82.59	96.42	95.35	92.00	93.39	89.07	86.38	92.10	88.87	95.94	62.27	86.06	79.19	86.47
	GA (%)	12.20	14.56	13.13	26.33	20.97	19.94	21.24	21.17	15.98	16.76	16.17	27.90	10.01	14.42	12.86	13.07
GYP Plot (g)	GCV (%)	6.79	7.67	7.01	13.01	10.42	10.09	10.66	10.83	8.17	8.30	8.15	13.55	6.15	7.54	7.01	6.82
	PCV (%)	7.79	8.33	7.71	13.25	10.67	10.51	11.04	11.48	8.80	8.65	8.65	13.83	7.79	8.13	7.88	7.33
	h <sup>2</sup> (%)	46.14	28.47	35.74	50.26	50.32	59.74	32.16	25.01	49.89	53.38	31.42	17.23	31.57	29.84	41.84	16.05
GYP Plot (g)	GA (%)	18.45	11.58	14.92	25.29	28.25	25.77	10.73	6.38	45.55	43.06	22.30	6.26	14.67	10.76	28.40	4.60
	GCV (%)	13.18	10.53	12.10	17.31	19.32	16.18	9.18	6.44	30.80	28.14	19.02	7.19	12.67	9.55	21.30	5.56
	PCV (%)	19.40	19.75	20.25	24.42	27.24	20.93	16.18	12.87	43.61	38.51	33.94	17.31	22.55	17.48	32.94	13.89
GYP Plot (g)	h <sup>2</sup> (%)	44.28	35.19	57.01	34.98	19.01	18.99	49.76	19.01	14.13	13.36	16.44	33.57	4.09	12.41	21.24	14.97
	GA (%)	17.23	15.01	29.53	16.42	6.59	7.01	25.07	6.59	4.12	4.17	6.61	12.64	1.37	4.01	12.50	5.65
	GCV (%)	12.57	12.27	18.98	13.47	7.33	7.80	17.25	8.65	5.32	5.53	7.91	10.58	3.29	5.52	13.15	7.09
GYP Plot (g)	PCV (%)	18.89	20.69	25.14	22.77	16.81	17.91	24.45	19.84	14.16	15.13	19.52	18.27	16.28	15.66	28.54	18.32

**Table-4.4b: Genetic Parameters of 50 F<sub>3</sub> progenies selected from F<sub>2</sub> population (BG102/Navreen) based from different selection indices and grown under different crop ecology**

Characters	Genetic parameters	F <sup>1st</sup> method of selection (HY)				2 <sup>nd</sup> method of selection (LY)				3 <sup>rd</sup> method of selection (MTL)				4 <sup>th</sup> method of selection (RPS)			
		1 <sup>st</sup> Date		2 <sup>nd</sup> Date		1 <sup>st</sup> Date		2 <sup>nd</sup> Date		1 <sup>st</sup> Date		2 <sup>nd</sup> Date		1 <sup>st</sup> Date		2 <sup>nd</sup> Date	
		DS	TP	DS	TP	DS	TP	DS	TP	DS	TP	DS	TP	DS	TP	DS	TP
DFF	h <sup>2</sup> (%)	68.00	63.74	24.30	77.46	61.05	65.91	50.17	43.31	3.06	45.02	9.85	95.72	53.34	65.94	32.59	55.04
	GA (%)	4.83	4.26	2.06	4.38	4.28	4.17	3.69	2.65	0.11	1.42	0.45	26.92	2.67	3.18	1.94	2.75
	PCV (%)	2.94	2.57	1.94	2.54	2.68	2.41	2.34	1.99	0.40	1.13	0.83	14.33	2.24	2.09	1.97	1.88
PH (cm)	h <sup>2</sup> (%)	3.56	3.22	3.93	2.88	3.43	2.96	3.30	3.03	2.30	1.69	2.66	14.65	3.07	2.58	3.45	2.53
	GA (%)	17.14	15.52	14.91	10.41	15.95	12.03	11.02	17.08	10.75	23.14	13.55	60.23	6.53	5.71	14.20	12.15
	PCV (%)	2.20	2.09	2.00	1.06	2.21	1.50	1.46	1.67	1.35	2.88	2.18	20.53	0.75	0.63	1.59	1.12
PPP	h <sup>2</sup> (%)	2.58	2.58	2.51	1.58	2.69	2.09	2.13	1.96	1.99	2.90	2.87	13.10	1.42	1.27	2.04	1.55
	GA (%)	6.23	6.56	6.51	4.92	6.75	6.03	6.44	4.75	6.09	6.03	7.79	16.88	5.57	5.34	5.43	4.46
	PCV (%)	12.99	11.94	20.25	23.72	10.29	56.15	19.21	36.13	11.93	28.85	11.32	39.68	14.29	29.60	18.95	27.98
GPP	h <sup>2</sup> (%)	4.26	3.28	6.47	8.55	3.52	15.17	7.11	11.96	5.48	10.65	5.20	11.45	3.94	7.59	6.26	7.61
	GA (%)	5.73	4.39	8.65	8.41	5.18	10.13	7.64	9.89	7.13	8.74	4.77	16.16	5.20	6.32	6.98	6.58
	PCV (%)	15.90	12.71	19.23	17.27	16.14	13.52	17.44	16.46	20.65	16.28	14.19	25.66	13.77	11.62	16.03	12.45
TW(g)	h <sup>2</sup> (%)	52.06	40.26	39.69	36.43	18.22	57.45	20.14	19.28	26.57	25.39	19.47	45.58	47.41	40.39	56.89	46.98
	GA (%)	19.38	14.60	17.15	12.42	6.53	19.78	7.63	7.03	8.19	7.94	6.30	20.13	19.60	15.18	23.26	16.32
	PCV (%)	13.03	11.17	13.21	9.98	7.42	12.67	8.25	7.77	7.73	7.63	6.92	14.76	13.81	11.59	14.96	11.55
GYP Plant (g)	h <sup>2</sup> (%)	18.06	17.60	20.97	16.54	17.39	16.72	18.39	17.69	14.99	15.15	15.70	21.87	20.06	18.23	19.84	16.85
	GA (%)	9.36	13.98	14.41	21.54	16.00	95.61	93.37	95.13	81.65	92.16	94.49	95.28	89.75	95.28	90.05	94.65
	PCV (%)	5.98	7.12	7.49	10.76	9.64	10.72	10.70	10.79	10.53	10.84	11.06	18.00	10.81	10.97	10.91	10.84
GYP Plot (g)	h <sup>2</sup> (%)	7.90	7.48	8.01	11.09	11.98	10.97	11.15	11.06	11.66	11.29	11.38	18.44	11.41	11.24	11.50	11.14
	GA (%)	37.93	43.56	59.96	21.44	53.37	72.25	55.45	65.28	39.62	47.11	59.73	35.14	46.53	45.26	15.98	59.05
	PCV (%)	13.12	14.52	27.20	8.33	30.46	37.25	31.19	39.26	21.93	23.91	37.90	22.89	20.82	19.51	7.47	27.70
GYP Plot (g)	h <sup>2</sup> (%)	10.24	10.48	16.88	8.65	19.29	20.31	19.35	22.43	15.16	15.12	21.81	17.57	14.81	14.07	9.06	17.48
	GA (%)	16.62	15.88	21.80	18.68	26.40	23.90	25.99	27.77	24.09	22.03	28.21	29.65	21.71	20.92	22.67	22.75
	PCV (%)	10.09	12.67	49.11	22.18	14.11	14.50	15.58	10.24	27.14	32.28	14.33	21.72	2.96	11.36	18.98	10.39
PCV (%)	h <sup>2</sup> (%)	1.49	1.95	22.21	4.61	9.29	7.55	3.31	2.24	92.64	39.07	45.13	71.57	0.35	1.87	2.25	1.30
	GA (%)	2.28	2.65	15.38	4.74	4.07	3.90	4.06	3.39	11.25	3.96	2.88	9.29	0.99	2.68	2.50	1.96
	PCV (%)	7.17	7.45	21.95	10.07	10.83	10.24	10.30	10.60	21.59	6.98	7.61	19.94	5.78	7.96	5.75	6.08

**Table-4.4c: Genetic Parameters of 50 F<sub>3</sub>progenies selected from F<sub>2</sub> population BG102/Reshmi (Commercial pvt. hybrid victory seeds) based from different selection indices and grown under different crop ecology**

