

"EVALUATION OF BRINJAL (ROUND) VARIETIES  
UNDER CHHATTISGARH REGION"

M.Sc.(Ag.) THESIS

by

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**"EVALUATION OF BRINJAL (ROUND) VARIETIES  
UNDER CHHATTISGARH REGION"**

*Thesis*

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*“Great potentially of raising the per chonbo yield of crops lies in strengthening biological research work and extensively applying its results to agriculture production.”*

*Comrade Kim*

The respected and beloved  
leader of Korean people

## V I T A

The author was born on December 05<sup>th</sup> 1975 at Khurai, Dist. Sagar (M.P.). He passed the Higher Secondary (10+2) Certificate Examination in 1993 from S P. Jain H.S.S., Khurai with first division in Mathematics (75.62%) and Biology (70.50%) group. He joined the College of Agriculture, I.G.A.U., Raipur in 1995 and obtained the degree of B.Sc. (Ag.) in 1999 with 7.68 O.G.P.A. out of 10 point scale. He joined the College of Agriculture, I.G.A.U., Raipur for his M.Sc. (Ag.) degree in Horticulture in 2001 and after successful completion of course work securing 8.30 O.G.P.A. out of 10 point scale, submitting this thesis in partial fulfilment of the requirement for the award of degree of M.Sc. (Ag.) in Horticulture.

During his study, he worked as Secretary during 1998-99 and Vice-President during 1999-2000. Apart from his excellent academic career, the author took keen interest in extracurricular activities also. He has represented his University in Youth Festival for eight times, In which attended two National level and one International (South Asian University Festival) level. He has also participated for his College in group dance, play, skit, mime, group song, quiz etc. at U.G. and P.G. level. He has passed NCC "B" Certificate Exam He received Merit Scholarship for under graduation and post graduation studies and also honoured as class representatives for P.G students during 2001. He was the editor of College magazine "~~ACRANTAL~~" during 2000-2001.

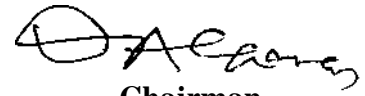
The author was fortunate to receive his post graduation under the superfluous and able guidance of Indian renowned eminent Horticulturist Dr D. A Sarnaik (Professor), Dept of Horticulture, College of Agriculture, Raipur

## CERTIFICATE – I

This is to certify that the thesis entitled "**EVALUATION OF BRINJAL (ROUND) VARIETIES UNDER CHHATTISGARH REGION**" submitted in partial fulfilment of the requirements for the degree of "Master of Science in Agriculture" of the Indira Gandhi Agricultural University, Raipur, is a record of the bonafide research work carried out by **Shri BHAGWAT SARAN ASATI** under my guidance and supervision. The subject of the thesis has been approved by Student's Advisory Committee and the Director of Instructions.

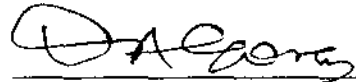
No part of the thesis has been submitted for any other degree or diploma (certificate awarded etc.) or has been published/ published part has been fully acknowledged. All the assistance and help received during the course of the investigations has been duly acknowledged by him.

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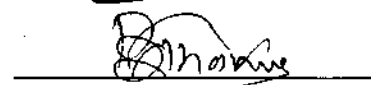
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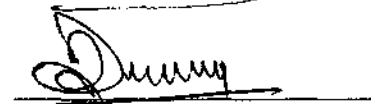
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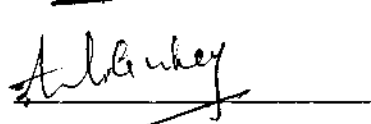
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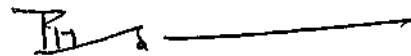
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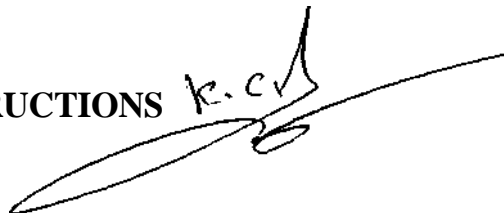
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Date ◯  
Dept of Horticulture  
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***Bhagwat saran Asati***

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## LIST OF ABBREVIATIONS

Abbreviations		Full form
%	-	Per cent
@	-	At the rate of
&	-	And
°C	-	Degree Celsius
CD	-	Critical difference
cm	-	Centimeter
DAT	-	Days after transplanting
df	-	Degree of freedom
Fig	-	Figure
FYM	-	Farmyard manure
g	-	Gram
ha	-	Hectare
kg	-	Kilogram
m <sup>2</sup>	-	Square meter
mg	-	Milligram
ml	-	Milliliter
No.	-	Number
NS	-	Non significant
q	-	Quintal
t	-	Tonne
wt	-	Weight

# *Introduction*

## CHAPTER – I

# INTRODUCTION

India ranks second for vegetables production in the world. Total production of vegetables in India is 71.6 million tonnes from an area of 5.3 million ha (ICAR, 1998).

Vegetable cultivation in India is mostly adopted by small and marginal farmers. These farmers grow vegetables to generate an additional income from their backyards or small portion of their scarce land holdings which is comparatively well endowed in terms of soil and irrigation.

Brinjal (*Solanum melongena* L.) is one of the popular vegetables, which belongs to Solanaceae family and it is grown in all parts of the country (specially in Chhattisgarh) throughout the year, mainly due to its adaptability to varied agroclimatic conditions and assured market.

It is a normally self fertilized annual crop of uncertain origin, but cultivated brinjal is undoubtedly of Indian origin (Thompson and Kelly, 1957). Brinjal is also extensively cultivated in South East Asian countries besides China and Philippines. Nevertheless, it is popular in France, Italy and United States of America.

In India brinjal production was 3.28 lakh tonnes from an area of 21895 ha with an average yield of 15 t/ha during 1997-98 (Anon, 2000). Presently brinjal occupies the second highest area of 12081 ha amongst all the vegetables in

Chhattisgarh region. In case of Raipur this crop is grown on 1448 ha with the production of 32644 tonnes (Anon, 1998).

Brinjal is preferred by both vegetarians and non vegetarians. The edible fresh and mature fruits contain 92.7% moisture and a large number of chemical components including vitamin A, vitamin C and Thiamine (124 I.U., 12.0 mg and 0.04 mg, respectively) besides organic acids and minerals like magnesium, phosphorus, iron, sodium, potassium and copper. It is used in Ayurveda as appetiser, aphrodisiac, cardiogenic and beneficial in *Vata* and *Kaph* etc. (Chadha, 1993), while brinjal is believed to be good for diabetic patients (Chauhan, 1981 and Choudhary, 1976).

Chhattisgarh region primarily a rice growing region. The average farmer is poor with the tribals constituting a major part of the population. Rice is the main crop of this region and vegetables are grown in very small area. One of the main reason for low productivity is the low potential of commercial varieties, which are being grown in this region. Development of high yielding cultivar is a continuous process and there is an urgent need to select best cultivars, suitable for growing under this region.

Fruit borer (*Leucinodes orbonalis* Guen.) is a serious pest of egg plant in India. The losses in fruit yield, reported from various parts of the country, varies from 18.8% to 80% (Krishnaiah, 1980). Thus the damage caused by the pest is the major problem in successful cultivation of this crop. Therefore, it is an urgent need to find out variety which may be free from borer infestation or a variety having least infestation of fruit borer.

Looking to the great potential for increasing area, production and productivity of this crop in the region, there is an urgent need to test different brinjal varieties (evolved recently in whole country) under Chhattisgarh region. On other hand majority of people prefer round shaped brinjal particularly to prepare “Bharta” in this state.

Therefore, the present investigation entitled "**Evaluation of brinjal (round) varieties under Chhattisgarh region**" was undertaken with the following objectives.

1. To select high yielding variety of brinjal (round), which is suitable for growing in Chhattisgarh region.
2. To find out a brinjal variety, which is resistant for shoot and fruit borer.
3. To study the relationship among yield and yield attributing characters.

# *Review of Literature*

## CHAPTER – II

### REVIEW OF LITERATURE

The literature pertaining to different aspects of the present study has been grouped under the following heads.

- 2.1 Growth, Flowering and Fruiting characters
- 2.2 Yield parameters
- 2.3 Quality characteristics
- 2.4 Correlation studies
- 2.5 Parameters recorded to screen varieties for infestation of fruit borer

#### **2.1 Growth, Flowering and Fruiting characters**

Popova (1961) reported the highest percentage of fruit set was found where stigma was above the stamens, while described the morphology of egg plant flowers.

Muthukrishnan and Shrinivasan (1963) reported that short styled or sterile flowers, incapable of setting fruits and variation in fruit set among the fertile flowers (long, medium and pseudo or short) were associated with the low fruit set in egg plants.

Tanaka (1972) described "Waimanalo Long" as new egg plant variety with 27.50 to 32.25 cm long fruits having 3.12 to 3.75 cm diameter and 85.04 to 133.39g average weight

Chadha and Saimbhi (1977) studied on 29 egg plant varieties and reported that flower number per cluster ranged from 2-2.5 and was generally greater in varieties with a predominantly clustered fruiting habit. Fruiting habit was not directly related to the ratio of short, long and medium styled flowers in a cluster.

Mohiedeen *et al.* (1977) reported that the percentage of long styled flowers ranged from 25.0 to 49.0, medium styled flowers from 6.1 to 31.7 and short styled flowers from 19.3 to 58.7 in all the egg plant varieties.

Rajgopal *et al.* (1978) reported that spread of plant ranged from 80.1 to 91.6 cm with maximum spread in A-61 (91.6 cm) and minimum for Arka Shirish (80.1 cm), while evaluating long fruited brinjal types at Coimbatore.

Anserwadekar (1979) observed variation in number of leaves per plant due to different genotypes of brinjal.

Sonone *et al.* (1984) reported that the brinjal variety Vaishali (RHR-51) had medium sized single fruit, more attractive fruit colour and fewer spines.

Thomas *et al.* (1990) observed wide variability in days to 50% flowering (21-50DAT), first fruit set (32-91 DAT) and number of fruits per plant (9-29), while evaluating 319 germplasm of brinjal..

Singh and Singh (1994) observed significant difference among the brinjal lines for all the characters studied *viz.* plant height, plant spread, number of branches per plant, days to flowering.

Arumugam *et al.* (1996) reported that the brinjal variety KKM-1 was a high yielding, bushy with a height of 95-110 cm, fruits were borne in clusters with

2-4 fruits per cluster, which were medium sized, egg shaped and milky white in colour.

Dalai *et al.* (2000) reported that CHES-249 was earliest to 50% flowering (30 days after transplanting).

## 2.2 Yield parameters

Rajgopal *et al.* (1976) conducted varietal evaluation trial on brinjal and reported that the variety S-1 gave yield of 122.53 q per ha which was at par with the variety T-8 (140.91 q per ha) and T-3 (133.30 q per ha)

Rajgopal *et al.* (1978) reported that higher girth of fruit (15.6cm) was found in Pusa Anmol and lowest (8.8cm ) in Arka-Kusumakar.

Chadha and Sidhu (1987) reported that Sadabahar Baingan gives an average yield of 313 q per ha, which was 36.6 per cent and 53 0 per cent more than Punjab Chamkela, and R-34 respectively.

Kallo *et al.* (1991) reported that the Hisar Shyamal was a high yielding brinjal variety, black purple in colour with an average total yield of 32.6 t per ha

Nandi (1992) evaluated seven brinjal lines and reported that the highest fruit weight (118.08 g) was recorded in BB-1. The maximum girth of fruit (22.12 cm) BB-1, whereas minimum girth of fruit (17.33 cm) was recorded in BB-1 1 with an average branch number of 10.3 per cent. The tallest plants were recorded in the entry BB-1 1 and the shortest in BB-7

Kallo *et al.* (1993) observed that the "Hisar Jamuni" produced on average yield 32.01 t per ha compared with 28.87 t per ha for BR-1 \2 a brinjal round variety

Yadav *et al* (1994) reported that two genotypes of brinjal viz. PH-4 and R-34 were identified as the most promising for yield and other related characters.

Upadhaya *et al.* (1995) observed higher fruit yield (37.39 t per ha) in cv Nurki, which also gave the highest fruit weight. Pusa Purple Cluster produced most fruits per plant (22.7) and Pusa Kranti the tallest plants (80.9 cm), while evaluating eight aubergines cultivars.

Rajput *et al.* (1996) recorded data on 14 yield related characters in 22 *Solanum melongena* genotypes. Plant height, fruit per plant, fruit weight, fruit girth were the main characters contributing to yield.

Jaiswal *et al* (1997) tested of 6 egg plant cultivars and reported that Pusa Purple Round produced the highest fruit yield (30.45 t per ha) which was followed by Pant Samrat (28.05 t per ha) . The check cultivar Jhumakia produced 21.79 t per ha.