Characters	Genetic parameters	1 <sup>st</sup> method of selection (HY)				2 <sup>nd</sup> method of selection (LY)				3 <sup>rd</sup> method of selection (MTL)				4 <sup>th</sup> method of selection (RPS)			
		1 <sup>st</sup> Date		2 <sup>nd</sup> Date		1 <sup>st</sup> Date		2 <sup>nd</sup> Date		1 <sup>st</sup> Date		2 <sup>nd</sup> Date		1 <sup>st</sup> Date		2 <sup>nd</sup> Date	
		DS	TP	DS	TP	DS	TP	DS	TP	DS	TP	DS	TP	DS	TP	DS	TP
DFF	h <sup>2</sup> (%)	87.00	69.17	69.17	44.48	69.63	69.63	71.68	69.63	99.82	99.87	99.76	99.92	99.62	99.80	99.43	99.84
	GA (%)	11.53	8.56	9.01	4.08	8.25	7.31	7.89	6.84	84.32	84.14	84.15	84.07	86.12	85.88	85.82	85.69
	GCV (%)	5.99	4.99	5.25	3.06	4.80	4.25	4.52	3.97	48.77	48.65	48.69	48.60	48.74	48.64	48.65	48.59
PH (cm)	PCV (%)	6.41	6.01	6.32	4.59	5.75	5.10	5.34	4.76	48.81	48.68	48.74	48.62	48.84	48.69	48.78	48.63
	h <sup>2</sup> (%)	82.50	36.72	5.08	15.57	55.20	25.87	43.13	28.08	97.06	94.82	95.39	95.73	91.77	94.87	95.65	95.14
	GA (%)	18.16	7.19	1.23	2.80	15.45	5.91	13.08	6.64	85.96	82.82	85.22	83.61	77.95	79.44	74.72	79.69
PPP	GCV (%)	12.51	5.75	2.65	3.44	10.09	5.64	9.66	6.07	50.41	49.14	50.42	49.37	49.93	49.15	50.46	49.30
	PCV (%)	13.77	9.50	11.77	8.73	13.58	11.09	14.71	11.47	51.17	50.47	51.62	50.47	52.12	50.46	51.59	50.54
	h <sup>2</sup> (%)	87.48	38.56	22.62	40.79	39.55	36.17	37.64	28.92	68.04	17.49	64.66	78.08	73.05	89.54	71.95	79.57
GPP	GA (%)	12.04	14.26	8.38	20.74	9.65	12.08	15.78	12.40	70.67	19.70	60.39	73.94	71.63	81.14	67.60	77.24
	GCV (%)	13.75	11.35	8.90	9.99	10.02	12.76	12.35	11.55	45.43	27.83	44.93	47.58	46.39	49.58	46.38	47.84
	PCV (%)	14.70	18.28	18.71	15.64	15.94	21.22	20.13	21.47	55.08	66.55	55.87	53.85	54.28	52.39	54.68	53.62
TW(g)	h <sup>2</sup> (%)	87.02	23.52	46.49	49.25	36.35	20.55	39.10	26.00	88.40	87.76	81.34	77.12	82.92	75.73	81.75	75.68
	GA (%)	19.67	7.37	18.65	20.49	12.57	6.53	13.25	8.08	83.88	78.47	77.12	76.02	82.92	75.73	81.75	75.68
	GCV (%)	16.16	7.37	13.27	14.16	10.12	6.99	10.28	7.69	51.55	48.40	49.41	47.89	51.23	47.99	50.64	48.24
GYP Plant (g)	PCV (%)	17.33	15.20	19.47	20.19	16.78	15.42	16.44	15.08	54.83	51.66	54.78	52.20	55.12	52.10	53.70	51.89
	h <sup>2</sup> (%)	97.08	96.98	96.87	96.42	97.01	90.10	96.75	96.76	99.77	99.44	99.63	99.70	99.40	99.76	99.80	99.70
	GA (%)	29.69	26.36	28.94	28.31	26.43	25.27	27.82	27.53	87.39	38.61	41.98	89.67	86.54	84.11	87.03	89.63
GYP Plot (g)	PCV (%)	14.62	12.99	14.26	13.01	13.02	13.04	13.72	13.29	50.55	56.11	59.47	50.51	50.50	50.54	50.53	50.51
	h <sup>2</sup> (%)	14.84	13.19	14.49	13.25	13.21	13.74	13.95	13.51	50.60	56.26	59.58	50.58	50.65	50.60	50.58	50.58
	GA (%)	88.09	42.27	41.66	35.03	31.53	10.07	43.94	54.60	83.49	76.35	76.97	86.73	84.91	83.31	85.75	77.83
GYP Plot (g)	GCV (%)	12.57	17.21	19.26	16.77	14.65	23.00	21.48	23.23	98.27	79.08	84.34	84.61	90.92	82.10	93.59	93.55
	PCV (%)	17.04	12.84	14.48	13.59	12.65	3.80	15.71	18.21	62.09	52.28	55.52	60.32	62.43	53.30	57.15	58.96
	h <sup>2</sup> (%)	18.15	19.75	22.43	22.96	22.53	11.97	23.71	24.65	67.95	59.83	63.28	64.77	67.75	58.40	61.71	66.83
GYP Plot (g)	GA (%)	77.20	55.28	44.53	51.05	65.51	74.54	70.73	75.07	88.67	93.86	89.20	90.88	91.10	92.70	91.85	92.94
	PCV (%)	16.18	25.19	19.87	22.65	33.93	52.39	39.47	52.68	79.76	76.57	63.51	72.61	85.34	95.18	87.64	89.64
	h <sup>2</sup> (%)	16.43	16.44	14.45	15.38	20.35	29.45	22.78	29.51	63.18	69.53	66.39	74.32	63.64	69.30	66.67	74.76
GYP Plot (g)	PCV (%)	18.70	22.12	21.66	21.53	25.14	34.11	27.08	34.06	67.10	71.76	70.29	77.96	66.67	71.98	69.57	77.54

**Table-4.3c: DFF of F<sub>3</sub> progeny of various F<sub>2</sub>BG102/ Reshmi (F<sub>1</sub>) Commercial hybridplants selected on different methods of selection and grown under different crop ecology**

Sl. No.	F <sub>2</sub> Plant No.	F <sub>2</sub> 2013		F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013		F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013		F <sub>3</sub> Progeny 2014						
		DFF	DS	1 <sup>st</sup> method of selection (HY)		2 <sup>nd</sup> Date			DFF	DS	2 <sup>nd</sup> method of selection (LY)		2 <sup>nd</sup> Date			DFF	DS	3 <sup>rd</sup> method of selection (MTL)		2 <sup>nd</sup> Date		DFF	DS	4 <sup>th</sup> method of selection (RPS)
1	364	92	88	98	93	104	451	90	83	93	88	99	944	95	74	84	80	90	392	89	90	100	95	106
2	253	96	79	89	84	95	704	97	74	84	80	90	859	84	77	87	83	93	232	82	74	84	80	90
3	378	82	80	90	85	96	536	86	73	83	78	89	477	85	80	90	86	96	191	94	86	96	92	102
4	238	95	87	97	93	103	409	91	76	86	81	92	747	93	78	88	83	94	166	86	86	96	92	102
5	884	87	81	91	86	97	438	85	73	83	79	89	79	86	76	86	82	92	86	84	76	86	82	92
6	242	87	79	89	85	96	446	85	74	84	79	90	880	83	87	97	92	103	103	86	76	86	81	92
7	94	89	84	94	89	100	837	89	78	88	84	94	287	89	85	95	91	101	197	84	75	85	81	91
8	506	84	82	92	88	98	877	86	78	88	84	94	54	84	86	96	91	102	82	86	75	85	80	91
9	960	89	85	95	91	101	698	86	75	85	80	91	698	86	78	88	83	94	31	86	75	85	81	91
10	262	93	85	95	91	102	505	83	73	83	79	89	194	88	74	84	80	90	78	83	75	85	80	91
11	400	89	86	96	91	102	686	89	77	87	82	93	962	89	72	82	78	88	85	88	77	87	83	93
12	981	86	77	87	83	93	520	89	83	93	88	99	176	84	90	100	95	106	64	95	72	82	78	88
13	737	97	79	89	85	95	701	83	76	86	81	93	307	97	89	99	94	105	182	89	75	85	80	91
14	783	89	85	95	91	103	820	93	82	92	87	98	470	86	75	85	81	91	132	82	73	83	79	89
15	313	83	75	85	81	91	786	98	79	89	85	95	456	82	90	100	95	106	130	95	76	86	81	92
16	379	82	87	97	92	103	684	91	77	87	82	93	485	85	82	92	88	98	107	92	73	83	79	89
17	200	91	77	87	83	93	580	94	84	94	90	100	429	90	81	91	87	97	118	84	73	83	79	89
18	391	85	76	86	82	92	825	86	84	94	90	100	455	87	83	93	88	99	188	97	76	86	81	92
19	168	85	88	98	93	104	889	97	73	83	79	89	401	96	87	97	93	103	192	93	82	92	88	98
20	27	96	88	98	94	104	810	86	81	91	86	97	315	84	79	89	84	95	706	96	86	96	92	102
21	530	85	88	98	94	104	663	86	88	98	93	104	203	87	86	96	91	102	184	83	87	97	92	103
22	638	90	74	84	79	90	430	95	88	98	93	104	223	85	86	96	92	102	158	91	73	83	78	89
23	26	83	76	86	81	92	735	83	75	85	80	91	160	85	87	97	92	103	198	93	73	83	79	89
24	68	97	82	92	87	98	416	94	74	84	80	90	172	91	86	96	91	102	162	96	87	97	92	103
25	359	96	87	97	93	103	499	89	74	84	80	90	991	95	87	97	92	103	92	88	86	96	91	102
26	500	82	82	92	87	98	717	94	77	87	82	93	917	97	84	94	90	100	93	97	87	97	93	103
27	464	86	77	87	82	93	745	89	77	87	83	93	916	94	77	87	82	93	81	98	75	85	80	91

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Sl. No.	F <sub>2</sub> Plant No.	F <sub>2</sub> 2013		F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013		F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013		F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013		F <sub>3</sub> Progeny 2014						
		DFE	TP	1 <sup>st</sup> method of selection (HY)		2 <sup>nd</sup> Date	TP		DS	TP	DFE	DS	2 <sup>nd</sup> method of selection (LY)			2 <sup>nd</sup> Date	TP	DS	TP	DFE	DS		3 <sup>rd</sup> method of selection (MTL)		2 <sup>nd</sup> Date	TP	DFE	DS	4 <sup>th</sup> method of selection (RPS)		2 <sup>nd</sup> Date
				1 <sup>st</sup> Date	2 <sup>nd</sup> Date								1 <sup>st</sup> Date	2 <sup>nd</sup> Date									1 <sup>st</sup> Date	2 <sup>nd</sup> Date					1 <sup>st</sup> Date	2 <sup>nd</sup> Date	
28	635	97	76	76	86	82	92	54	84	77	87	83	93	281	85	74	84	80	90	2	90	73	83	78	89						
29	458	84	78	88	84	84	94	755	92	74	84	79	90	777	85	86	96	91	102	7	94	80	90	85	96						
30	672	91	84	94	90	100	100	707	91	74	84	80	90	711	100	77	87	83	93	159	86	76	86	81	92						
31	648	84	88	98	94	104	104	563	91	84	94	90	100	766	91	79	89	85	95	116	92	88	98	93	104						
32	462	97	90	100	96	106	106	461	83	77	87	82	93	286	86	77	87	83	93	153	96	76	86	82	92						
33	382	95	88	98	93	104	104	586	89	74	84	80	90	222	95	76	86	81	92	112	91	74	84	80	90						
34	81	98	83	93	88	99	92	546	84	73	83	78	89	37	97	77	87	83	93	135	88	81	91	87	97						
35	125	86	76	86	81	92	92	584	85	74	84	80	90	91	84	85	95	91	101	154	87	77	87	82	93						
36	280	97	77	87	83	93	93	372	97	83	93	88	99	4	96	75	85	80	91	484	94	76	86	81	92						
37	651	98	75	85	81	91	91	575	91	75	85	80	91	8	85	75	85	81	91	363	84	75	85	81	91						
38	171	88	90	100	95	106	106	547	85	75	85	81	91	753	82	78	88	83	94	405	97	87	97	92	103						
39	414	95	77	87	83	93	93	516	85	76	86	81	92	709	88	83	93	89	99	483	97	75	85	80	91						
40	434	83	75	85	81	91	91	435	85	76	86	82	92	53	84	73	83	79	89	331	93	73	83	78	89						
41	388	83	77	87	82	93	93	408	92	73	83	79	89	5	89	77	87	82	93	497	83	87	97	93	103						
42	149	95	76	86	82	92	92	237	95	75	85	81	91	869	85	83	93	88	99	383	87	77	87	83	93						
43	454	83	87	97	93	103	103	496	85	76	86	81	92							371	82	87	97	92	103						
44	279	85	76	86	81	92	92	439	91	87	97	92	103							385	87	74	84	80	90						
45	703	84	84	94	90	100	100	306	83	77	87	83	93							490	86	80	90	86	96						
46	99	91	78	88	83	94	94	418	86	77	87	82	93							169	93	87	97	92	103						
47	277	85	83	93	89	99	99	524	87	77	87	83	93							498	98	78	88	83	94						
48	637	95	75	85	80	91	91	366	84	76	86	81	92							50	94	81	91	87	97						
49	384	97	76	86	82	92	92	377	83	77	87	82	93							399	92	81	91	87	97						
50	121	92	88	98	93	104	104	335	85	81	91	86	97							230	97	81	91	87	97						
	Mean		81	91	87	97	97		88	77	87	83	93		89	81	91	86	97		91	79	89	84	95						
	Min.	82	74	84	79	90	90		83	73	83	78	88		82	72	82	78	88		82	72	82	77	88						
	Max.	98	90	100	96	106	106		98	87	97	93	104		100	90	99	96	105		98	90	100	95	106						
	Stem(±)		1	2	2	2	2			2	2	2	2			1	1	1	1			1	1	2	1						
	CD at 0.05		4	6	6	6	6			5	5	5	5			3	3	3	3			4	4	3	3						
	CV %	6	2	3	4	3			5	3	3	3	3		6	2	2	2	1			6	3	2	4						