Deotale *et al.* (1998) studied of 11 aubergine cultivars and reported that Selection-I was the tallest 165 days after planting (79.98 cm) and produced the most fruits per plant (68 per plant). Poona Spiny was the earliest to reach 50% flowering and produced the highest yield (393.92 q per ha).

### **2.3 Quality characteristics**

Selvaraj *et al.* (1974) reported that Arka Shirish had the highest skin chlorophyll content in comparison to other brinjal varieties.

Bajaj *et al* (1981) analysed 18 varieties of egg plant consisting of 10 round, for chemical constituents. The total phenolic content varied from 0.025%

(K-202-14) to 0.062% (Azad Kranti) and chlorophyll content was maximum in variety 17(4) (0.122 mg per g) and minimum in the variety S-16 (0.025 mg per g)

Sidhu *et al.* (1982) reported that the total phenolic content varied from 0.07% (Pusa purple cluster) to 0.19 % (BR-112). Total chlorophyll content was maximum in the brinjal variety PBR-91-1 (0.126 mg per g) and minimum in P-8 (0.026 mg per g).

Kaur *et al.* (1985) observed five varieties of egg plant for the various chemical constituents and bio-chemical properties at different stages of maturity. The variety Punjab Chamkila had the maximum total phenol content at all the stages of maturity.

Awasthi *et al.* (1987) analysed 16 brinjal cultivars and reported that chlorophyll content in the peel of fresh fruit ranged 0.15 – 2.1 mg per g tissue.

Singh *et al.* (1988) reported that significant variations were observed for chlorophyll content, total phenol content ranging from 0.023 - 0.050 mg per g, 110.08 - 143.24 mg per 100 g, among eight varieties of brinjal.

Chadha *et al.* (1990) reported that both bitterness and discolouration increased with increasing percentage of total phenol in brinjal.

Darekar *et al.* (1991) screening 9 varieties of brinjal for resistance to *Leucinodes orbonalis*. They observed that the varieties PBR-129-5, Arka-Kushumakar and wild brinjal were resistance. Polyphenol content was negatively correlated with attack.

Ingale and Patel (1997) studied for chemical quality components using ten parents of brinjal crop. Total phenol content was found in parents screening from 0.185-0.62 per cent

## **2.4 Correlation studies**

Singh and Singh (1981) reported that yield was positively correlated with weight and number of fruits and negatively correlated with days to flowering.

Dhankar and Singh (1983) observed that the fruit yield was negatively associated with days to first set and days to 50% flowering.

Chadha and Sidhu (1983) observed that total yield per plant was highly correlated with height of plant, number of branches, weight of fruit

Chadha and Paul (1984) conducted correlation studies of 40 varieties of egg plant. They reported that the negative correlation between the yield and the number of days taken to first flower and the number of days taken to first fruit

Mishra and Mishra (1990) observed that the positive correlation between fruit girth and fruit weight.

Gautam and Srinivas (1992) reported that the plant spread showed significant positive correlation with yield.

Mandal and Dana (1992) conducted correlation studied in brinjal and reported that fruits per plant, secondary branches per plant and plant height were important characters for the selection of superior genotypes

Tambe *et al.* (1992) reported that the yield has shown significant and positively correlation with primary and secondary branches

Patil and Ajri (1993) screened 17 entries of brinjal for resistance to *Leucinodes orbonalis* and observed that the number of holes per fruit, number of larvae per fruit and per cent infested plants showed a strong positive correlation with susceptibility to the pest.

Ushakumari and Subramanian (1993) reported that number of fruits had the highest correlation followed by number of branches with fruit yield.

Kumar *et al.* (1995) collected information on yield correlation is derived from data on 11 yield related characters on 21 brinjal genotypes. Yield was positively associated with flowers per cluster, primary branches per plant and fruits per plant.

Kumar *et al.* (1997) suggested to select for fruit number rather than size to simultaneously increase in yield and resistance.

Shukla *et al.* (1998) while studying the effect of plant and fruit characters on fruit infestation by *Leucinodes orbonalis* on number basis observed that fruit diameter has direct significant effect on damage fruits via calyx diameter

Sharma and Swaroop (2000) reported that most of the characters were positively correlated with yield except for days to 50% flowering.

## **2.5 Parameters recorded to screen varieties for infestation of fruit borer**

Dhankar and Sharma (1986) reported that the range for per cent infested fruits varied from 27.08 (Pusa Purple Cluster-2) to 56.43 (Sel-1) and hence no brinjal strain was found superior than Pusa Purple Cluster-2 for susceptibility to pest under study.

Mishra *et al.* (1988) conducted screening trial of 46 brinjal varieties against fruit and shoot borer (*Leucinodes orbonalis* Guen.) and reported that tightly arranged seeds in the mesocarp, thick fruit skin and closely packed vascular bundles in the pulp were possible causes of resistance in long fruited varieties.

Dash and Singh (1990) found none of the nine brinjal cultivars free from the attack of *Leucinodes orbonalis* in Orissa during kharif 1985. Pusa Purple Cluster was evaluated as least susceptible with 18.76 per cent fruit damage Mukta Keshi recorded highest mean number of holes per fruit.

Sharma (1994) considered per cent borer infestation of number basis, genotype PBR-129-5, revealed the minimum (23.4%) infestation, through it was at par with Azad Kranti (26%). Genotype PBR-91-1 shown maximum infestation both on number 46% as well as weight (46.8%) basis. Minimum infestation on number (23.4) and weight (20.5%) basis was recorded on genotype PBR-129-5

Sah *et al.* (1995) screened 28 brinjal cultivars and reported that none of the varieties were resistant to fruit infestation, but the lowest infestation on the basis of number (25.29%) was recorded for Kachbachia and for Anpurna on the basis of weight (25.34%).

Mishra and Mishra (1996) reported that the shoot and fruit borer as the most notorious pest of brinjal causing even upto 30 to 50 per cent damage in the tribal dominated North Eastern Ghat of Orissa. Fruit borer incidence was lowest in BB-49 (12.5%).

Tripathi *et al.* (1996) reported that the pest accounted for 4.4-62.5 and 4.0-55.4 per cent fruit infestation on number and weight basis respectively in brinjal crop.

Tripathi and Senapati (1998) reported that the pest accounted for 25.38-75.21 and 23.29-71.29% of fruit infestation on number and weight basis respectively in brinjal crop.

Panda (1999) reported that fruit damage varied from 85-100%. Early fruiting brinjal varieties were more liable to fruit attack. Tight calyx increased the resistance of the fruits to attack.

## *Materials and Methods*

## CHAPTER – III

### MATERIALS AND METHODS

The present investigation entitled "Evaluation of brinjal (round) varieties under Chhattisgarh region" at Horticultural Research Farm, Indira Gandhi Agricultural University, Raipur (C.G.) during *Rabi* season of 2000-2001. The materials used and methodology adopted in the investigation are described below

#### 3.1 Location and Climate

Raipur is located in central part of Chhattisgarh, popularly known as "Plains of Chhattisgarh" at 21°11' N latitude and 81°36' E longitude and an altitude of 289.56 meters from mean sea level. The climate of Raipur is sub humid type. The average of 50 years of data, showed that the annual rainfall ranges between 1200-1400 mm, mostly received from middle of June to end of September, with occasional high showers during winter and summer seasons. The average maximum and minimum temperatures are 46°C and 10°C during summer and winter seasons, respectively.

The weather data recorded during the period of investigation, viz. maximum and minimum temperature, rainfall, relative humidity and evaporation rate and sunshine hours have been depicted in Appendix and Fig. 1.

#### 3.2 Soil

The soil of the experimental site was clay (*vertisol*) with an average fertility and good drainage

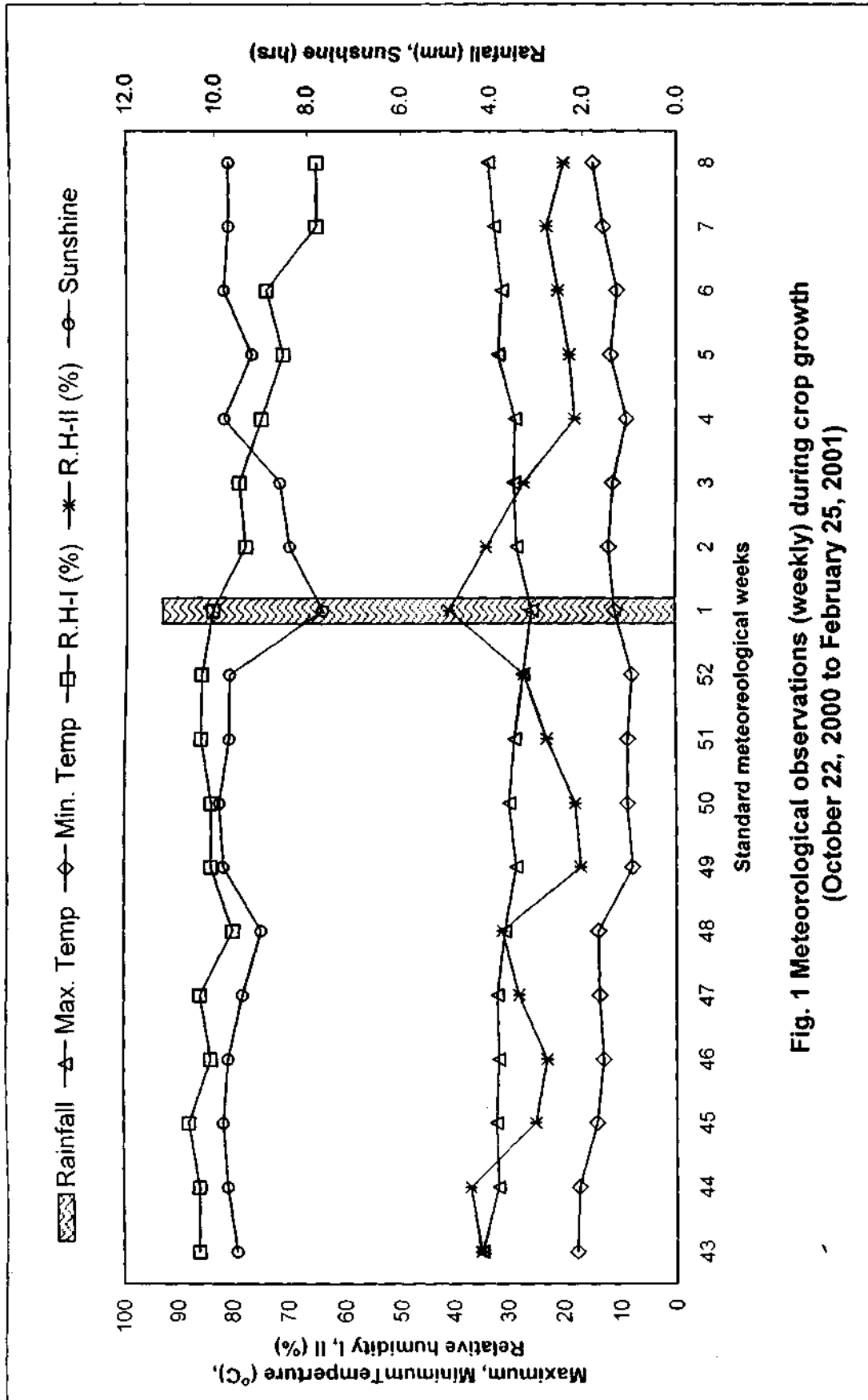


Fig. 1 Meteorological observations (weekly) during crop growth (October 22, 2000 to February 25, 2001)

In order to know the nutrient status of soil, samples of an experiment site were collected (0 to 20 cm depth) from randomly selected five places with the help of soil auger, before commencement of experiment. The samples were mixed thoroughly and a uniform composite sample was made for physical and chemical analysis.

**Table:1 Physico-chemical analysis of experimental soil**

S. No.	Particulars	Value	Class
A.	Physical Analysis		
	Coarse sand (%)	5.10	
	Fine sand (%)	14.92	Clay
	Silt (%)	36.03	( <i>vertisol</i> )
	Clay (%)	42.06	
B.	Chemical Analysis		
	Available Nitrogen (kg/ha)	220.00	Low
	Available Phosphorus (kg/ha)	10.00	Low
	Available Potash (kg/ha)	345.00	Medium
	Soil reaction ( pH)	6.50	Neutral
	Electrical conductivity (mmhos/cm)	084	
	Organic Carbon (%)	0.60	Medium

### 3.3 Previous history of the field

For the last several years the field was under cultivation The field was kept follow during rainy season and the crops such as chilli, brinjal, tomato were grown during rabi since last two years.

### 3.4 Details of an experiment

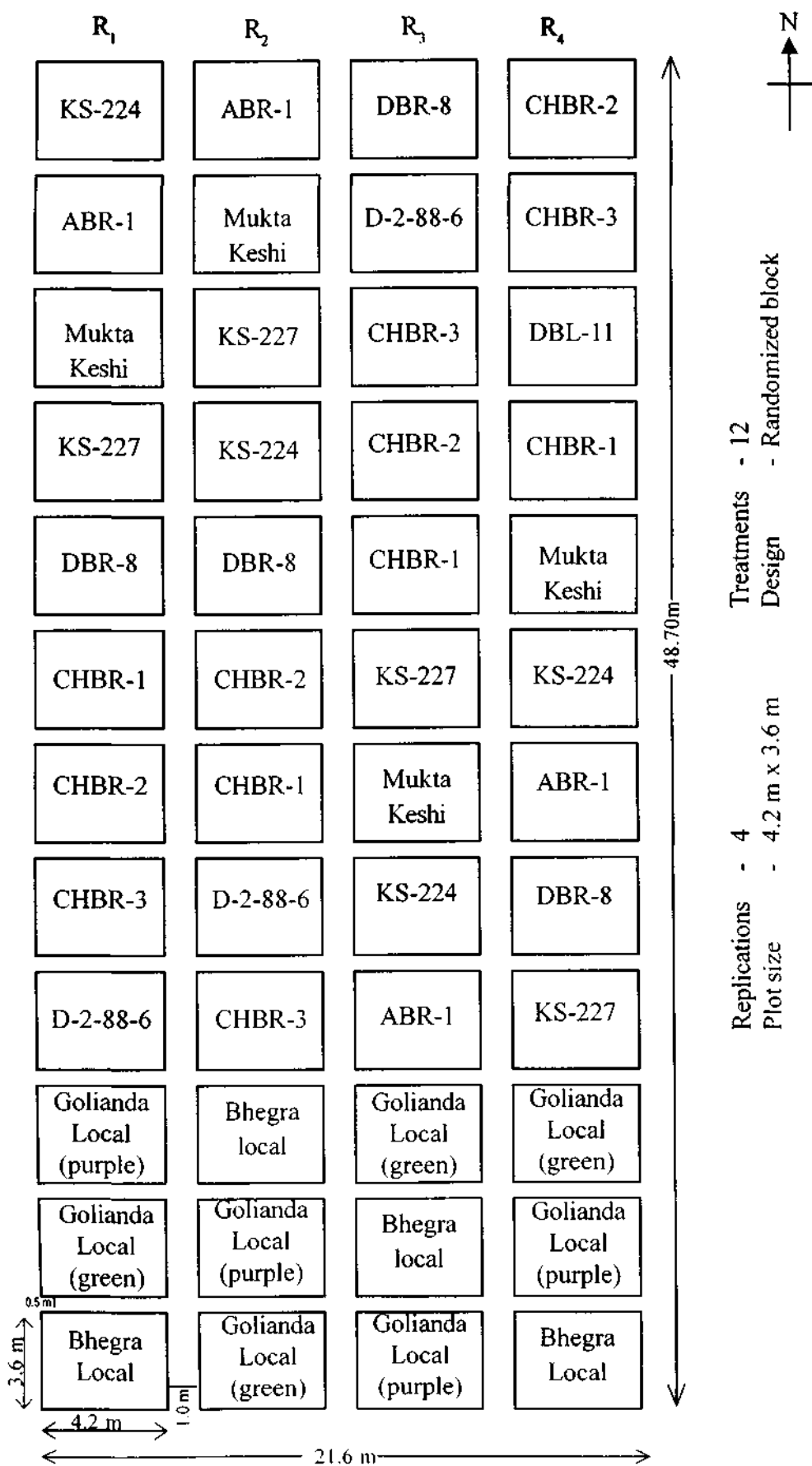
1. Design	Randomized Block
2. Number of replications	4
3. Number of treatments	12 varieties/genotypes of brinjal

- 4 Total number of plots : 48
5. Net plot size : 4.2m x 3.6 m
- 6 Distance between two replications : 1 m
- 7 Distance between two plots : 0.5 m
8. Spacing : 60 cm x 45 cm
9. Number of rows per plot : 7
10. Total area : 21 60 m x 48 70 m
11. Net area under experiment : 725.76 square meter
12. Crop duration : 120 days

### 3.5 Details of treatments

The following twelve varieties of brinjal were included in the trial.

S.No.	Notation	Varieties	Source
1.	T <sub>1</sub>	KS-224	Kalyanpur
2.	T <sub>2</sub>	ABR-1	Anand
3.	T <sub>3</sub>	Mukta Keshi	Mukteshwar
4.	T <sub>4</sub>	KS-227	Kalyanpur
5.	T <sub>5</sub>	DBR-8	IARI, New Delhi
6.	T <sub>6</sub>	CHBR-1	Ranchi
7.	T <sub>7</sub>	CHBR-2	Ranchi
8.	T <sub>8</sub>	CHBR-3	Ranchi
9.	T <sub>9</sub>	D-2-88-6	Sabour
10.	T <sub>10</sub>	Local-1 [Golianda Local (purple)]	Nagoi
11.	T <sub>11</sub>	Local-2 [Golianda Local (green)]	Nagoi
12.	T <sub>12</sub>	Local-3 [Bhegra Local ]	Banabel



**Fig. 2: Layout plan of experimental field**

**Table 2 : Schedule of cultural operations**

<b>S. No.</b>	<b>Cultural Operations</b>	<b>Date</b>
1.	Nursery raising	July 21, 2000
2	Field preparation	
a.	Ploughing and Harrowing	Aug. 22, 2000
b.	Levelling by pata	Aug. 23, 2000
3.	Layout of experiment	Aug. 24, 2000
4.	Application of FYM	Aug. 25, 2000
5.	Transplanting and Basal dose of fertilizer application	Aug. 25, 2000
6.	Gap filling	Sept. 1, 2000
7.	Irrigation	Aug. 25, Sept. 9, 23, Oct. 10, 22, Nov. 10, 25 & Dec. 9, 2000
8.	Split dose of nitrogen	Sept. 25, Nov. 5, 2000
9.	Hand weeding	Sept. 24, Oct. 26, Nov. 25, 2000
10.	Spraying of Dimethioate to control fruit borer	Sept. 26, 2000
11.	Picking	Oct. 25, Nov. 3, 15, 24, Dec. 5, 15, 30, 2000, Jan. 15, 30, Feb. 20, 2001

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### 3.6 Fertilizer application

F.Y.M. at the rate of 20 tonnes/ha was applied as basal dose and other fertilizers were applied as per schedule given below.

<b>Nutrient</b>	<b>Kg/ha</b>	<b>Source of nutrient</b>	<b>Quantity of fertilizer applied per plot</b>
Nitrogen	100	Urea	425 g in two split doses, first dose 212.50g of 30 days after transplanting Second dose of 212.50 g 70 days after transplanting
Phosphorus	60	Single super phosphate	600 g as basal application
Potash	30	Murate of potash	100 g as basal application

### 3.7 Nursery raising

The soil was dug to a fine tilth and was made fully pulverised by mixing Farm yard manure. Raised nursery beds of 1 m x 1 m size were prepared and seeds were sown in lines at the distance of 8 cm after treating them with thiram @ 3 g/kg. Seeds were sown 2 cm deep and covered with a fine mixture of soil and F.Y.M. Light irrigation was given just after sowing The dried grass was spread on nursery beds, which was removed immediately after germination.

Beds were irrigated twice a day with the help of 'hazara' as and when required Hoeing was done timely to provide proper aeration for seedlings and weeding was also done to avoid the competition of seedlings with weeds for obtaining vigorous seedlings. Spraying with 0.2 % Dimethoate as well as 0.25%

Captan was also done 10 and 15 days after germination to protect the crop from insect and diseases.

### **3.8 Preparation of the field**

Field was prepared thoroughly by two ploughing followed by two cross harrowing and it was levelled with the help of 'pata', then it was divided into 48 plots having irrigation channels, path and distance to mark different replications as well as plots as shown in layout (Fig.2). Well rotten farmyard manure was spread and mixed with the soil in equal quantity (30.24 kg/plot), so that F.Y.M. may be applied at the rate of 200 q/ha.

### **3.9 Transplanting**

The nursery beds were irrigated before uprooting the seedlings. Seedlings were transplanted in the flat beds at the spacing of 60 cm row to row and 45 cm within the rows. Transplanting was done in the evening and just after transplanting a light irrigation was given.

### **3.10 Gap filling**

One week after transplanting gap filling was done wherever the mortality of transplanted seedlings was observed so that required plant population in each plot was maintained properly.

### **3.11 Irrigation**

The field was visited daily for observing the crop. The crop was irrigated as and when required Total seven irrigation were given to the experimental field during the entire crop" period The timings of irrigation application are given in Table 2.

### **3.12 Weeding and Plant protection measures**

Weeds under experimental plots were removed timely by hand weeding so that there will not be competition for growth in between the crop and weeds. Weeding was done by khurpi in such a way that soil may also be loosened to provide proper aeration for crop growth. Likewise three weedings were done during the crop span i.e. 30, 60 and 90 days after transplanting.

Regular spray of Dimethoate was done to control and prevent the attack of shoot and fruit borer (*Leucinodes orbonalis* Guen.), aphids and Jassids.

### **3.13 Harvesting**

Picking of fruits was done, when the fruits developed suitable marketable size and colour at an interval of 10 days.

### **3.14 Sampling technique**

Ten plants were randomly selected from each plot by the help of random numbers table and tagged before recording the first observation.

### **3.15 Observations**

#### **3.15.1 Morphological characters**

##### **1. Colour of stem**

Stem colour was noted as green, pigmented, dark green with the help of standard colour chart.

##### **2. Colour of flower**

Flower colour was noted as light purple, variegated purple, white with the help of standard colour chart

### **3. Colour of fruit**

By referring standard colour chart the colour of the fruits was recorded as light purple, purple, dark purple, greyish purple, light green, light to dark green and white.

### **4. Colour of leaves**

Based on visual observations different shades of leaf colour observed were light green, dark green, and pale yellowish green by confinding standard colour chart.

### **5. Fruiting habit**

Fruiting pattern was classified based on fruiting arrangement on axils as follows.

- (a) Fruiting solitary - Singly
- (b) Fruiting in bunch - In clusters

### **6. Flowering habit**

The flowering habit was recorded on the basis of arrangement of flower on axils as follows.

- i. Flowering single - Solitary
- ii. Flowering in bunch - In clusters

### **7. Pigmentation on leaves**

Pigmentation was noted on the basis of anthocyanin pigment on leaves by visual observation

Pigmentation	Leaves
Present -	Show reddish-brown colour
Absent -	Do not show colour

### **8. Fruit shape**

The standard shape of fruits such as round, oblong, oval, oval to oblong shape were recorded in varieties.

### **9. Spines on leaves**

Spines on leaves was noted on the basis of following categories

- i. Present      ii. Rarely present      iii. Absent

### **10. Growth habit**

Growth habit was recorded on the basis of plant position on the soil surface.

- a. If growth of stems upright      - Erect in nature  
 b. If stems extend out ward or horizontally      - Spreading type.

#### **3.15.2 Plant stand per plot**

The plots were observed daily and the number of healthy plants per plot was counted at an interval of 20 days after transplanting This observation was named as plant stand.

### **3.15.3 Growth, Flowering and Fruiting characters**

#### **1. Plant height (cm)**

The length of the main stem, from the ground level to the apical bud, of 10 randomly selected plants in each plot was recorded in centimeter using meter scale, at an interval of 20 days. The first observation was taken at 20 days after transplanting. Average height of the plant was calculated

#### **2. Number of leaves per plant**

The number of leaves of 10 randomly selected plants were counted at the 20 days interval after transplanting.

#### **3. Plant spread (cm)**

Plant spread was measured at 40, 80 and 120 days after transplanting. It was measured in randomly selected ten plants with help of meter scale in two directions i.e. North-South and East-West. Average value was calculated of each plant and finally mean values were calculated per plant.

#### **4. Days to first flowering**

The plots were visited daily for observing the crop. The period from the date of transplanting to the date of first flowering was recorded and expressed in number of days and average per treatment was calculated

#### **5. Days to 50% flowering**

The plots were observed daily and exact date was noted, when 50% plants of the plot bloomed and number of days counted from the date of transplanting

## **6. Days to first fruit set**

The number of days taken from the date of transplanting to the date of first fruit set was recorded under each treatment.

## **7. Number of primary, secondary and tertiary branches per plant**

Number of primary, secondary and tertiary branches in each plot were separately counted from 10 selected plants at an interval of 40 days after transplanting and treatment wise mean number of each branches per plant was determined.