**Table-4.3.1c: PH (cm) of F<sub>3</sub> progeny, of various F<sub>2</sub> BG102/Reshmi (Commercial pvt. hybrid victory seeds) plants selected on different methods of selection and grown under different crop ecology**

Sl. No.	F <sub>2</sub> Plant No.	F <sub>2</sub> 2013 PH (cm)	F <sub>3</sub> Progeny 2014					F <sub>2</sub> Plant No.	F <sub>2</sub> 2013 PH (cm)	F <sub>3</sub> Progeny 2014					F <sub>2</sub> Plant No.	F <sub>2</sub> 2013 PH (cm)	F <sub>3</sub> Progeny 2014					F <sub>2</sub> Plant No.	F <sub>2</sub> 2013 PH (cm)	F <sub>3</sub> Progeny 2014						
			1 <sup>st</sup> method of selection (HY)		2 <sup>nd</sup> Date		TP			1 <sup>st</sup> Date		2 <sup>nd</sup> Date		TP			1 <sup>st</sup> Date		2 <sup>nd</sup> Date		TP			3 <sup>rd</sup> method of selection (MTL)		2 <sup>nd</sup> Date		TP	1 <sup>st</sup> Date	
1	364	101	84	86	86	126	451	124	79	101	77	97	944	100	92	82	62	79	392	113	92	82	62	79	392	113	92	82	62	79
2	253	129	94	96	94	128	704	128	89	92	90	89	859	104	75	100	74	97	232	122	75	100	74	97	232	122	75	100	74	97
3	378	119	87	91	88	130	536	112	86	94	82	91	477	105	81	90	81	87	191	117	81	90	81	87	191	117	81	90	81	87
4	238	115	86	95	86	112	409	114	84	94	80	86	747	93	81	106	82	103	166	128	81	106	82	103	166	128	81	106	82	103
5	884	128	64	73	82	130	438	119	67	79	67	76	79	95	81	95	82	92	86	121	81	95	82	92	86	121	81	95	82	92
6	242	113	80	81	83	125	446	102	76	93	72	90	880	104	85	99	86	96	103	127	85	99	86	96	103	127	85	99	86	96
7	94	138	95	101	92	119	837	121	74	92	72	89	287	100	78	94	79	91	197	125	78	94	79	91	197	125	78	94	79	91
8	506	100	60	92	84	125	877	111	73	68	74	65	54	88	96	89	96	86	82	117	96	89	96	86	82	117	96	89	96	86
9	960	120	77	84	78	129	698	100	85	89	86	85	698	100	95	105	96	102	31	127	95	105	96	102	31	127	95	105	96	102
10	262	121	88	93	88	119	505	119	76	85	76	82	194	100	77	88	78	85	78	112	77	88	78	85	78	112	77	88	78	85
11	400	117	77	92	77	131	686	129	55	89	55	86	962	107	86	88	87	85	85	120	86	88	87	85	85	120	86	88	87	85
12	981	103	76	89	77	125	520	118	88	90	89	87	176	100	85	90	86	87	64	145	85	90	86	87	64	145	85	90	86	87
13	737	126	87	83	87	127	701	115	92	100	93	97	307	99	61	78	62	75	182	107	61	78	62	75	182	107	61	78	62	75
14	783	121	87	91	87	121	820	107	80	89	80	86	470	109	77	84	78	81	132	109	77	84	78	81	132	109	77	84	78	81
15	313	125	65	95	83	126	786	118	81	94	82	91	456	100	81	99	82	96	130	106	81	99	82	96	130	106	81	99	82	96
16	379	113	76	86	80	125	684	122	71	88	71	85	485	107	86	98	86	95	107	125	86	98	86	95	107	125	86	98	86	95
17	200	105	79	86	81	127	580	96	71	80	71	77	429	103	91	97	92	94	118	100	91	97	92	94	118	100	91	97	92	94
18	391	123	92	101	91	138	825	125	87	95	93	92	455	104	60	79	61	76	188	135	60	79	61	76	188	135	60	79	61	76
19	168	123	65	83	85	117	889	121	78	92	79	90	401	100	63	77	64	74	192	132	63	77	64	74	192	132	63	77	64	74
20	27	123	75	92	75	127	810	119	80	94	81	91	315	101	81	95	82	92	706	129	81	95	82	92	706	129	81	95	82	92
21	530	121	78	85	78	131	663	124	54	81	54	78	203	100	86	93	87	90	184	106	86	93	87	90	184	106	86	93	87	90
22	638	119	83	87	84	123	430	109	94	102	95	99	223	100	89	94	90	91	158	117	89	94	90	91	158	117	89	94	90	91
23	26	127	79	92	78	128	735	114	80	94	81	91	160	93	76	82	77	79	198	114	76	82	77	79	198	114	76	82	77	79
24	68	130	71	99	72	122	416	139	82	100	82	97	172	105	103	102	103	99	162	118	103	102	103	99	162	118	103	102	103	99
25	359	106	51	72	77	125	499	110	93	97	93	94	991	107	66	82	66	79	92	126	66	82	66	79	92	126	66	82	66	79
26	500	132	79	95	79	127	717	126	92	91	93	88	917	88	59	69	60	66	93	90	59	69	60	66	93	90	59	69	60	66
27	464	140	81	94	81	122	745	115	92	103	92	100	916	107	87	88	88	85	81	119	87	88	88	85	81	119	87	88	88	85

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Sl. No.	F <sub>2</sub> Plant No.	F <sub>2</sub> 2013		F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013		F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013		F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013		F <sub>3</sub> Progeny 2014			
		PH(cm)	DS	TP	DS	TP	DS		TP	PH(cm)	DS	TP	DS	TP		DS	TP	PH(cm)	DS	TP	DS		TP	DS	TP	PH(cm)	DS	TP
28	635	121	78	84	78	78	120	54	88	87	92	88	89	281	108	85	91	86	88	2	120	85	91	86	88			
29	458	129	86	95	86	86	131	755	96	70	81	70	77	777	103	90	91	91	88	7	124	90	91	91	88			
30	672	120	70	79	71	71	137	707	113	75	87	74	84	711	102	93	94	94	91	159	118	93	94	94	91			
31	648	119	73	79	74	74	125	563	120	73	80	71	76	766	102	98	109	99	106	116	122	98	109	99	106			
32	462	121	91	97	91	91	129	461	110	79	85	75	82	286	98	109	110	110	107	153	100	109	110	110	107			
33	382	114	82	87	81	81	133	586	108	88	95	83	92	222	108	87	96	88	93	112	127	87	96	88	93			
34	81	119	90	99	92	92	125	546	90	91	106	88	103	37	109	79	89	80	86	135	123	79	89	89	86			
35	125	121	71	94	70	70	125	584	100	88	100	87	97	91	108	87	93	88	90	154	120	87	93	88	90			
36	280	115	92	95	93	93	115	372	110	81	91	79	88	4	106	99	105	99	102	484	124	99	105	99	102			
37	651	121	70	85	70	70	119	575	116	77	101	75	98	8	108	97	106	97	103	363	117	97	106	97	103			
38	171	116	89	96	87	87	113	547	114	82	90	81	87	753	104	72	85	73	82	405	120	72	85	73	82			
39	414	107	67	85	67	67	115	516	120	90	95	91	92	709	104	72	72	72	69	483	110	72	72	72	69			
40	434	125	54	76	85	85	112	435	126	84	103	85	101	53	105	89	87	89	84	331	105	89	87	89	84			
41	388	120	91	90	90	90	109	408	130	82	98	83	95	5	100	85	83	86	80	497	115	85	83	86	80			
42	149	130	70	85	71	71	106	237	120	82	99	83	96	869	86	85	88	85	85	383	121	85	88	85	85			
43	454	107	84	90	81	81	110	496	128	83	89	83	86							371	122	84	93	85	90			
44	279	117	84	96	83	83	113	439	119	102	108	103	105							385	115	84	98	85	95			
45	703	108	95	103	97	97	115	306	119	73	85	74	82							490	129	83	103	85	100			
46	99	110	88	90	89	89	117	418	115	86	96	87	93							169	184	83	108	84	105			
47	277	112	88	92	89	89	113	524	130	103	109	103	106							498	120	82	113	84	110			
48	637	128	78	95	78	78	104	366	113	90	99	90	96							50	112	82	118	84	115			
49	384	107	93	95	89	89	109	377	112	72	82	72	81							399	114	81	123	84	120			
50	121	131	79	92	79	79	110	335	100	76	88	75	85							230	117	81	128	83	125			
	Mean	119	80	90	82	82	117		115	81	92	81	89		102	83	91	83	88		120	83	94	84	92			
	Min.	100	51	72	67	67	104		88	54	68	54	65		86	59	69	60	66		90	55	81	81	78			
	Max.	140	95	103	97	97	138		139	103	109	103	106		109	109	110	110	107		145	110	110	110	107			
	Sem(±)		5	5	7	7	7			5	6	6	6			4	6	5	5				7	6	5	6		
	CD at 0/05		15	14	19	20	20			15	18	18	17			12	18	16	16				21	18	15	17		
	CV %	8	9	8	11	8			9	9	10	11	10		6	9	11	11	10			8	15	11	11	11		

**Table-4.3.2c: PPP of F<sub>3</sub> progeny of various F<sub>2</sub> BG102/Reshmi (Commercial pvt. hybrid victory seeds) plants selected on different methods of selection and grown under different crop ecology**

Sl. No.	F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				
		F <sub>2</sub> 2013		F <sub>3</sub> method of selection (HY)			F <sub>2</sub> 2013		2 <sup>nd</sup> method of selection (LY)			F <sub>2</sub> 2013		F <sub>3</sub> 3 <sup>rd</sup> method of selection (MTL)			F <sub>2</sub> 2013		F <sub>3</sub> 4 <sup>th</sup> method of selection (RPS)		
		PPP	DS	TP	DS		TP	DS	TP	DS		TP	PPP	DS	TP		DS	TP	DS	TP	DS
1	364	6	8	9	8	11	5	9	5	7	6	944	7	8	7	7	392	8	8	7	7
2	253	10	9	9	9	12	8	10	8	8	7	859	8	8	8	7	232	11	9	9	9
3	378	11	8	8	8	12	7	8	6	6	477	6	8	7	7	191	6	6	6	6	
4	238	7	7	7	6	13	8	10	8	8	747	6	8	7	7	166	6	6	5	6	
5	884	15	9	9	8	14	8	9	7	7	79	6	5	5	5	86	9	8	8	7	
6	242	10	8	8	8	11	9	10	8	8	880	7	6	6	6	103	7	5	5	5	
7	94	10	8	7	7	11	8	11	9	9	287	6	6	6	6	197	5	6	6	5	
8	506	5	9	9	9	12	6	9	7	7	54	10	9	9	8	82	7	7	7	7	
9	960	8	9	9	8	14	10	7	7	7	698	8	7	7	7	31	4	7	7	7	
10	262	10	9	9	8	14	11	9	9	9	194	6	7	6	6	78	4	6	6	6	
11	400	10	9	9	8	11	7	5	5	5	962	6	8	8	8	85	3	8	8	8	
12	981	15	10	9	9	14	9	7	7	7	176	7	7	7	7	64	11	10	9	9	
13	737	7	9	8	8	13	6	10	8	7	307	9	8	8	8	182	9	8	8	7	
14	783	12	9	9	9	17	7	6	7	6	470	6	7	7	6	132	11	9	9	9	
15	313	13	10	10	10	11	9	7	7	7	456	8	8	8	8	130	11	8	8	8	
16	379	14	9	9	9	14	11	8	8	8	485	8	7	7	7	107	9	8	7	7	
17	200	7	8	8	8	14	9	7	7	7	429	10	7	7	7	118	8	6	6	6	
18	391	8	8	8	8	14	5	5	5	5	455	6	8	8	8	188	9	8	8	8	
19	168	14	10	10	10	15	9	7	7	7	401	9	8	8	8	192	10	7	7	7	
20	27	4	6	6	6	13	7	5	5	5	315	9	7	7	7	706	13	8	8	8	
21	530	7	7	7	7	14	9	7	7	6	203	6	7	7	7	184	4	7	7	7	
22	638	5	7	7	7	12	5	5	5	5	223	10	9	9	9	158	12	8	8	7	
23	26	9	10	10	9	13	14	7	7	7	160	14	8	8	8	198	8	8	7	7	
24	68	9	8	8	8	13	7	7	7	7	172	6	7	7	7	162	4	7	7	7	
25	359	10	9	9	8	13	4	8	6	6	991	10	7	7	7	92	7	7	7	7	
26	500	9	7	7	6	14	9	7	7	6	917	6	8	7	7	93	5	7	7	6	
27	464	10	11	11	10	12	10	7	8	8	916	7	5	5	5	81	10	8	8	8	

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Sl. No.	F <sub>2</sub> Plant No.	F <sub>2</sub> 2013	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013	F <sub>3</sub> Progeny 2014						
			1 <sup>st</sup> method of selection (HY)		2 <sup>nd</sup> method of selection (LY)				3 <sup>rd</sup> method of selection (MTL)		4 <sup>th</sup> method of selection (RPS)																
		PPP	DS	TP	DS	TP		PPP	DS	TP	DS	TP		PPP	DS	TP	DS	TP	DS	TP		PPP	DS	TP	DS	TP	
28	635	5	7	7	7	7	54	10	10	8	8	8	281	17	10	9	9	9	9	2	12	7	7	7	7	7	
29	458	9	8	8	8	8	755	6	10	8	8	777	7	6	6	6	6	6	7	5	6	6	6	6	6	6	
30	672	6	7	7	7	7	707	14	9	7	7	711	6	6	6	6	6	6	159	16	11	12	11	11	11	11	
31	648	11	8	7	7	7	563	7	9	7	7	766	10	8	8	8	8	8	116	13	12	11	11	11	11	11	
32	462	6	9	8	8	8	461	7	9	6	7	286	9	8	8	8	8	8	153	7	8	8	8	7	7	7	
33	382	7	7	7	7	7	586	7	8	5	6	222	7	7	6	6	6	6	112	6	7	7	7	7	7	7	
34	81	10	10	10	9	9	546	4	8	5	5	37	7	7	6	6	6	6	135	10	7	7	7	7	7	7	
35	125	11	7	7	6	6	584	3	8	6	7	91	8	8	8	8	8	8	154	7	6	6	6	6	6	6	
36	280	8	7	8	7	7	372	8	8	6	6	4	14	9	10	9	9	9	484	5	7	7	6	6	6	6	
37	651	7	8	8	8	8	575	11	11	9	9	8	7	8	9	9	9	9	363	5	7	7	7	6	6	6	
38	171	13	11	11	10	10	547	9	10	8	8	753	7	7	7	7	7	7	405	7	6	6	6	6	6	6	
39	414	6	8	7	7	7	516	11	11	9	9	709	6	6	7	7	7	7	483	8	7	7	7	7	7	7	
40	434	7	6	6	6	6	435	10	11	9	9	53	6	7	7	7	6	6	331	7	6	6	6	6	6	6	
41	388	5	7	6	6	6	408	8	10	8	8	5	9	7	7	7	7	7	497	4	6	6	5	5	5	5	
42	149	9	8	8	7	7	237	8	9	6	6	869	9	7	7	7	7	7	383	5	7	7	6	6	6	6	
43	454	8	8	8	7	7	496	5	9	7	7								371	7	7	7	7	7	7	7	
44	279	11	7	7	7	7	439	4	8	6	6								385	7	6	6	5	5	5	5	
45	703	6	8	8	8	8	306	9	9	7	7								490	8	7	7	6	6	6	6	
46	99	6	7	7	7	7	418	8	13	10	10								169	3	6	6	6	5	5	5	
47	277	13	10	10	9	9	524	7	9	7	7								498	7	7	7	7	7	7	7	
48	637	14	11	11	11	11	366	5	8	6	6								50	6	7	7	7	7	7	7	
49	384	9	8	8	8	8	377	6	7	5	5								399	7	7	6	6	6	6	6	
50	121	8	7	7	7	7	335	6	9	7	7								230	5	7	7	6	6	6	5	
	Mean	9	8	8	8	8		7	8	7	7									8	8	7	7	7	7	7	
	Min.	4	1	5	3	6		3	3	6	4									3	3	5	5	5	5	5	
	Max.	15	11	11	10	16		14	14	13	10									16	12	11	11	11	11	11	
	Sem(±)	1	1	1	1	1		1	1	1	1									1	1	1	1	1	1	1	
	CD at 0.05		2	2	3	3			2	2	2										4	4	2	3	3	3	3
	CV %	32	14	14	16	12		33	12	17	16		30	31	60	33	25			40	28	17	29	24	24	24	

**Table-4.3.3c: GPP of F<sub>3</sub> progeny of various F<sub>2</sub> BG102/Reshmi (Commercial pvt. hybrid victory seeds) plants selected on different methods of selection and grown under different crop ecology**

Sl. No.	F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014						F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014						F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014						F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014					
		1 <sup>st</sup> method of selection (HY)			2 <sup>nd</sup> method of selection (LY)				1 <sup>st</sup> method of selection (MTL)			2 <sup>nd</sup> method of selection (RPS)				1 <sup>st</sup> method of selection (HY)			2 <sup>nd</sup> method of selection (LY)				1 <sup>st</sup> method of selection (MTL)			2 <sup>nd</sup> method of selection (RPS)		
		DS	TP	DS	TP	DS	TP		DS	TP	DS	TP	DS	TP		DS	TP	DS	TP	DS	TP		DS	TP	DS	TP	DS	TP
4	238	126	99	95	101	82	409	70	63	67	63	67	63	67	747	99	89	80	90	79	79	166	86	87	85	84		
5	884	96	63	84	59	76	438	101	85	65	85	65	85	65	79	96	94	81	95	80	86	92	100	87	100	86		
6	242	88	77	82	78	88	446	80	96	74	70	74	74	880	103	60	67	62	66	66	103	147	85	95	87	94		
7	94	102	73	73	74	88	837	95	86	76	86	76	69	287	88	61	71	62	70	70	197	77	80	88	81	87		
8	506	58	69	85	70	90	877	74	68	69	67	69	69	54	115	98	92	99	91	91	82	86	74	83	77	83		
9	960	40	84	83	85	87	698	98	87	70	87	70	70	698	98	79	81	79	80	80	31	135	77	90	83	91		
10	262	41	87	86	88	77	505	43	99	68	74	68	68	194	120	104	95	104	95	78	98	98	74	74	76	74		
11	400	125	84	72	85	88	686	72	71	80	71	80	80	962	83	74	77	76	76	76	85	100	73	72	75	72		
12	981	102	69	73	71	107	520	116	117	89	116	89	89	176	120	72	71	73	70	70	64	110	76	73	78	74		
13	737	96	80	77	81	106	701	74	78	73	77	73	73	307	105	82	84	85	83	83	182	74	80	86	81	87		
14	783	98	91	81	93	73	820	88	92	74	91	74	74	470	96	82	76	83	75	75	132	40	73	66	75	67		
15	313	135	107	89	108	98	786	99	70	69	69	69	69	456	130	82	79	83	79	79	130	79	56	69	58	70		
16	379	66	79	67	81	97	684	111	69	62	69	62	62	485	102	87	90	87	89	89	107	73	66	75	67	76		
17	200	120	94	79	96	90	580	70	92	79	92	79	79	429	98	83	85	84	84	84	118	135	93	66	76	76		
18	391	105	94	86	95	100	825	78	85	84	84	84	84	455	120	79	83	81	82	82	188	115	104	95	95	96		
19	168	116	94	78	95	114	889	130	75	76	74	76	76	401	117	83	76	84	75	75	192	150	98	92	99	93		
20	27	115	88	72	90	76	810	88	88	81	88	81	81	315	96	68	65	68	64	64	706	95	93	91	95	92		
21	530	140	87	82	88	97	663	90	92	82	92	82	82	203	101	82	79	83	78	78	184	97	57	67	58	68		
22	638	80	97	78	98	112	430	105	72	77	72	77	77	223	96	75	68	76	67	67	158	95	85	80	85	81		
23	26	81	65	70	66	97	735	59	82	72	82	72	72	160	117	100	84	101	83	83	198	125	94	87	94	88		
24	68	120	76	80	77	83	416	101	70	73	69	73	73	172	115	96	103	96	102	102	162	101	81	79	80	80		
25	359	92	64	71	65	87	499	122	71	78	71	78	78	991	106	83	78	85	77	77	92	98	76	75	78	76		
26	500	112	79	72	80	75	717	49	65	71	65	71	71	917	88	79	78	81	77	77	93	74	76	75	78	75		
27	464	140	107	94	108	118	745	70	83	87	82	87	87	916	95	77	80	79	80	81	97	97	103	86	103	87		