## **8. Number of stamens, sepals and petals per flower**

Number of stamens, sepals and petals in each plot were separately counted from 10 randomly selected flowers on a particular day and the average was calculated under each treatment.

### **3.15.4 Yield parameters**

#### **1. Number of flowers per cluster**

Number of flowers from 10 randomly selected clusters (one cluster from each selected plant) were counted at three stages i.e. after second, fourth and sixth picking. Average number of flowers per cluster was calculated at each stage and finally mean value was worked out by dividing summation of averages with three.

#### **2. Number of fruits per plant**

Number of fruits counted from 10 randomly selected plants of brinjal from each plot, at each picking and total number of fruits per plant was calculated, by dividing the total fruits picked in all the pickings with 10

### **3. Percentage of long, medium and short or pseudo styled flowers**

Number of different types of flower counted after very close examination from each of the ten randomly selected plants, in each plot, on a particular day and percentage for different types of flower was worked out.

### **4. Weight per fruit (g)**

The weight of ten randomly selected fruits from each plot was recorded at each picking and average values were worked out.

### **5. Fruit girth (cm)**

The girth of 10 randomly selected fruits from each plot was recorded at the point of maximum thickness by running a thread along the girth and measuring it on a meter scale at each picking, then average values were calculated.

### **6. Fruit stalk length (cm)**

The stalk length of fruit of 10 randomly selected fruits from each plot was measured by running a thread along the stalk length and measuring it on a meter scale at each picking and average values were worked out.

### **7. Yield per plant (g)**

The weight of fruits of ten selected plants was recorded at each picking and the average weight of fruits per plant was calculated.

### **8. Yield per plot (kg)**

The fruits harvested from each plot were weighed at each picking. Total yield was calculated individual plot after the last picking in kg.

## **9. Yield per hectare (q)**

Total yield of fruits kilograms per plot was converted into quintals per hectare.

### **3.15.5 Parameters recorded to screen varieties for infestation of fruit borer**

#### **3.15.5.1 Quantitative characters**

##### **1. Calyx diameter (cm)**

Diameter of calyx were measured by the help of vernier calipers at the periphery of the calyx for ten randomly selected flowers and average was calculated.

##### **2. Number of holes per fruit**

Number of holes per fruit were recorded on 10 fruits from each variety at each picking.

##### **3. Number of larvae per fruit**

Ten borer affected fruits per plot were cut open to observe number of larvae present inside

##### **4. Number of spines on calyx**

Number of spines on calyx in each plot were counted from ten randomly selected flowers and treatmentwise mean number of spines on calyx was determined.

##### **5. Pedicel length (cm)**

The stalk of the flower was measured in centimeter on meter scale for ten randomly selected same flowers and average values were worked out

## 6. Fruit diameter (cm)

The diameter of 10 randomly selected fruits from each plot was recorded at the point of maximum thickness by the use of vernier calipers. The average diameter per fruit was calculated.

## 7. Shoot diameter (cm)

The diameter of main stem, 3 cm above from the ground level, recorded from selected plants of each plot at the 40, 80 and 120 days after transplanting and an average was calculated under each treatment to obtain shoot diameter. Vernier calipers was used to measure the shoot diameter of plants considered to record this parameter.

## 8. Fruit borer infestation percentage

Incidence of fruit borer was recorded in terms of percentage of fruit damage by weight as well as number at each picking with the help of following formula.

$$\text{Fruit borer infestation (\%)} = \frac{\text{Total number of borer affected fruits}}{\text{Total number of fruits harvested}} \times 100$$

(numberbasis)

$$\text{Fruit borer infestation (\%)} = \frac{\text{Total weight of borer affected fruits}}{\text{Total yield}} \times 100$$

(weight basis)

### 3.15.5.2 Qualitative characters

#### 1. Estimation of chlorophyll content

For the estimation of chlorophyll content 1g fresh leaf sample was collected from each variety at vegetative (60 DAT) and fruiting stage (100 DAT)

The sample was cut into pieces and crushed with mortar and pestle by adding 80 per cent acetone for extraction. The extract so obtained was filtered and centrifuged and then the supernatant was collected. Finally the volume of each sample was made up to 25 ml in volumetric flask by acetone.

Reading was recorded in spectrophotometer with the sample. Absorbance was noted at 645, 663 and 652 nm, for blank and the sample. Chlorophyll content was calculated as per the following formula. (Sadasivam and Manikam 1992).

$$\text{Chlorophyll 'A' mg/g of fresh leaves} = \frac{12.7 \times A_{645} \times V}{1000 \times a \times W}$$

$$\text{Chlorophyll 'B' mg/g of fresh leaves} = \frac{22.9 \times A_{645} - 4.68 \times A_{663} \times V}{1000 \times a \times W}$$

Where,

A = optimal density/absorbance

a = length of light path in cell (1 cm)

W - weight of sample

V = volume of solution

## 2. Estimation of total phenol content

After first picking (60DAT) and third picking (80DAT), the total phenol content was estimated in laboratory. For the estimation of phenol the method used was as described by (Sadasivam and Manikam, 1992).

Fresh fruit material from 12 varieties were collected. From the sample 1g was taken for extraction in alcoholic borate buffer (0.2M, pH 7.6) at room temperature after crushing them finally with mortar and pestle. The extract so

obtained was centrifuged at 3,000 rpm for 15 minutes twice and the supernatant so obtained was collected and pooled together. The volume of the sample was then made to 5 ml with borate buffer solution for estimation.

From the solution, 0.1 ml extract was taken and to that 0.8 ml distilled water 0.1 ml folin ciocalteu, 2 ml  $\text{Na}_2\text{CO}_3$  were added to make 3 ml solution. Three replicates were made for each variety. Absorbance was noted in spectrophotometer at 650 nm after incubating the sample for 45 minutes to develop colour. Blank reading was also taken Standard curve was prepared by using different concentrations of chlorogenic acid stock solution  $1 \times 10^{-3}$  g/ml and conversion factor obtained as 189.25. Phenolic content was expressed as mg total phenol/100 g fresh weight of plant sample.

Note : Borate buffer - Boric acid 0.61 g + Borax 0.152 g dissolved in 200 ml distilled water.

80 per cent alcoholic borate buffer - In the prepared borate buffer 80 ml of alcohol was added.

### **3. Total soluble solids (%)**

Ten fruits were randomly selected from the each variety. The fruit were thoroughly washed with tap water. The fruits were then cut into small pieces and squeezed to obtained the juice. The juice was filtered through two fold muslin cloth The juice was used to determine T.S.S. with the help of Erma hand refractometer. Mean value was expressed as per cent total soluble solids in juice

### 3.16 Statistical analysis

(A) **Analysis of variance** - The data collected for different characters were processed and were analysed by the method of analysis of variance as derived by Panse and Sukhatme (1978).

Source of variation	Dgrees of freedom	Sum of squares	Mean sum of squares	F <sub>c</sub>	F,
Replication	(r-1)	SS <sub>r</sub>	V <sub>r</sub>	V <sub>r</sub> / V <sub>e</sub>	
Treatment	(t-1)	SS <sub>t</sub>	V <sub>t</sub>	v./ V <sub>e</sub>	
Error	(r-1)(t-1)	SS <sub>e</sub>	V <sub>e</sub>		
Total	(rt-1)				

Where,

r = Replications

S<sub>t</sub> = Treatment sum of squares

t = Treatments

S<sub>e</sub> = Error sum of squares

S<sub>r</sub> = Replication sum of squares

V<sub>t</sub> = Treatment variance

V<sub>r</sub> = Replication variance

V<sub>e</sub> = Error variance

$$SE_{m\pm} = \sqrt{\frac{\text{Error variance}}{\text{Number of replications}}}$$

$$SE_d = \sqrt{\frac{2 \times \text{Error variance}}{\text{Number of replications}}}$$

Where,

SE (d) = standard error of difference between two treatments

SE(m) = standard error of mean difference between two treatments

The critical differences to test the difference between two means was calculated as follows.

$$CD = SE (d) \times t_{5\% \text{ for error degree of freedom}}$$

**(B) Coefficient of correlation** - Correlation Coefficients were calculated for all possible combinations of the growth, flowering & fruiting characters and yield attributing parameters by using the standard procedure giving by Miller *et al.*(1958).

$$r(x, y) = \frac{\text{Cov}(x, y)}{\sqrt{\text{var}(x) \cdot \text{var}(y)}}$$

$r(x, y)$  = Coefficient of correlation between characters x and y.

$\text{Cov}(x, y)$  = Covariance for x and y.

$\text{var}(x)$  and  $\text{var}(y)$  = variance of characters x and y respectively

The calculated "r" is then compared with table value of "r" at 5% and 1% level of significance.

The correlation coefficient among various parameters recorded to present study for screening the varieties against fruit borer were also worked out.

## *Results*

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## **CHAPTER – IV**

### **RESULTS**

The present chapter deals with the experimental results obtained during the course of investigation on "Evaluation of brinjal (round) varieties under Chhattisgarh region". The results were statistically analysed by using the analysis of variance technique in order to find out the significance of different treatments. The experimental findings of present work have been grouped under the following heads.

4.1 Morphological characters

4.2 Plant stand per plot

4.3 Growth, Flowering and Fruiting characters

4.4 Yield parameters

4.5 Parameters recorded to screen varieties for infestation of fruit borer

4.6 Correlation studies

#### **4.1 Morphological characters**

Morphological characters of twelve treatments (varieties) are presented in Table 3.

#### **4.2 Plant stand per plot**

Data regarding plant stand at 20, 40, 60, 80, 100 and 120 days after transplanting are presented in Table 4 and graphical representation are shown on Fig. 3.

**Table 3 : Morphological characters of the treatments (varieties)**

Treatments (Varieties)	Colour of stem	Colour of flower	Colour of fruit	Colour of leaves	Fruiting habit	Flowering habit	Pigmentation on leaves	Fruit shape	Spines on leaves	Growth habit
T <sub>1</sub> -KS-224	Pigmented	Light purple	Light purple	Light green	Singly	Clusters	Absent	Round	Absent	Erect
T <sub>2</sub> -ABR-1	Green	Variegated purple	Dark purple	Pale yellowish green	Singly	Clusters & Solitary	Absent	Round	Absent	Spreading
T <sub>3</sub> -Mukta Keshi	Pigmented	Light purple	Purple	Light green	Singly	Solitary	Present	Oblong	Absent	Erect
T <sub>4</sub> -KS-227	Green	Light purple	Light purple	Light green	Singly	Solitary	Absent	Round	Absent	Spreading
T <sub>5</sub> -DBR-8	Green	Light purple	Light purple	Pale yellowish green	Singly	Clusters & Solitary	Present	Round	Absent	Erect
T <sub>6</sub> -CHBR-1	Pigmented	Variegated purple	Dark purple	Dark green	Singly	Solitary & Clusters	Present	Round	Absent	Spreading
T <sub>7</sub> -CHBR-2	Pigmented	Light purple	Purple	Dark green	Singly	Solitary & Clusters	Present	Round	Absent	Spreading
T <sub>8</sub> -CHBR-3	Pigmented	Light purple	Purple	Dark green	Singly	Clusters	Present	Round	Absent	Erect
T <sub>9</sub> -D-2-88-6	Green	Light purple	Greyish purple	Light green	Clusters & Singly	Clusters	Absent	Oval	Absent	Erect
T <sub>10</sub> -Golianda Local (purple)	Green	Light purple	Purple	Light green	Singly	Clusters & Solitary	Absent	Round	Absent	Erect
T <sub>11</sub> -Golianda Local (green)	Green	Light purple	Light green	Light green	Singly	Solitary	Absent	Round	Present	Erect
T <sub>12</sub> -Bhegra Local	Green	Light purple	Light green	Light green	Clusters & Singly	Clusters & Solitary	Absent	Round	Present	Spreading

Plant stand at 20 days after transplanting ranged from 50.75 to 56.0 with mean 54.87. The maximum number of plants per plot (56.00) were found in ABR-1, which was found statistically similar with all the treatments except Bhegra Local, Golianda Local (purple) and Golianda Local (green). On other hand, the minimum number of plants per plot (50.75) were found in Golianda Local (green), which was found at par with Golianda Local (purple).

Number of plants per plot at 40 days after transplanting ranged from 47.25 to 56.00. The maximum number of plants per plot (56.00) were found in KS-227, which was found at par with ABR-1, DBR-8, CHBR-3, Mukta Keshi, CHBR-1, CHBR-2, KS-224 and D-2-88-6. The minimum number of plants per plot (47.25) were found in Golianda Local (green), which was found non significant with Golianda Local (purple) for this character at 40 DAT.