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Sl. No.	F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014								
		F <sub>2</sub> 2013	1 <sup>st</sup> method of selection (HY)		2 <sup>nd</sup> Date		F <sub>2</sub> 2013	2 <sup>nd</sup> method of selection (LY)		2 <sup>nd</sup> Date		F <sub>2</sub> 2013	3 <sup>rd</sup> method of selection (MTL)		2 <sup>nd</sup> Date		F <sub>2</sub> 2013	4 <sup>th</sup> method of selection (RPS)		2 <sup>nd</sup> Date					
		GPP	DS	TP	DS	TP	DS	TP	DS	TP	GPP	DS	TP	DS	TP	GPP	DS	TP	DS	TP					
28	635	110	85	85	86	78	54	115	92	94	91	94	281	111	76	69	76	68	2	110	72	76	75	76	
29	458	130	100	95	101	97	755	72	89	92	89	92	777	89	68	65	70	64	7	121	66	70	68	70	
30	672	54	94	99	95	97	707	45	74	81	73	81	711	86	61	74	64	73	159	73	94	92	94	93	
31	648	80	74	86	75	70	563	40	87	90	87	90	766	103	82	78	84	77	116	77	83	81	83	81	
32	462	61	63	71	65	102	461	111	89	94	89	94	286	126	82	79	83	78	153	60	82	75	84	76	
33	382	96	100	97	101	90	586	70	87	88	87	88	222	118	108	90	109	89	112	118	106	81	83	82	
34	81	97	89	96	91	101	546	58	75	82	75	82	37	103	116	100	117	99	135	82	74	76	77	77	
35	125	44	85	78	85	72	584	80	84	86	83	86	91	95	129	101	130	100	154	114	97	81	97	81	
36	280	105	62	87	64	92	372	82	96	86	95	86	4	98	77	85	78	84	484	115	96	90	99	91	
37	651	101	92	74	93	93	575	48	67	75	67	75	8	121	87	80	88	79	363	95	42	85	85	86	
38	171	98	62	72	63	92	547	88	65	69	64	69	753	95	64	70	65	69	405	115	84	79	85	80	
39	414	92	67	102	68	77	516	49	85	85	85	85	709	104	122	82	98	81	483	120	93	85	94	86	
40	434	130	98	93	99	89	435	112	102	93	102	93	53	120	96	87	97	86	331	63	85	79	86	79	
41	388	56	56	67	57	83	408	112	95	97	95	97	5	95	79	79	80	78	497	109	109	87	88	83	
42	149	100	65	71	66	109	237	77	75	76	75	76	869	98	76	76	77	75	383	77	90	87	91	88	
43	454	123	75	75	77	81	496	98	65	74	65	74							371	98	76	76	77	77	
44	279	105	57	79	58	73	439	77	72	74	71	74							385	90	76	78	78	79	
45	703	97	73	65	75	82	306	57	73	79	73	79							490	109	99	86	101	87	
46	99	98	79	73	80	102	418	116	86	77	85	77							169	60	83	81	84	82	
47	277	78	61	66	63	74	524	140	81	80	81	80							498	126	103	86	104	87	
48	637	39	72	64	73	18	366	99	91	84	91	84							50	119	100	83	101	84	
49	384	86	71	75	72	86	377	70	88	78	87	78							399	120	90	80	91	81	
50	121	81	79	83	80	86	335	80	87	77	86	77							230	90	84	78	85	79	
	Mean	96	81	80	82	88		86	82	78	81	78		104	85	80	85	80		99	85	81	86	81	
	Min.	39	56	64	57	18		40	40	63	60	63		82	60	64	61	63		40	42	66	58	67	
	Max.	140	107	101	108	118		140	140	116	101	116		130	129	103	130	102		150	114	95	117	95	
	Seem(±)		8	8	8	9			8	8	7	7			9	9	12	10			10	10	9	9	
	CD at 0.05		10	9	9	2			14	10	9	9			8	8	10	11			24	24	16	24	15
	CV %	27	6	5	5	1		28	9	6	6	6		12	6	6	7	8			24	14	10	14	9

**Table-4.3.4c:  $T_w$  (g) of  $F_3$  progeny, of various  $F_2$ BG102/Reshmi (Commercial pvt. hybrid victory seeds) plants selected on different methods of selection and grown under different crop ecology**

Sl. No.	$F_2$ Plant No.	$F_2$ 2013		$F_3$ Progeny 2014				$F_2$ Plant No.	$F_2$ 2013		$F_3$ Progeny 2014				$F_2$ Plant No.	$F_2$ 2013		$F_3$ Progeny 2014							
		$T_w$ (g)	DS	1 <sup>st</sup> method of selection (HY)		2 <sup>nd</sup> method of selection (LY)			$T_w$ (g)	DS	2 <sup>nd</sup> method of selection (LY)		3 <sup>rd</sup> method of selection (MTL)			$T_w$ (g)	DS	4 <sup>th</sup> method of selection (RPS)							
				I <sup>st</sup> Date	TP	DS	TP				I <sup>st</sup> Date	TP	DS	TP				I <sup>st</sup> Date	TP	I <sup>st</sup> Date	TP	DS	TP		
1	364	2.4	25	26	24	19	451	2.5	27	26	25	26	944	2.5	22	21	22	22	392	2.3	27	27	27	27	26
2	253	3.2	31	31	30	25	704	2.4	32	31	30	31	859	2.8	21	20	21	21	232	2.4	28	28	28	27	
3	378	3.1	25	27	25	20	536	2.5	27	26	25	25	477	2.5	22	21	22	22	191	2.9	22	21	21	20	
4	238	2.7	21	22	21	16	409	2.3	27	26	26	25	747	2.8	31	30	31	32	166	2.6	27	27	27	27	
5	884	2.8	20	21	21	15	438	3.0	27	26	26	25	79	2.5	27	26	27	26	86	3.1	27	26	26	25	
6	242	2.4	26	26	26	20	446	2.5	22	21	21	20	880	2.3	31	30	31	30	103	2.5	22	22	22	21	
7	94	2.8	26	27	26	20	837	2.5	27	26	26	24	287	2.3	26	25	26	26	197	2.6	27	27	27	26	
8	506	3.1	26	26	26	20	877	2.3	27	26	26	26	54	2.0	22	21	22	21	82	3.1	30	31	30	29	
9	960	2.8	26	27	26	21	698	2.3	32	31	30	29	698	2.3	22	21	22	21	31	2.5	20	20	20	19	
10	262	2.1	21	22	21	16	505	2.2	27	26	25	25	194	2.6	27	26	27	26	78	3.1	26	26	26	25	
11	400	2.8	26	27	27	22	686	3.1	26	25	25	24	962	2.6	26	26	26	26	85	2.8	29	29	29	28	
12	981	2.5	30	31	31	25	520	2.6	32	30	30	29	176	2.8	22	21	22	22	64	2.6	30	31	31	30	
13	737	2.2	25	26	26	20	701	2.5	30	29	28	27	307	2.8	26	26	26	26	182	2.8	30	30	30	29	
14	783	3.1	26	27	27	21	820	2.5	27	26	26	25	470	2.6	27	26	27	26	132	2.5	31	32	32	33	
15	313	2.4	25	26	26	21	786	2.3	18	17	17	18	456	2.5	22	21	22	20	130	2.7	26	26	26	26	
16	379	2.4	30	31	31	25	684	2.3	22	21	21	21	485	2.2	26	26	26	25	107	2.6	31	31	31	32	
17	200	2.4	21	21	21	16	580	3.2	22	21	20	20	429	2.5	23	23	23	22	118	2.6	20	20	20	19	
18	391	2.6	26	26	26	21	825	2.5	22	21	21	21	455	2.7	31	30	31	30	188	2.7	21	21	21	20	
19	168	2.5	26	27	26	21	889	3.2	27	26	26	26	401	2.2	21	21	21	20	192	2.5	21	20	20	19	
20	27	2.6	21	21	21	16	810	3.1	27	26	26	25	315	2.2	30	29	30	29	706	2.8	26	26	26	24	
21	530	3.0	26	27	26	21	663	2.5	22	21	20	20	203	2.9	22	21	22	21	184	2.8	26	26	26	25	
22	638	2.6	21	22	21	16	430	2.7	27	26	26	25	223	2.6	29	29	29	31	158	2.6	31	31	31	30	
23	26	2.8	31	28	31	26	735	2.5	27	26	25	25	160	2.9	31	30	31	30	198	2.6	26	26	26	25	
24	68	2.5	30	29	30	25	416	2.8	22	21	21	20	172	2.1	27	26	27	26	162	2.4	26	26	26	25	
25	359	2.2	17	19	18	14	499	2.9	22	21	21	21	991	2.6	31	30	31	31	92	2.7	21	22	22	20	
26	500	3.0	31	28	31	26	717	2.5	23	22	21	20	917	2.4	27	26	27	25	93	2.9	26	26	26	24	
27	464	2.4	20	21	21	15	745	2.1	32	31	31	31	916	2.3	27	27	27	28	81	2.8	30	31	31	32	

Contd....

Sl. No.	F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014						
		1 <sup>st</sup> method of selection (HY)		2 <sup>nd</sup> method of selection (LY)			1 <sup>st</sup> method of selection (MTL)		2 <sup>nd</sup> method of selection (RPS)			1 <sup>st</sup> method of selection (MTL)		2 <sup>nd</sup> method of selection (RPS)			1 <sup>st</sup> method of selection (MTL)		2 <sup>nd</sup> method of selection (RPS)				
	T <sub>w</sub> (g)	DS	TP	DS	TP		T <sub>w</sub> (g)	DS	TP	DS	TP		T <sub>w</sub> (g)	DS	TP	DS	TP		T <sub>w</sub> (g)	DS	TP	DS	TP
28	635	2.4	21	21	16	54	2.0	22	21	21	20	281	2.5	26	26	26	25	2	2.5	21	21	21	19
29	458	2.6	21	22	16	755	2.8	27	26	26	26	777	2.2	26	26	26	24	7	2.5	20	21	21	19
30	672	2.6	17	18	14	707	2.6	22	21	21	20	711	2.6	27	26	27	26	159	2.5	25	26	26	26
31	648	2.5	31	30	31	563	2.7	27	26	25	25	766	2.9	27	26	27	27	116	1.8	21	21	21	19
32	462	2.0	26	27	26	461	2.5	27	26	26	28	286	2.9	26	25	26	25	153	2.6	30	31	31	31
33	382	2.9	21	22	22	586	3.0	22	21	21	20	222	2.7	21	21	22	21	112	2.8	25	25	25	24
34	81	2.8	26	27	26	546	2.6	27	26	26	26	37	2.3	23	22	23	21	135	2.7	24	24	24	23
35	125	2.9	26	26	26	584	2.7	32	31	30	30	91	2.7	22	21	22	21	154	2.6	29	29	29	29
36	280	2.6	26	27	27	372	2.4	22	21	20	19	4	2.8	27	27	27	27	484	2.3	21	21	21	20
37	651	2.8	21	21	21	575	2.8	27	26	26	26	8	2.7	27	26	27	27	363	2.4	25	25	25	24
38	171	2.9	26	27	27	547	2.5	28	27	26	25	753	2.2	22	22	22	21	405	2.9	22	22	22	21
39	414	2.5	27	27	27	516	2.3	22	21	21	20	709	2.5	21	21	22	21	483	2.7	27	27	27	25
40	434	2.5	21	21	16	435	2.1	23	22	21	20	53	2.7	27	26	27	26	331	2.3	25	25	25	25
41	388	2.9	26	27	27	408	2.5	27	26	26	24	5	2.4	22	21	22	21	497	2.8	26	26	26	25
42	149	2.9	26	26	26	237	3.1	27	26	26	25	869	2.4	27	26	27	25	383	2.2	26	26	26	24
43	454	2.7	30	31	31	496	2.3	28	27	26	27							371	2.8	26	27	26	25
44	279	2.7	30	31	31	439	2.6	27	26	25	24							385	2.4	21	21	21	21
45	703	2.3	26	27	27	306	2.5	27	26	26	25							490	2.4	30	30	30	29
46	99	2.5	21	21	16	418	2.5	22	21	21	20							169	2.5	26	27	26	27
47	277	2.5	26	27	27	524	2.5	23	22	21	21							498	2.7	21	22	21	21
48	637	2.7	26	27	27	366	3.0	32	29	31	30							50	3.1	28	28	28	28
49	384	2.7	26	27	26	377	2.7	27	26	25	25							399	2.5	24	25	25	25
50	121	2.7	26	27	26	335	2.1	22	21	21	20							230	2.6	30	30	31	29
	Mean	2.6	25	26	25		2.6	26	25	24	24		2.5	25	25	26	25		2.6	26	26	26	25
	Min.	2.1	17	18	17		2	18	17	17	18		2	21	20	21	20		1.8	20	20	20	19
	Max.	3.2	31	31	31		3.1	32	31	31	31		3	31	30	31	32		3.1	31	32	32	33
	Stant(±)		0.4	0.4	0.5			0.4	0.8	0.4	0.4			0.4	0.2	0.2	0.4			0.6	0.4	0.3	0.4
	CD at 0.05		1	1	1			1	2	1	1			1	1	1	1			2	1	1	1
	CV %	9	3	2	3		9	2	4	3	2		10	2	4	4	3		9	4	2	2	3

**Table-4.3.5c: GYP plant (g) of F<sub>3</sub> progeny, of various F<sub>2</sub>BG102/Reshmi (Commercial pvt. hybrid victory seeds) plants selected on different methods of selection and grown under different crop ecology**

Sl. No.	F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014					
		1 <sup>st</sup> method of selection (HY)		2 <sup>nd</sup> Date			2 <sup>nd</sup> method of selection (LY)		2 <sup>nd</sup> Date			3 <sup>rd</sup> method of selection (MTL)		2 <sup>nd</sup> Date			4 <sup>th</sup> method of selection (RPS)		2 <sup>nd</sup> Date			
		DS	TP	DS	TP		DS	TP	DS	TP		DS	TP	DS	TP		DS	TP	DS	TP		
1	364	23	21	19	19	451	8	7	12	7	19	944	4	2	9	10	4	392	6	5	5	4
2	253	22	21	18	18	704	13	13	14	11	12	859	5	4	12	14	4	232	10	9	7	7
3	378	21	20	20	20	536	12	12	11	11	11	477	5	5	9	8	3	191	11	11	9	9
4	238	18	17	15	14	409	12	11	9	10	12	747	8	7	7	6	9	166	13	12	10	10
5	884	18	17	16	16	438	13	12	10	12	13	79	10	9	6	8	6	86	3	2	9	9
6	242	17	17	15	15	446	8	8	10	7	9	880	11	11	9	11	7	103	15	14	10	10
7	94	18	18	17	17	837	14	13	12	12	13	287	12	12	12	14	8	197	12	12	11	10
8	506	21	21	19	19	877	6	6	8	5	15	54	14	14	13	14	5	82	13	13	10	8
9	960	18	17	16	16	698	11	11	8	10	13	698	11	11	8	10	4	31	8	7	4	3
10	262	18	17	14	14	505	13	12	11	12	14	194	10	9	8	10	7	78	10	10	7	6
11	400	21	20	18	18	686	10	9	9	8	13	962	13	13	11	12	13	85	11	11	8	7
12	981	20	19	17	17	520	12	12	12	11	12	176	15	15	14	15	12	64	12	12	9	8
13	737	17	17	16	15	701	12	12	9	11	11	307	16	16	13	15	14	182	10	10	10	8
14	783	18	17	16	16	820	12	11	8	9	12	470	9	8	6	7	10	132	15	15	14	13
15	313	24	23	21	21	786	12	11	9	11	9	456	14	14	12	14	10	130	2	2	9	8
16	379	32	31	28	28	684	13	12	9	11	10	485	7	6	6	5	11	107	15	15	13	12
17	200	17	16	15	14	580	14	13	10	12	10	429	7	7	9	6	8	118	14	14	10	9
18	391	21	20	19	18	825	13	12	18	11	10	455	12	11	14	13	15	188	11	11	8	6
19	168	24	23	22	21	889	12	12	14	11	12	401	12	11	10	12	9	192	16	15	14	13
20	27	23	22	19	19	810	12	12	10	11	10	315	8	7	5	7	14	706	7	6	3	2
21	530	17	17	16	16	663	11	11	8	10	9	203	16	15	13	15	11	184	14	14	13	11
22	638	18	17	17	17	430	10	9	11	7	11	223	7	6	11	6	16	158	13	13	12	11
23	26	24	23	21	20	735	15	14	12	14	15	160	12	12	10	12	14	198	11	11	13	9
24	68	21	21	18	18	416	14	13	10	12	11	172	9	9	10	9	12	162	2	2	6	5
25	359	22	22	19	19	499	10	9	8	8	14	991	9	8	9	9	11	92	14	14	10	9
26	500	22	22	19	18	717	10	9	7	8	11	917	13	13	11	13	14	93	12	11	9	7
27	464	20	19	16	16	745	13	13	10	11	14	916	14	14	13	14	16	81	17	17	18	15

Contd....

Sl. No.	F <sub>2</sub> Plant No.	F <sub>2</sub> 2013		F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013		F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013		F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>2</sub> 2013		F <sub>3</sub> Progeny 2014			
		GYP plant (g)	DS	1 <sup>st</sup> method of selection (HX)		2 <sup>nd</sup> method of selection (LY)			GYP plant (g)	DS	2 <sup>nd</sup> method of selection (LY)		3 <sup>rd</sup> method of selection (MTL)			GYP plant (g)	DS	4 <sup>th</sup> method of selection (RPS)										
				F <sup>st</sup> Date	TP	DS	TP				F <sup>st</sup> Date	TP	DS	TP				F <sup>st</sup> Date	TP	DS	TP		F <sup>st</sup> Date	TP	DS	TP		
28	635	18	17	15	15	23	54	14	14	11	13	11	281	10	10	8	10	12	2	8	8	9	8	7				
29	458	31	30	26	25	18	755	10	10	11	9	14	777	6	6	6	5	11	7	11	10	10	11	9				
30	672	17	17	17	13	23	707	13	12	14	12	9	711	17	16	11	13	14	159	17	16	16	17	15				
31	648	20	19	18	15	18	563	11	11	7	9	14	766	12	12	10	12	15	116	12	11	10	11	9				
32	462	19	18	20	18	17	461	7	7	6	5	14	286	12	11	9	10	12	153	14	13	12	13	11				
33	382	21	21	17	16	17	586	11	11	10	9	7	222	8	7	9	7	6	112	12	11	8	9	7				
34	81	17	17	14	14	24	546	12	12	9	11	13	37	7	8	8	6	7	135	15	14	11	12	10				
35	125	17	17	18	17	17	584	13	12	10	11	14	91	3	2	11	12	9	154	16	15	15	15	14				
36	280	17	17	15	15	16	372	10	10	8	10	7	4	13	12	11	13	15	484	14	14	12	13	11				
37	651	17	17	14	14	13	575	14	13	11	13	14	8	16	15	13	14	16	363	9	8	7	7	5				
38	171	18	18	15	15	21	547	14	14	11	13	14	753	11	10	11	10	8	405	12	12	10	10	9				
39	414	18	17	15	15	16	516	13	12	10	11	9	709	10	9	9	9	8	483	16	15	12	12	11				
40	434	17	17	16	15	9	435	14	13	11	12	9	53	10	9	10	9	11	331	9	8	5	6	4				
41	388	22	21	18	18	22	408	12	12	10	11	14	5	9	8	6	8	9	497	11	11	13	11	9				
42	149	17	17	14	14	17	237	12	11	9	11	13	869	16	16	12	14	13	383	13	12	10	11	9				
43	454	24	23	20	20	13	496	15	15	13	15	16						371	11	11	8	8	6	6				
44	279	23	23	21	21	19	439	9	8	11	9	12						385	11	11	10	10	8	8				
45	703	12	12	19	19	14	306	10	10	8	9	13						490	10	10	8	8	6	6				
46	99	20	19	16	16	19	418	9	9	6	8	7						169	2	1	6	2	3	3				
47	277	17	17	14	14	24	524	11	10	10	11	3						498	13	13	18	12	11	11				
48	637	18	17	13	13	13	366	10	10	7	9	4						50	16	15	19	15	13	13				
49	384	20	20	18	17	12	377	11	10	9	11	7						399	6	5	10	11	9	9				
50	121	18	17	14	14	15	335	10	10	7	9	3						230	13	12	11	11	10	10				
		<b>Mean</b>	<b>20</b>	<b>19</b>	<b>18</b>	<b>17</b>		<b>12</b>	<b>11</b>	<b>10</b>	<b>10</b>	<b>11</b>		<b>11</b>	<b>10</b>	<b>10</b>	<b>10</b>			<b>11</b>	<b>11</b>	<b>10</b>	<b>10</b>	<b>9</b>				
		<b>Min.</b>	<b>12</b>	<b>12</b>	<b>13</b>	<b>9</b>		<b>6</b>	<b>6</b>	<b>6</b>	<b>5</b>	<b>3</b>		<b>3</b>	<b>2</b>	<b>5</b>	<b>3</b>			<b>2</b>	<b>1</b>	<b>3</b>	<b>2</b>	<b>2</b>				
		<b>Max.</b>	<b>32</b>	<b>31</b>	<b>28</b>	<b>28</b>		<b>15</b>	<b>15</b>	<b>18</b>	<b>15</b>	<b>19</b>		<b>17</b>	<b>16</b>	<b>14</b>	<b>15</b>	<b>16</b>		<b>17</b>	<b>17</b>	<b>19</b>	<b>17</b>	<b>15</b>				
		<b>Sem(±)</b>		<b>3</b>	<b>2</b>	<b>69</b>			<b>1</b>	<b>7</b>	<b>1</b>	<b>1</b>			<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>			<b>2</b>	<b>1</b>	<b>1</b>	<b>2</b>				
		<b>CD at 0.05</b>		<b>7</b>	<b>5</b>	<b>196</b>			<b>4</b>	<b>21</b>	<b>4</b>	<b>3</b>			<b>5</b>	<b>5</b>	<b>5</b>	<b>4</b>			<b>4</b>	<b>4</b>	<b>4</b>	<b>5</b>				
		<b>CV %</b>	<b>17</b>	<b>19</b>	<b>15</b>	<b>16</b>		<b>17</b>	<b>19</b>	<b>6</b>	<b>18</b>	<b>17</b>		<b>34</b>	<b>28</b>	<b>29</b>	<b>30</b>	<b>24</b>		<b>32</b>	<b>26</b>	<b>24</b>	<b>23</b>	<b>31</b>				