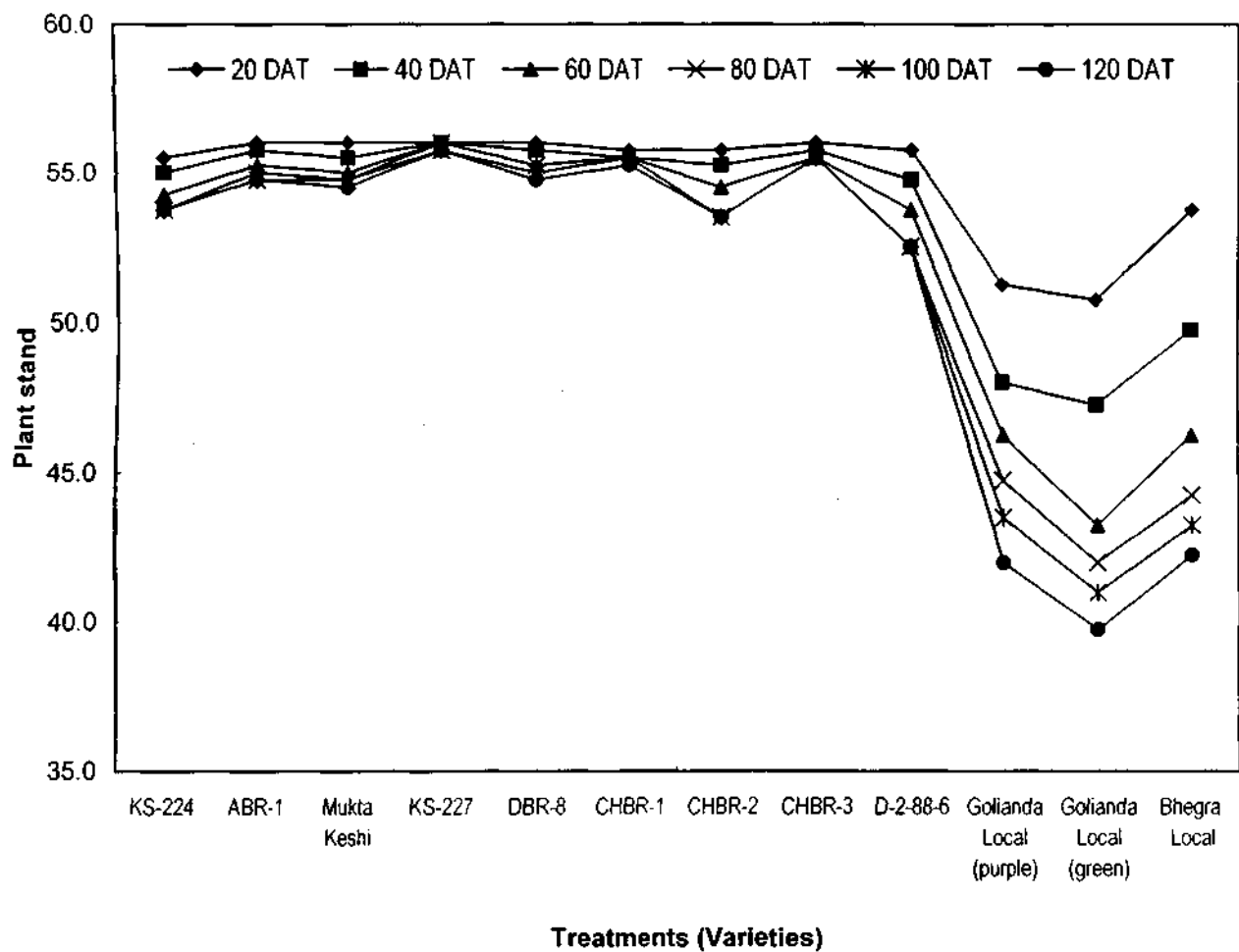
Data recorded on number of plants per plot at 60 days after transplanting ranged from 43.25 to 56.00 with mean of 53.56. The highest value for plant stand (56.00) was found in KS-227, which was found non significant with CHBR-1, CHBR-3, ABR-1, DBR-8, Mukta Keshi, CHBR-2 and KS-224. The lowest value for plant stand (43.25) was noted in Golianda Local (green), which was found remarkably inferior than all the other treatments. However, significant difference was also not observed among CHBR-1, CHBR-2, ABR-1, DBR-8, Mukta Keshi, CHBR-2, KS-224 and D-2-88-6 for this trait at 60 DAT.

It was revealed from the data recorded on number of plants per plot at 80 days after transplanting, ranged from 42.00 to 56.00 with mean 51.89. The maximum number of plants per plot (56.00) were noted in KS-227, which was found statistically similar with CHBR-1, CHBR-3, DBR-8, ABR-1, Mukta Keshi,

**Table 4 : Plant stand per plot**

Treatments (Varieties)	Plant stand per plot					
	20 DAT	40 DAT	60 DAT	80 DAT	100 DAT	120 DAT
T <sub>1</sub> -KS-224	55.50	55.00	54.25	53.75	53.75	53.75
T <sub>2</sub> -ABR-1	56.00	55.75	55.25	55.00	54.75	54.75
T <sub>3</sub> -Mukta Keshi	56.00	55.50	55.00	54.75	54.75	54.50
T <sub>4</sub> -KS-227	56.00	56.00	56.00	56.00	55.75	55.75
T <sub>5</sub> -DBR-8	56.00	55.75	55.25	55.25	55.00	54.75
T <sub>6</sub> -CHBR-1	55.75	55.50	55.50	55.50	55.50	55.25
T <sub>7</sub> -CHBR-2	55.75	55.25	54.50	53.50	53.50	53.50
T <sub>8</sub> -CHBR-3	56.00	55.75	55.50	55.50	55.50	55.50
T <sub>9</sub> - D-2-88-6	55.75	54.75	53.75	52.50	52.50	52.50
T <sub>10</sub> -Golianda Local (purple)	51.25	48.00	46.25	44.75	43.50	42.00
T <sub>11</sub> -Golianda Local (green)	50.75	47.25	43.25	42.00	41.00	39.75
T <sub>12</sub> -Bhegra Local	53.75	49.75	46.25	44.25	43.25	42.25
SE(m)±	0.57	0.49	0.76	0.93	1.04	1.08
CD at 5%	1.66	1.43	2.19	2.69	3.01	3.12

DAT - Days after transplanting



**Fig. 3 : Plant stand per plot at different interval**

KS-224 and CHBR-2. On other hand, the minimum number of plants per plot (42.00) were found in Golianda Local (green), which was found at par with Bhegra Local. However, significant difference was also not observed among ABR-1, Mukta Keshi, KS-224, CHBR-2 and D-2-88-6 for plant stand at this stage.

It was noticed from the data recorded at 100 days after transplanting, that plant stand ranged from 41.00 to 55.75. It was seen that the highest number of plants per plot (55.75) were counted also in KS-227, which was found at par with CHBR-1, CHBR-3, DBR-8, ABR-1, Mukta Keshi, KS-224 and CHBR-2. The lowest value for plant stand (41.00) was found in also Golianda Local (green), which was found statistically similar with Bhegra Local and Golianda Local (purple).

Data recorded at final stage (120 DAT), showed that number of plants per plot ranged from 39.75 to 55.75. The maximum number of plants per plot (55.75) were counted in KS-227, which was found statistically similar with CHBR-3, ABR-1, DBR-8, Mukta Keshi, KS-224, and CHBR-2. On other hand, the minimum number of plants per plot (39.75) were counted in Golianda Local (green), which was found at par with Bhegra Local and Golianda Local (purple). However, significantly different was also not observed among CHBR-3, CHBR-1, ABR-1, DBR-8, Mukta Keshi, KS-224, CHBR-2 and D-2-88-6 at this stage

### **4.3 Growth, Flowering and Fruiting characters**

#### **4.3.1 Plant height (cm)**

The average plant height recorded at different intervals are presented in Table 5 and shown in Fig.4.

Height of the plant at 20 days after transplanting ranged from 8.11 cm to 21.88 cm (with an overall mean of 12.02 cm). The maximum height of the plant (21.88 cm) was measured in KS-227, which was found significantly superior than all the treatments included under this study. On other hand the minimum plant height (8.11 cm) was noted in D-2-88-6, which was found at par with CHBR-3, Mukta Keshi and KS-224. However, significant difference was not observed among ABR-1, CHBR-2, CHBR-1, DBR-8 and Golianda Local (green) for this trait.

Fourty days after transplanting, the plant height ranged from 17.29 cm to 35.64 cm. The maximum plant height (35.64 cm) was measured in CHBR-1, which was found significantly better than all the treatments included under this study. The minimum plant height (17.29 cm) was measured in Golianda Local (purple), which was found statistically similar with Golianda Local (green) and Bhegra Local. However, remarkable difference was not observed among CHBR-2, KS-227, ABR-1 and CHBR-3 for plant height at this stage.

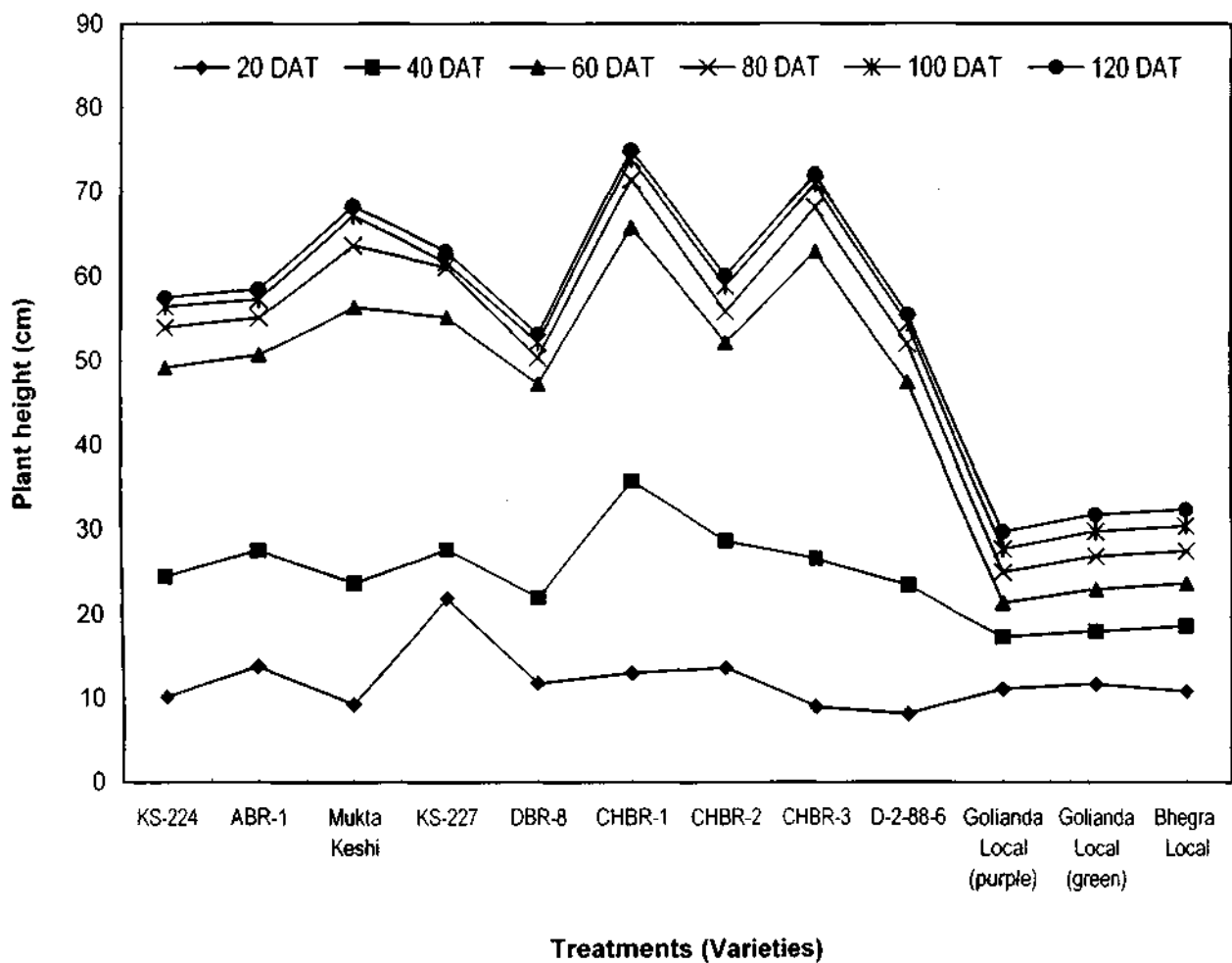
It was observed from the data recorded at sixty days after transplanting, that the plant height ranged from 21.32 cm to 65.76 cm with the mean of 46.23 cm. The maximum plant height (65.76 cm) was noted in CHBR-1, which was found at par with CHBR-3. The minimum plant height (21.32 cm) was noted in Golianda Local (purple), which was found statistical similar with Golianda Local (green) and Bhegra Local. Remarkable difference was not noted among Mukta Keshi, KS-227, CHBR-2 and ABR-1