**Table-4.3.6c: GYP plot (g) of F<sub>3</sub> progeny, of various F<sub>2</sub> BG102/Reshmi (commercial pvt. hybrid victory seeds) plants selected on different methods of selection and grown under different crop ecology**

Sl. No.	F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014			
		1 <sup>st</sup> method of selection (HY)		2 <sup>nd</sup> method of selection (HY)			2 <sup>nd</sup> method of selection (LY)		3 <sup>rd</sup> method of selection (MTL)			4 <sup>th</sup> method of selection (RPS)								
		DS	TP	DS	TP		DS	TP	DS	TP		DS	TP	DS	TP		DS	TP	DS	TP
1	364	707	658	679	284	451	194	158	167	158	944	263	249	235	261	392	167	90	139	61
2	253	664	615	636	319	704	356	320	328	320	859	271	363	243	376	232	233	184	205	147
3	378	731	682	703	201	536	334	248	307	248	477	133	177	105	189	191	296	248	268	260
4	238	545	496	517	263	409	300	232	273	232	747	154	158	126	68	166	335	286	307	249
5	884	596	547	568	255	438	381	295	354	295	79	190	142	162	154	86	250	243	222	205
6	242	551	502	523	245	446	194	108	166	108	880	310	261	282	224	103	341	292	313	255
7	94	638	590	611	203	837	404	368	376	368	287	423	374	395	337	197	358	310	331	322
8	506	695	646	667	228	877	148	80	120	80	54	441	392	413	355	82	355	306	327	269
9	960	600	552	572	240	698	303	267	275	267	698	267	218	239	181	31	166	167	138	130
10	262	533	484	505	269	505	394	358	366	358	194	268	220	240	232	78	264	215	236	178
11	400	659	613	631	220	686	258	172	231	172	962	360	311	332	324	85	305	256	277	269
12	981	633	585	606	201	520	343	257	315	257	176	469	420	441	433	64	341	292	313	356
13	737	576	527	548	241	701	343	257	315	257	307	453	405	426	418	182	358	309	330	472
14	783	601	603	573	288	820	296	210	269	210	470	184	135	156	98	132	520	471	492	584
15	313	785	736	757	251	786	343	257	315	257	456	418	369	390	332	130	658	302	630	314
16	379	988	982	960	223	684	340	254	312	254	485	160	92	132	50	107	490	442	463	654
17	200	541	492	513	213	580	384	348	356	348	429	150	102	123	64	118	374	325	346	337
18	391	690	641	662	233	825	370	383	342	383	455	394	496	367	458	188	288	239	260	252
19	168	793	744	765	219	889	363	277	335	277	401	342	293	314	256	192	525	476	497	539
20	27	704	655	676	218	810	337	251	309	251	315	162	113	134	76	706	173	75	146	68
21	530	599	650	571	272	663	306	270	278	270	203	458	410	430	372	184	467	418	439	381
22	638	636	587	608	183	430	196	190	168	190	223	128	79	100	77	158	457	408	429	371
23	26	755	706	727	277	735	445	359	417	359	160	344	295	316	258	198	385	336	357	299
24	68	676	627	648	220	416	379	343	351	343	172	240	242	212	154	162	59	77	31	146
25	359	707	659	680	263	499	251	194	223	194	991	238	189	210	152	92	376	328	349	290
26	500	689	640	661	237	717	244	158	216	158	917	375	327	347	339	93	292	243	264	256

Contd.....

Sl. No.	F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014				F <sub>2</sub> Plant No.	F <sub>3</sub> Progeny 2014			
		1 <sup>st</sup> method of selection (HY)		2 <sup>nd</sup> Date			2 <sup>nd</sup> method of selection (LY)		2 <sup>nd</sup> Date			3 <sup>rd</sup> method of selection (MTL)		2 <sup>nd</sup> Date			4 <sup>th</sup> method of selection (RPS)		2 <sup>nd</sup> Date	
		DS	TP	DS	TP		DS	TP	DS	TP		DS	TP	DS	TP	DS	TP	DS	TP	
27	464	605	556	577	255	745	362	326	334	326	916	430	382	402	344	81	601	552	573	615
28		567	519	539	263		416	330	388	330		267	219	240	231	2	297	248	269	211
29	458	942	894	914	238	755	294	208	208	208	777	139	40	111	40	7	390	341	362	354
30	672	510	462	483	246	707	376	340	348	340	711	376	327	348	290	159	598	549	570	612
31	648	581	532	553	222	563	280	245	253	245	766	343	294	315	257	116	383	334	355	347
32	462	659	610	631	218	461	120	34	93	34	286	296	248	269	260	153	451	402	423	447
33	382	619	570	591	213	586	290	254	262	254	222	170	172	142	134	112	312	264	285	277
34	81	532	483	504	193	546	342	256	314	256	37	154	105	126	68	135	426	377	398	339
35	125	650	602	622	210	584	363	339	335	339	91	360	311	332	274	154	541	492	513	655
36	280	559	510	531	174	372	299	263	271	263	4	373	324	345	337	484	461	413	433	375
37	651	521	472	493	246	575	407	371	379	371	8	427	379	399	391	363	233	184	205	196
38	171	557	509	529	166	547	407	321	379	321	753	270	222	242	234	405	368	319	340	282
39	414	560	511	532	176	516	359	273	331	273	709	226	178	199	190	483	433	384	405	347
40	434	577	528	549	168	435	393	357	365	357	53	227	228	199	191	331	203	154	175	117
41	388	670	621	642	174	408	359	273	331	273	5	190	141	162	104	497	394	346	366	408
42	149	521	473	494	171	237	342	256	315	256	869	413	365	385	327	383	379	330	351	343
43	454	742	693	714	183	496	480	444	452	444						371	280	232	252	244
44	279	775	726	747	168	439	287	302	260	302						385	359	310	331	323
45	703	342	294	315	182	306	297	261	269	261						490	282	234	255	246
46	99	593	544	565	162	418	230	144	202	144						169	65	53	37	65
47	277	530	481	502	157	524	367	431	339	431						498	438	390	410	552
48	637	496	448	469	152	366	268	231	240	231						50	519	470	491	633
49	384	655	606	627	151	377	353	367	325	367						399	331	334	303	296
50	121	521	473	493	169	335	263	177	235	177						230	396	498	368	460
	<b>Mean</b>	<b>631</b>	<b>587</b>	<b>604</b>	<b>218</b>		<b>323</b>	<b>268</b>	<b>295</b>	<b>268</b>		<b>292</b>	<b>256</b>	<b>264</b>	<b>236</b>		<b>359</b>	<b>311</b>	<b>332</b>	<b>328</b>
	<b>SEM(±)</b>	<b>631</b>	<b>587</b>	<b>604</b>	<b>218</b>		<b>34</b>	<b>33</b>	<b>31</b>	<b>32</b>		<b>39</b>	<b>27</b>	<b>36</b>	<b>33</b>		<b>34</b>	<b>30</b>	<b>31</b>	<b>29</b>
	<b>CD at 0.05</b>	<b>113</b>	<b>104</b>	<b>113</b>	<b>66</b>		<b>57</b>	<b>52</b>	<b>51</b>	<b>92</b>		<b>111</b>	<b>77</b>	<b>103</b>	<b>94</b>		<b>98</b>	<b>84</b>	<b>88</b>	<b>82</b>
	<b>CV %</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>15</b>		<b>9</b>	<b>10</b>	<b>9</b>	<b>17</b>		<b>23</b>	<b>18</b>	<b>23</b>	<b>24</b>		<b>20</b>	<b>19</b>	<b>20</b>	<b>21</b>

**Table-4.7b: Estimates of Standardized selection differential, standardized selection response and realized heritability for different traits from two methods as well as two date of sowing based on different methods of selection of BG102/Naven**