At 80 days after transplanting, plant height ranged from 24 92 cm to 71.39 cm with an overall mean of 50.88 cm The maximum plant height (71.39 cm) was

**Table 5 : Plant height at different interval (cm)**

Treatments (Varieties)	Plant height (cm)					
	20 DAT	40 DAT	60 DAT	80 DAT	100 DAT	120 DAT
T <sub>1</sub> -KS-224	10.14	24.45	49.20	54.00	56.43	57.51
T <sub>2</sub> -ABR-1	13.76	27.51	50.71	55.11	57.28	58.45
T <sub>3</sub> -Mukta Keshi	9.26	23.62	56.35	63.64	67.16	68.28
T <sub>4</sub> -KS-227	21.88	27.61	55.18	61.06	61.68	63.00
T <sub>5</sub> -DBR-8	11.77	21.93	47.20	50.37	52.18	53.15
T <sub>6</sub> -CHBR-1	12.99	35.64	65.76	71.39	73.32	74.88
T <sub>7</sub> -CHBR-2	13.64	28.60	52.20	55.84	58.88	60.10
T <sub>8</sub> -CHBR-3	8.99	26.52	62.95	68.10	70.88	72.01
T <sub>9</sub> -D-2-88-6	8.11	23.37	47.38	52.00	54.43	55.49
T <sub>10</sub> -Golianda Local (purple)	11.12	17.29	21.32	24.92	27.66	29.66
T <sub>11</sub> -Golianda Local (green)	11.72	17.98	22.92	26.79	29.70	31.69
T <sub>12</sub> -Bhegra Local	10.86	18.60	23.61	27.39	30.34	32.28
SE(m) <sub>±</sub>	0.81	1.10	1.99	1.84	1.95	1.75
CD at 5%	2.35	3.19	5.74	5.30	5.63	5.06

DAT-Days after transplanting



**Fig.4 : Plant height at different interval (cm)**

recorded by CHBR-1, which was statistically similar with CHBR-3. On other hand, the minimum plant height (24.92 cm) was noted in Golianda Local (purple), which was found at par with Golianda Local (green), and Bhegra Local. However, significant difference was not observed in between CHBR-3 and Mukta Keshi for this character.

It was revealed from the data recorded at 100 days after transplanting that plant height ranged from 27.66 cm to 73.32 cm with mean of 53.33 cm. The maximum plant height (73.32 cm) was measured in CHBR-1, which was found statistically similar with CHBR-3. The minimum plant height (27.66 cm) was found in Golianda Local (purple), which was found at par with Golianda Local (green) and Bhegra Local. Similarly, significant difference was not observed in between CHBR-3 and Mukta Keshi for plant height at this stage.

At final stage (120 days after transplanting), plant height ranged from 29.66 cm to 74.88 cm. The maximum plant height (74.88 cm) was recorded in CHBR-1, which was found at par with CHBR-3. On other hand, the minimum plant height (29.66 cm) was noted in Golianda Local (purple), which was found at par with Golianda Local (green) and Bhegra Local. Both the treatments i.e. CHBR-3, Mukta Keshi were found at par with each other, but proved the remarkable superiority over KS-227, CHBR-2, and ABR-1 for plant height at this stage (120 days after transplanting).

#### **4.3.2 Number of leaves per plant**

The average number of leaves per plant counted at different stages of the crop growth are presented in Table 6 and shown in Fig 5.

It was noticed from the data recorded at 20 days after transplanting that the number of leaves per plant ranged from 4.17 to 9.85 with an overall mean of 6.19. It was seen that the maximum number of leaves per plant (9.85) were counted in ABR-1, which was found significantly superior than all the treatments. The minimum number of leaves per plant (4.17) were counted in Golianda Local (purple), which was found at par with Bhegra Local, Golianda Local (green), D-2-88-6 and Mukta Keshi. However, significant difference was not observed among KS-227, CHBR-1, KS-224, DBR-8, CHBR-3 and CHBR-2 for this trait.

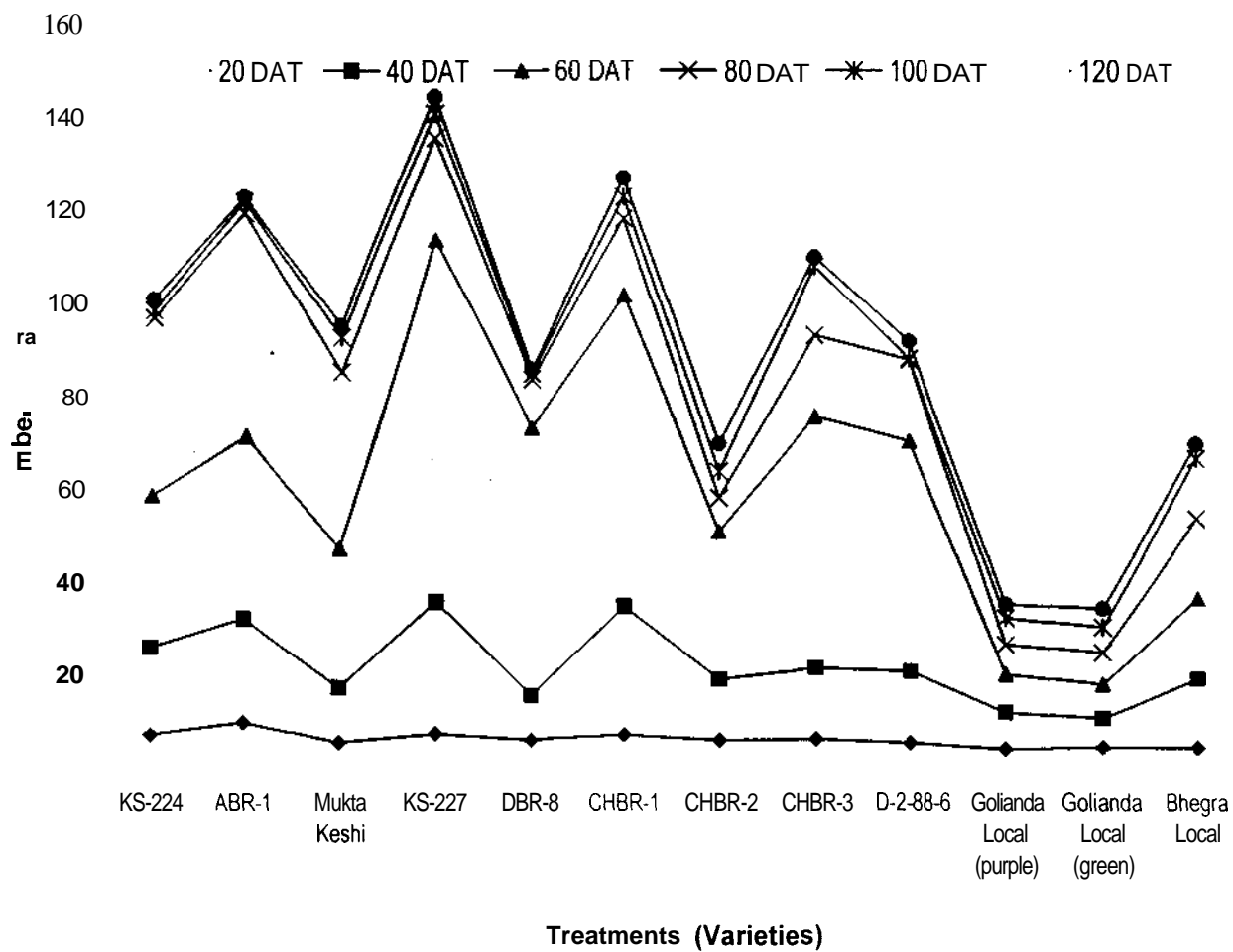
At 40 days after transplanting, number of leaves per plant ranged from 10.67 to 36.02. The maximum number of leaves per plant (36.02) were counted in KS-227, which was found at par with CHBR-1 and ABR-1. The minimum number of leaves per plant (10.67) were found in Golianda Local (green), which was found at par with Golianda Local (purple) and DBR-8. Significant difference was also not observed among KS-224, CHBR-3 and D-2-88-6 for number of leaves per plant.

It was revealed from the data recorded on number of leaves per plant at 60 days after transplanting that it ranged from 18.12 to 113.40 with mean 61.46. The maximum number of leaves per plant (113.40) were counted in KS-227, which was found significantly superior than all the treatments studied in this investigation. The minimum number of leaves per plant (18.12) were found in Golianda Local (green), which was found at par with Golianda Local (purple). However, significant difference was not observed among CHBR-3, DBR-8, ABR-1 and D-2-88-6 for this character.

**Table 6 : Number of leaves per plant at different interval**

Treatments (Varieties)	Number of leaves per plant					
	20 DAT	40 DAT	60 DAT	80 DAT	100 DAT	120 DAT
T <sub>1</sub> -KS-224	7.20	26.17	58.71	96.70	98.25	100.55
T <sub>2</sub> -ABR-1	9.85	32.35	71.32	119.20	121.67	122.60
T <sub>3</sub> -Mukta Keshi	5.50	17.35	47.35	84.97	92.42	95.00
T <sub>4</sub> -KS-227	7.42	36.02	113.40	135.52	140.75	144.37
T <sub>5</sub> -DBR-8	6.22	15.82	73.17	83.55	84.72	85.62
T <sub>6</sub> -CHBR-1	7.22	35.02	101.60	118.15	122.85	126.87
T <sub>7</sub> -CHBR-2	6.07	19.17	51.00	58.30	63.85	69.78
T <sub>8</sub> -CHBR-3	6.22	21.60	75.50	92.85	107.65	109.70
T <sub>9</sub> -D-2-88-6	5.45	20.92	70.27	87.60	87.92	91.60
T <sub>10</sub> -Golianda Local (purple)	4.17	12.02	20.30	26.75	32.45	35.47
T <sub>11</sub> -Golianda Local (green)	4.52	10.67	18.12	24.97	30.50	34.50
T <sub>12</sub> -Bhegra Local	4.45	19.35	36.77	53.87	66.72	69.75
SE(m)±	0.52	2.02	2.83	3.30	2.92	3.63
CD at 5%	1.50	5.84	8.18	9.52	8.42	10.49

DAT- Days after transplanting



**Fig. 5 : Number of leaves per plant at different interval**

Data recorded at 80 days after transplanting showed that number of leaves per plant ranged from 24.97 to 135.52. The maximum number of leaves per plant (135.52) were counted in KS-227 , which was found significantly better than all the treatments. On other hand, the minimum number of leaves per plant (24.97) were counted in Golianda Local (green), which was found at par with Golianda Local (purple). Significant difference was not observed in between ABR-1 and CHBR-1 for this character

Data recorded on number of leaves per plant at 100 days after transplanting ranged from 30.50 to 140.75 with mean 87.48. The maximum number of leaves per plant (140.75) were found in KS-227, which was found superior than all the treatments. The minimum number of leaves per plant (30.50) were counted in Golianda Local (green), which was found at par with Golianda Local (purple). Significant difference was not observed among CHBR-1 and ABR-1 for this trait.

Data recorded at final stage (120 DAT) showed that the number of leaves per plant ranged from 34.50 to 144.37 with mean 90.48. The maximum number of leaves per plant (144.37) were counted in KS-227, which was found significantly better than all the other treatments included under this study. The minimum number of leaves per plant (34.50) were found in Golianda Local (green), which was found at par with Golianda Local (purple). Significant difference was not observed in between CHBR-1 and ABR-1 for this attribute

### 4.3.3 Number of primary branches per plant

The average number of primary branches per plant noted under the treatments studied in this investigation at different intervals are presented in Table 7 and showed in Fig 6.

It was noticed from the data recorded at 40 days after transplanting that the number of primary branches per plant ranged from 1.35 to 5.45 and mean value was 3.48. The maximum number of primary branches per plant (5.45) was noted in ABR-1, which was found statistically similar with CHBR-3 and D-2-88-6. The minimum number of primary branches per plant (1.35) was noted under the treatment Golianda Local (green), which was found at par with Golianda Local (purple) and Bhegra Local. Significant difference was not observed among D-2-88-6, KS-227 and CHBR-1 for this character.

It was revealed from the data recorded at 80 days after transplanting that the number of primary branches per plant ranged from 1.65 to 6.87 with an overall average of 4.67. The maximum number of primary branches per plant (6.87) were found in D-2-88-6, which was found at par with CHBR-3. The lowest number of primary branches per plant (1.65) were found in Golianda Local (purple), which was found statistical similar with Golianda Local (green) and Bhegra Local. The treatments CHBR-3, KS-224, CHBR-1 and ABR-1 were found non significant among themselves for this trait.