Methods of selection and selection intensity (5%)	Population selected mean	No. of selected lines	Mean of selected parent	Standardized selection differential (R/σ <sub>p</sub> )	Progeny mean				Standardized selection response (S/grp)				Average standardized selection response	Realized heritability (RS)				Average Realized heritability	
					1 <sup>st</sup> Date		2 <sup>nd</sup> Date		1 <sup>st</sup> Date		2 <sup>nd</sup> Date			1 <sup>st</sup> Date		2 <sup>nd</sup> Date			
					DS	TP	DS	TP	DS	TP	DS	TP		DS	TP	DS	TP		DS
<b>Based on HY</b>		50																	
PH (cm)	115.36		117.52	77.88	117.10	116.70	115.90	117.00	77.45	77.06	76.26	77.36	77.03	0.99	0.99	0.98	0.99	0.99	0.99
PPP	7.57		9.98	7.14	9.29	9.74	7.86	7.96	6.46	6.91	5.02	5.12	5.88	0.90	0.97	0.70	0.72	0.82	0.82
GPP	69.6		80.58	67.47	80.23	74.27	71.01	73.38	67.12	61.16	57.90	60.28	61.62	0.99	0.91	0.86	0.89	0.91	0.91
GYP Plant (g)	10.01		23.06	21.17	18.31	18.62	12.97	17.38	16.42	16.74	11.08	15.50	14.94	0.78	0.79	0.52	0.73	0.71	0.71
<b>Based on LY</b>		50																	
PH (cm)	115.36		118.20	78.56	115.00	113.66	115.60	117.00	75.36	74.02	75.96	77.36	75.68	0.96	0.94	0.97	0.98	0.98	0.96
PPP	7.57		8.32	5.48	8.18	7.92	8.16	7.96	5.34	5.09	5.32	5.12	5.22	0.97	0.93	0.97	0.93	0.93	0.95
GPP	69.6		81.82	68.71	80.00	74.97	72.59	73.30	66.90	61.87	59.48	60.19	62.11	0.97	0.90	0.87	0.88	0.88	0.91
GYP Plant (g)	10.01		14.17	12.28	10.82	11.30	10.89	9.89	8.94	9.42	9.00	8.01	8.84	0.73	0.77	0.73	0.65	0.72	0.72
<b>Based on MTL</b>		49																	
PH (cm)	115.36		105.69	66.05	103.50	91.76	92.94	92.05	63.86	52.12	53.29	52.41	55.42	0.97	0.79	0.81	0.79	0.84	0.84
PPP	7.57		9.14	6.31	8.58	7.44	8.82	8.30	5.75	4.60	5.98	5.46	5.45	0.91	0.73	0.95	0.87	0.87	0.87
GPP	69.6		90.61	77.50	79.79	74.33	70.61	71.53	66.68	61.22	57.51	58.43	60.96	0.86	0.79	0.74	0.75	0.79	0.79
GYP Plant (g)	10.01		11.51	9.63	9.74	10.17	7.91	10.54	7.85	8.28	6.03	8.65	7.70	0.82	0.86	0.63	0.90	0.80	0.80
<b>Based on RPS</b>		50																	
PH (cm)	115.36		115.76	76.12	115.37	113.58	115.06	114.48	75.72	73.94	75.42	74.84	74.98	0.99	0.97	0.99	0.98	0.98	0.98
PPP	7.57		8.76	5.92	8.05	8.62	8.60	9.11	5.22	5.78	5.77	6.28	5.76	0.88	0.98	0.97	1.06	0.97	0.97
GPP	69.6		73.42	60.31	72.90	72.26	72.61	69.32	59.79	59.15	59.50	56.21	58.66	0.99	0.98	0.99	0.93	0.97	0.97
GYP Plant (g)	10.01		14.14	12.25	11.35	11.83	14.03	10.40	9.47	9.95	12.15	8.51	10.02	0.77	0.81	0.99	0.69	0.82	0.82

**Table-4.7a: Estimates of Standardized selection differential, standardized selection response and realized heritability for different traits from two methods as well as two date of sowing based on different methods of selection of BG102/BPT5204**

Methods of selection and selection intensity (5%)	Population mean	No. of selected lines	Mean of selected parent	Standardized selection differential (R/σ <sub>p</sub> )	Progeny mean				Standardized selection response (S/σ <sub>p</sub> )				Average standardized selection response	Realized heritability (R/S)				Average Realized heritability
					1 <sup>st</sup> Date		2 <sup>nd</sup> Date		1 <sup>st</sup> Date		2 <sup>nd</sup> Date			1 <sup>st</sup> Date		2 <sup>nd</sup> Date		
					DS	TP	DS	TP	DS	TP	DS	TP		DS	TP	DS	TP	
<b>Based on HY</b>		50																
PH (cm)	116.15		122.12	0.46	122.01	121.06	121.79	121.70	0.45	0.38	0.43	0.43	0.42	0.98	0.82	0.94	0.93	0.92
PPP	8.08		12.32	1.41	12.07	10.63	11.00	12.29	1.33	0.85	0.97	1.40	1.14	0.94	0.60	0.69	0.99	0.81
GPP	78.48		109.48	1.14	80.95	103.34	99.22	88.37	0.09	0.92	0.76	0.36	0.53	0.08	0.80	0.67	0.32	0.47
GYP Plant (g)	10.12		25.38	2.68	24.90	24.52	20.25	17.49	2.60	2.53	1.78	1.30	2.05	0.97	0.94	0.66	0.48	0.76
<b>Based on LY</b>		50																
PH (cm)	116.15		122.34	0.48	122.30	121.43	122.09	122.20	0.47	0.41	0.46	0.46	0.45	0.99	0.85	0.96	0.98	0.95
PPP	8.07		10.06	0.66	9.74	9.94	10.00	9.74	0.55	0.62	0.64	0.55	0.59	0.84	0.94	0.97	0.84	0.90
GPP	78.48		89.76	0.42	88.06	89.30	89.59	89.00	0.35	0.40	0.41	0.39	0.39	0.85	0.96	0.98	0.93	0.93
GYP Plant (g)	10.12		16.43	1.11	15.90	15.50	15.72	15.90	1.02	0.95	0.98	1.02	0.99	0.92	0.85	0.89	0.92	0.90
<b>Based on MTL</b>		48																
PH (cm)	116.15		101.92	-1.09	114.72	115.37	115.62	115.33	-0.11	-0.06	-0.04	-0.06	-0.07	0.10	0.05	0.04	0.06	0.06
PPP	8.07		9.08	0.34	9.00	8.63	8.78	8.45	0.31	0.19	0.24	0.13	0.22	0.92	0.55	0.70	0.38	0.64
GPP	78.48		87.85	0.35	85.19	85.96	87.80	84.48	0.25	0.28	0.34	0.22	0.27	0.72	0.80	0.99	0.64	0.79
GYP Plant (g)	10.12		10.76	0.11	10.72	10.43	10.69	10.63	0.11	0.05	0.10	0.09	0.09	0.94	0.48	0.89	0.79	0.78
<b>Based on RPS</b>		50																
PH (cm)	116.15		124.72	0.66	120.66	122.90	123.96	123.88	0.35	0.52	0.60	0.59	0.52	0.53	0.79	0.91	0.90	0.78
PPP	8.07		9.72	0.55	9.65	8.83	9.28	9.36	0.52	0.25	0.40	0.43	0.40	0.96	0.46	0.74	0.78	0.74
GPP	78.48		90.28	0.43	88.74	82.61	88.56	89.03	0.38	0.15	0.37	0.39	0.32	0.87	0.35	0.85	0.89	0.74
GYP Plant (g)	10.12		16.08	1.05	15.88	15.58	14.82	14.82	1.01	0.96	0.83	0.83	0.91	0.97	0.92	0.79	0.79	0.87

**Table-4.7c: Estimates of Standardized selection differential, standardized selection response and realized heritability for different traits from two methods as well as two Date of sowing based on different methods of selection of BG102/ Reshmi (F<sub>1</sub>) Commercial Pvt. hybrid**

Methods of selection and selection intensity (5%)	Population mean	No. of selected lines	Mean of selected parent	Standardized selection differential (R/σ <sub>p</sub> )	Progeny mean				standardized selection response (S/σ <sub>p</sub> )				Average standardized selection response	Realized heritability (R/S)				Average Realized heritability	
					1st Date of sowing		2nd Date of sowing		1st Date of sowing		2nd Date of sowing			1st Date of sowing		2nd Date of sowing			
					DS	TP	DS	TP	DS	TP	DS	TP		DS	TP	DS	TP		DS
<b>Based on HY</b>																			
PH (cm)	115	50	119.1	108.85	79.62	89.8	82.4	117.2	69.35	79.5	72.13	106.93	81.99	0.64	0.73	0.66	0.98	0.75	
PPP	6.82		9	6.47	8.33	8.19	7.86	8.38	5.8	5.66	5.33	5.85	5.66	0.9	0.87	0.82	0.9	0.87	
GPP	80.2		95.6	92.64	80.61	80.42	81.8	88.36	77.65	77.5	78.82	85.4	79.83	0.84	0.84	0.85	0.92	0.86	
GYP Plant (g)	25.3		19.8	17.46	19.17	17.56	16.8	17.61	16.83	15.2	14.45	15.27	15.44	0.96	0.87	0.83	0.87	0.88	
<b>Based on LY</b>		50																	
PH (cm)	115		115.1	104.81	81.33	92.48	81.2	89.45	71.06	82.2	70.97	79.18	75.86	0.68	0.78	0.68	0.76	0.73	
PPP	6.82		8.6	6.07	8.2	7	7.07	6.85	5.67	4.47	4.54	4.32	4.75	0.93	0.74	0.75	0.71	0.78	
GPP	80.2		85.82	82.86	82.04	78.47	80.7	78.47	79.08	75.5	77.77	75.51	76.97	0.95	0.91	0.94	0.91	0.93	
GYP Plant (g)	25.3		11.66	9.32	11.04	9.98	10.2	11.31	8.7	7.64	7.87	8.97	8.30	0.93	0.82	0.84	0.96	0.89	
<b>Based on MTL</b>		42																	
PH (cm)	115		101.7	91.4	83.38	91.41	83.4	88.48	73.11	81.1	73.14	78.21	76.40	0.8	0.89	0.8	0.86	0.84	
PPP	6.82		8	5.47	7.45	7.29	7.03	7.14	4.92	4.76	4.5	4.61	4.70	0.9	0.87	0.82	0.84	0.86	
GPP	80.2		103.7	100.75	85.09	80.22	85.1	79.5	82.13	77.3	82.16	76.54	79.52	0.82	0.77	0.82	0.76	0.79	
GYP Plant (g)	25.3		10.53	8.19	9.92	9.87	10.4	10.25	7.58	7.53	8.1	7.91	7.78	0.93	0.92	0.99	0.97	0.95	
<b>Based RPS</b>		50																	
PH (cm)	115		119.7	109.45	83.38	91.41	83.4	88.48	73.11	81.1	73.14	78.21	76.40	0.67	0.74	0.67	0.71	0.7	
PPP	6.82		7.56	5.03	7.29	7.07	6.83	6.9	4.76	4.54	4.3	4.37	4.49	0.95	0.9	0.86	0.87	0.9	
GPP	80.2		99.34	96.38	84.56	80.97	86.1	81.3	81.6	78	83.14	78.34	80.27	0.85	0.81	0.86	0.81	0.83	
GYP Plant (g)	25.3		11.32	8.98	10.82	10.27	10.3	8.73	8.48	7.93	7.98	6.39	7.70	0.94	0.88	0.89	0.71	0.86	