At 120 days after transplanting, number of primary branches per plant ranged from 1.95 to 7.27 with mean of 5.03. The maximum number of primary branches per plant (7.27) were noted in D-2-88-6, which was found non

significant with CHBR-3. On other hand, the minimum number of primary branches per plant (1.950) were noted under the treatment Golianda Local (purple), which was found statistically similar with Golianda Local (green) and Bhegra Local. Significant difference was not observed among CHBR-3, KS-224, CHBR-1, ABR-1, KS-227 and DBR-8 for this trait.

#### **4.3.4 Number of secondary branches per plant**

The data recorded under the treatments included in this study for number of secondary branches per plant has been presented in Table 7 and shown in Fig 6.

Number of secondary branches per plant ranged from 0.72 to 2.77 (with an overall mean of 1.49). Fourty days after transplanting the maximum number of secondary branches per plant (2.77) were found in ABR-1, which was found significantly superior than all the treatments. The lowest number of secondary branches per plant (0.72) was found in D-2-88-6, which was found non significant with Mukta Keshi, CHBR-3 and Golianda Local (purple). Significant difference was also not observed among Bhegra Local, CHBR-1, DBR-8 and Golianda Local (green) for this attribute.

It was noticed from the data recorded at 80 days after transplanting that the number of secondary branches per plant ranged from 3.07 to 9.97 with an overall mean of 7.13. The maximum number of secondary branches per plant (9.91) were noted in ABR-1, which was found at par with DBR-8, D-2-88-6, KS-227, CHBR-3 and KS-224. On other hand, the minimum number of primary branches per plant (3.07) were noted under the treatment Golianda Local (green), which was found statistically similar with Golianda Local (purple) and Bhegra Local. Significant

**Table 7 : Number of primary, secondary and tertiary branches per plant**

Treatments (Varieties)	Number of branches								
	Primary			Secondary			Tertiary		
	Days after transplanting			Days after transplanting			Days after transplanting		
	40	80	120	40	80	120	40	80	120
T <sub>1</sub> -KS-224	3.42	5.97	6.05	1.57	8.17	9.42	0.02	4.92	6.90
T <sub>2</sub> -ABR-1	5.45	5.77	5.95	2.77	9.97	10.15	0.15	7.30	9.42
T <sub>3</sub> -Mukta Keshi	2.57	5.40	5.57	0.87	7.87	9.80	0.07	3.47	5.12
T <sub>4</sub> -KS-227	4.35	5.32	5.90	1.25	8.47	11.35	0.52	3.07	6.00
T <sub>5</sub> -DBR-8	3.97	5.40	5.72	1.85	9.62	10.57	0.07	5.50	7.22
T <sub>6</sub> -CHBR-1	4.27	5.97	6.00	1.92	6.32	10.17	0.20	4.20	5.85
T <sub>7</sub> -CHBR-2	3.02	3.47	4.15	1.22	7.10	9.02	0.07	4.32	5.82
T <sub>8</sub> -CHBR-3	5.17	6.20	6.65	0.95	8.40	8.87	0.05	3.07	5.57
T <sub>9</sub> -D-2-88-6	5.02	6.87	7.27	0.72	8.62	9.42	0.02	3.05	4.05
T <sub>10</sub> -Golianda Local (purple)	1.40	1.65	1.95	0.97	3.30	4.37	0.02	1.57	2.85
T <sub>11</sub> -Golianda Local (green)	1.35	1.70	2.32	1.70	3.07	4.75	0.02	0.82	1.95
T <sub>12</sub> -Bhegra Local	1.77	2.37	2.85	2.1	4.65	5.70	0.52	2.52	4.50
SE(m)±	0.28	0.26	0.34	0.14	0.65	0.60	0.02	0.36	0.38
CD at 5%	0.80	0.76	0.99	0.41	1.88	1.73	0.08	1.04	1.11

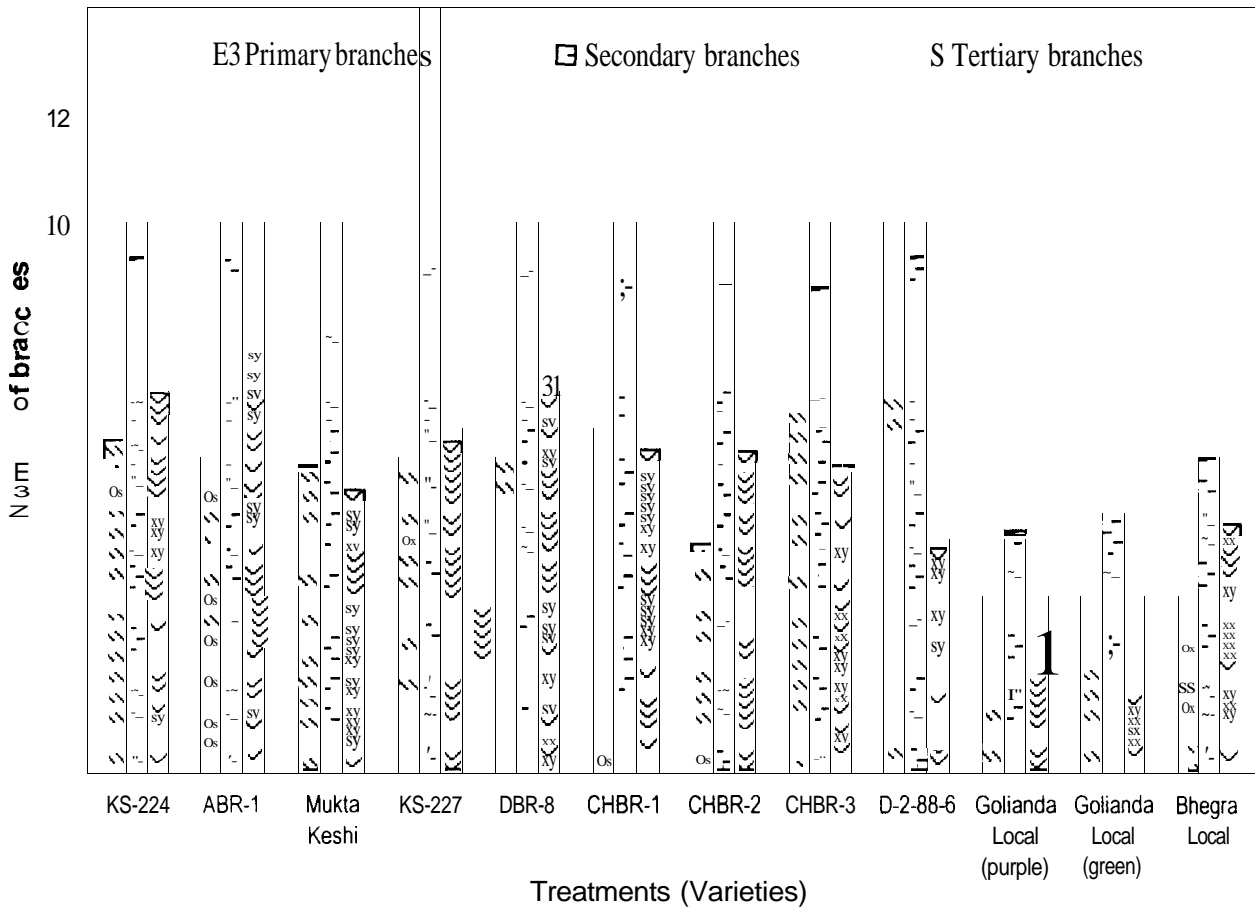


Fig. 6 : Number of primary, secondary and tertiary branches per plant at 120 DAT

difference was not observed among DBR-8, D-2-88-6, KS-227, CHBR-3, KS-224 and Mukta Keshi.

It was revealed from the data recorded at final stage (120 DAT) that the number of secondary branches per plant ranged from 4.37 (minimum) to 11.35 (maximum) with mean of 8.63. The maximum number of secondary branches per plant (11.35) were noted in KS-227, which was found at par with DBR-8, CHBR-1, ABR-1 and Mukta Keshi. The minimum number of secondary branches per plant (4.37) were recorded in Golianda Local (purple), which was found non significant with Golianda Local (green) and Bhegra Local. The treatments DBR-8, CHBR-1, ABR-1, Mukta Keshi, KS-224, D-2-88-6, CHBR-2 and CHBR-3 were also found non significant regards this attribute.

#### **4.3.5 Number of tertiary branches per plant**

The average number of tertiary branches per plant noted at different interval under different treatments is presented in Table 7 and their graphical representation have been demonstrated in Fig.6.

At 40 days after transplanting, number of tertiary branches per plant ranged from 0.02 to 0.52. The maximum number of tertiary branches per plant (0.52) was counted in KS-227, which was found non significant with Bhegra Local On other hand, the minimum number of tertiary branches per plant (0.02) was found in D-2-88-6, which was also found non significant with Golianda Local (green), Golianda Local (purple), KS-224, CHBR-3, CHBR-2, DBR-8 and Mukta Keshi Significant difference was not observed in between CHBR-1 and ABR-1 for this character

It was observed from the data recorded at 80 days after transplanting that the number of tertiary branches per plant ranged from 0.82 to 7.30 with an overall mean of 3.65. It was seen that the maximum number of tertiary branches per plant (7.30) were counted in ABR-1, which was found significantly superior than all the treatments. On other hand, the lowest number of tertiary branches per plant (0.82) were found in Golianda Local (green), which was found at par with Golianda Local (purple). Similarly significant difference was also not observed in between DBR-8 and KS-224 for this trait.

Data recorded at final stage (120 DAT) showed that the number of tertiary branches per plant ranged from 1.95 to 9.42 with mean 5.44. The maximum number of tertiary branches per plant (9.42) were counted in ABR-1, which was found significantly better than all the other treatments included under this study. On other hand, the minimum number of tertiary branches per plant (1.95) was found in Golianda Local (green), which was found at par with Golianda Local (purple). However, significant difference was not observed in between DBR-8 and KS 224 for this attribute.

#### 4.3.6 Days to first flowering

The data on number of days required to first flowering from the date of transplanting were recorded and the average values are given in Table 8.

The data recorded on this trait indicate that number of days to first flowering ranged from 78.82 to 94.27. The maximum period (67.27days) for flowering was observed in CHBR-1, which was found statistically similar with Golianda Local (purple), Bhegra Local, KS-227, Mukta Keshi and CHBR-2. The

**Table 8 : Days to first flowering and Days to 50% flowering**

Treatments (Varieties)	First flowering (DAT)	50% flowering (DAT)
T <sub>1</sub> -KS-224	86.55	92.00
T <sub>2</sub> -ABR-1	78.82	86.25
T <sub>3</sub> -Mukta Keshi	89.22	103.70
T <sub>4</sub> -KS-227	90.17	101.00
T <sub>5</sub> -DBR-8	81.65	93.50
T <sub>6</sub> -CHBR-1	94.27	105.25
T <sub>7</sub> -CHBR-2	87.32	105.75
T <sub>8</sub> -CHBR-3	86.52	99.00
T <sub>9</sub> - D-2-88-6	83.20	96.00
T <sub>10</sub> -Golianda Local (purple)	92.00	104.25
T <sub>11</sub> -Golianda Local (green)	80.95	106.50
T <sub>12</sub> -Bhegra Local	90.45	113.25
SE(m)±	2.57	2.89
CD at 5%	7.42	8.35

DAT-Days after transplanting

earliest flowering (51.825) was observed in ABR-1, which was found at par with Golianda Local (green), DBR-8 and D-2-88-6. Similarly, significant difference was also not observed among Golianda Local (purple), Bhegra Local, KS-227, Mukta Keshi, CHBR-2, KS-224 and CHBR-3 for days to first flowering.

#### 4.3.7 Days to 50% flowering

Data recorded on days to 50% flowering (Table 8) indicate that days to 50% flowering ranged from 59.25 to 86.25 with an average of 73.54. The maximum value (86.25 days) for this character was observed in Bhegra Local, which was found at par with Golianda Local (green), CHBR-2 and CHBR-1. The earliest 50% flowering (59.25 days) was observed in ABR-1, which was found non significant with KS-224 and DBR-8. Similarly, significant difference was not observed among Golianda Local (green), CHBR-2, CHBR-1, Golianda Local (purple), Mukta Keshi, KS-227 and CHBR-3.

#### 4.3.8 Number of sepals per flower

The data recorded under the treatments included in this study for number of sepals per flower has been presented in Table 9.

Number of sepals per flower ranged from 5.17 to 5.97 (with an overall mean of 5.52). The maximum number of sepals per flower (5.97) were noted in CHBR-2, which was found non significant with Mukta Keshi and CHBR-1. The minimum number of sepals per flower (5.17) were noted in D-2-88-6, which was found statistically similar with Bhegra Local, CHBR-3 and Golianda Local (green). Significant difference was also not observed among KS-224, ABR-1, KS-227, DBR-8, Golianda Local (purple), Golianda Local (green) and CHBR-3

**Table 9 : Number of stamens, sepals and petals per flower**

Treatments (Varieties)	Number per flower		
	Stamens	Sepals	Petals
T <sub>1</sub> -KS-224	5.82	5.55	5.57
T <sub>2</sub> -ABR-1	5.40	5.50	5.42
T <sub>3</sub> -Mukta Keshi	5.72	5.87	5.82
T <sub>4</sub> -KS-227	5.37	5.50	5.37
T <sub>5</sub> -DBR-8	5.42	5.50	5.42
T <sub>6</sub> -CHBR-1	5.77	5.85	4.65
T <sub>7</sub> -CHBR-2	5.95	5.97	5.87
T <sub>8</sub> -CHBR-3	5.32	5.32	5.25
T <sub>9</sub> -D-2-88-6	5.10	5.17	5.15
T <sub>10</sub> -Golianda Local (purple)	5.65	5.47	5.80
T <sub>11</sub> -Golianda Local (green)	5.37	5.37	5.40
T <sub>12</sub> -Bhegra Local	5.42	5.17	5.62
SE(m)±	0.06	0.08	0.07
CD at 5%	0.19	0.25	0.22

#### **4.3.9 Number of petals per flower**

Data recorded on number of petals per flower (Table 9) indicate that it ranged from 5.15 to 5.87 with an overall mean of 5.53. The maximum number of petals per flower (5.87) was found in CHBR-2 and this treatment was found statistically similar with Mukta Keshi, Golianda Local (purple) and CHBR-1. The lowest number of petals per flower (5.15) was observed in D-2-88-6, which was found non significant with CHBR-3 and KS-227. Similarly significant difference was not observed among Mukta Keshi, Golianda Local (purple), CHBR-1 and Bhegra Local for this character.

#### **4.3.10 Number of stamens per flower**

An average number of stamens per flower was calculated from data collected on this trait for each treatment and presented in Table 9.

The data presented in table revealed that number of stamens per flower ranged from 5.10 to 5.95 with an overall mean of 5.52. The maximum number of stamens per flower (5.95) were found in CHBR-2, which was found statistically similar with KS-224 and CHBR-1. The lowest number of stamens per flower (5.10) were found in D-2-88-6, which was found remarkably inferior than all the other treatments. However, significant difference was not observed among KS-224, CHBR-1, Mukta Keshi and Golianda Local (purple) as well as among DBR-8, Bhegra Local, ABR-1, KS-227, Golianda Local (green) and CHBR-3.

#### **4.3.11 Days to first fruit set**

The data on number of days required to first fruit set were recorded and the average values are given in Table 10.

**Table 10 : Days to first fruit set**

Treatments (Varieties)	First fruit set (DAT)
T <sub>1</sub> -KS-224	99.95
T <sub>2</sub> -ABR-1	94.37
T <sub>3</sub> -Mukta Keshi	110.00
T <sub>4</sub> -KS-227	117.32
T <sub>5</sub> -DBR-8	104.20
T <sub>6</sub> -CHBR-1	116.37
T <sub>7</sub> -CHBR-2	107.92
T <sub>8</sub> -CHBR-3	111.55
T <sub>9</sub> - D-2-88-6	104.75
T <sub>10</sub> -Golianda Local (purple)	112.15
T <sub>11</sub> -Golianda Local (green)	112.17
T <sub>12</sub> -Bhegra Local	120.35
SE(m)±	2.95
CD at 5%	8.52

DAT-Days after transplanting

It was noticed from the data recorded on growth parameters that the number of days required for first fruit set ranged from 67.37 to 93.35. The maximum period (93.35 days) for fruit set was observed in Bhegra Local, which was found at par with KS-227, CHBR-1, Golianda Local (purple), and Golianda Local (green). The minimum period (67.37 days) for fruit set was observed in ABR-1, which was found at par with KS-224. However, significant difference was also not observed among KS-227, CHBR-1, Golianda Local (green), Golianda Local (purple), CHBR-3 and Mukta Keshi.

#### 4.3.12 Shoot diameter (cm)

The average shoot diameter recorded at different intervals are presented in Table 11 and shown in Fig. 7.

It was noticed from the data recorded at 20 days after transplanting that the shoot diameter ranged from 0.45 cm to 0.62 cm and mean value was 0.56 cm. The maximum shoot diameter (0.62 cm) was measured in Golianda Local (green), which was found statistically similar with Bhegra Local, Golianda Local (purple), Mukta Keshi and CHBR-3. The minimum shoot diameter (0.45 cm) was measured in DBR-8, which was found remarkably inferior than all the treatments except D-2-88-6. Marked difference was also not observed among Bhegra Local, Golianda Local (purple), Mukta Keshi, CHBR-3, KS-224 and ABR-1 for shoot diameter.

Data recorded at 40 days after transplanting revealed that the shoot diameter ranged from 0.65 cm to 0.77 cm with an overall mean of 0.72 cm. All the treatments were found non significant for this character, however the

**Table 11 : Shoot diameter at different interval (cm)**

Treatments (Varieties)	Shoot diameter (cm)					
	20 DAT	40 DAT	60 DAT	80 DAT	100 DAT	120 DAT
T <sub>1</sub> -KS-224	0.56	0.76	1.03	1.27	1.33	1.36
T <sub>2</sub> -ABR-1	0.56	0.75	0.92	1.13	1.22	1.28
T <sub>3</sub> -Mukta Keshi	0.59	0.77	1.05	1.26	1.30	1.32
T <sub>4</sub> -KS-227	0.54	0.71	0.90	1.13	1.18	1.23
T <sub>5</sub> -DBR-8	0.45	0.66	0.82	1.06	1.10	1.15
T <sub>6</sub> -CHBR-1	0.52	0.72	0.96	1.29	1.37	1.41
T <sub>7</sub> -CHBR-2	0.54	0.74	0.95	1.20	1.25	1.29
T <sub>8</sub> -CHBR-3	0.59	0.75	1.02	1.35	1.39	1.41
T <sub>9</sub> -D-2-88-6	0.50	0.65	0.85	1.08	1.35	1.17
T <sub>10</sub> -Golianda Local (purple)	0.61	0.70	0.78	0.85	0.92	0.97
T <sub>11</sub> -Golianda Local (green)	0.62	0.73	0.83	0.91	0.99	1.05
T <sub>12</sub> -Bhegra Local	0.61	0.73	0.81	0.89	0.96	1.02
SE(m)±	0.02	0.02	0.03	0.05	0.06	0.03
CD at 5%	0.06	NS	0.09	0.13	0.18	0.10

DAT- Days after transplanting

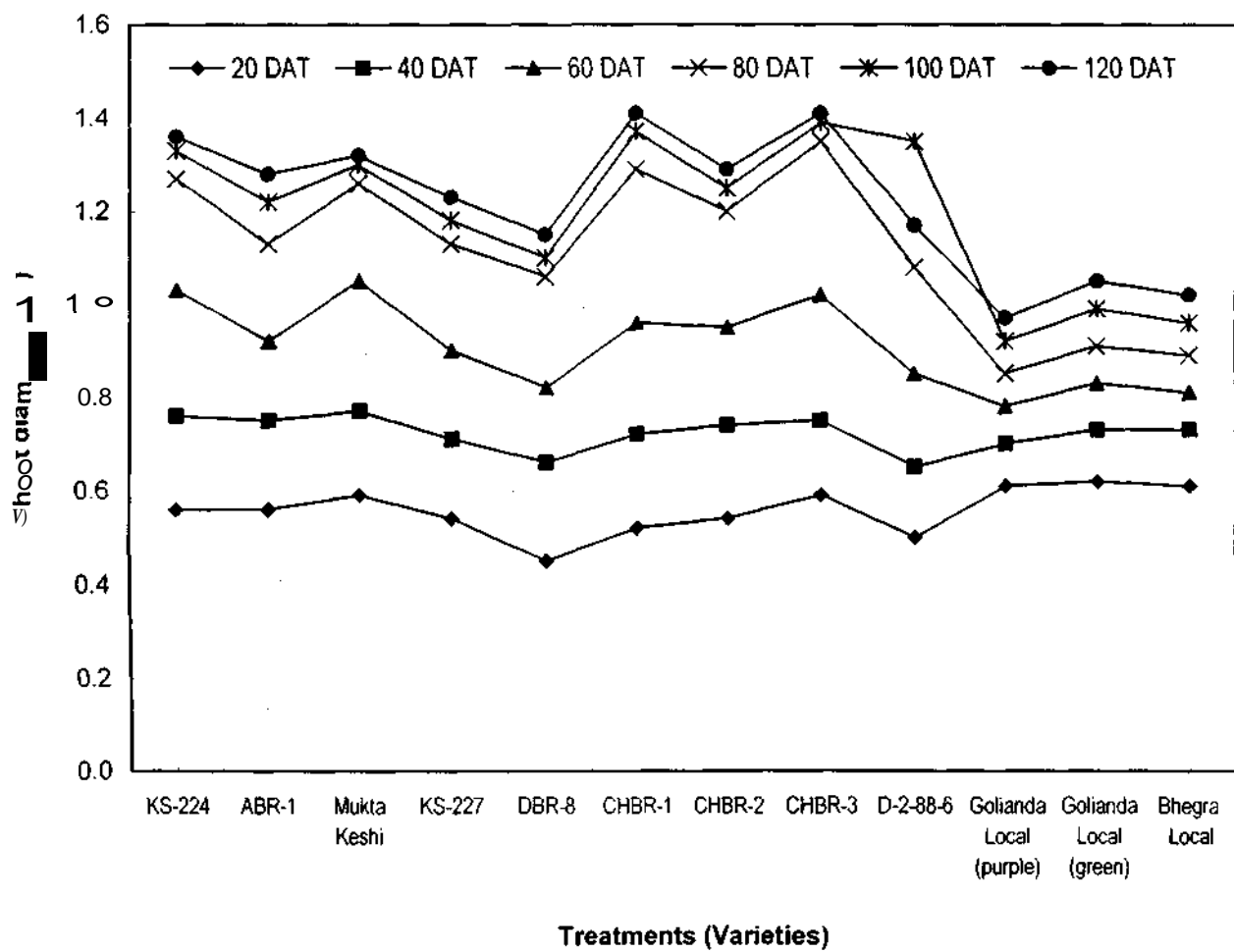


Fig. 7: Shoot diameter at different interval (cm)

maximum shoot diameter (0.77 cm) was measured in Mukta Keshi, whereas, the minimum shoot diameter (0.65 cm) was found in D-2-88-6.

Sixty days after transplanting, the minimum and maximum shoot diameter were 0.78 cm and 1.05 cm respectively with an average of 0.91 cm. The maximum shoot diameter (1.05 cm) was observed in Mukta Keshi, which was found at par with KS-224, CHBR-3 and CHBR-1. The treatment Golianda Local (purple) was found most inferior for shoot diameter (0.78 cm), which was found statistically similar with Bhegra Local, DBR-8, Golianda Local (green) and D-2-88-6. However, marked difference was also not observed among KS-224, CHBR-3, CHBR-1 and CHBR-2 for this character.

It was revealed from the data recorded at 80 days after transplanting that the shoot diameter ranged from 0.85 cm to 1.35 cm and mean was 1.12 cm. The highest shoot diameter (1.35 cm) was measured in CHBR-3, which was found non significant with CHBR-1, KS-224 and Mukta Keshi. On other hand, the lowest shoot diameter (0.85 cm) was observed in Golianda Local (purple) which was found at par with Bhegra Local and Golianda Local (green). Similarly, significant difference was also not observed among CHBR-1, KS-224, Mukta Keshi and CHBR-2 at this trait.

Hundred days after transplanting, diameter of shoot ranged from 0.92 cm to 1.39 cm with mean of 1.20 cm. The maximum shoot diameter (1.39 cm) was noted in CHBR-3, which was found at par with CHBR-1, D-2-88-6, KS-224, Mukta Keshi, CHBR-2 and ABR-1. The minimum shoot diameter (0.92 cm) was measured in Golianda Local (purple), which was found statistically similar with Bhegra Local, Golianda Local (green) and DBR-8. However, the treatments D-2-

88-6, KS-224, Mukta Keshi, CHBR-2, ABR-1 and KS-227 were also found non significant among themselves for this trait.

It was noticed from the data recorded at final stage (120 days after transplanting) that the shoot diameter ranged from 0.97 cm to 1.41 cm and mean value was found 1.22 cm. The maximum shoot diameter (1.41 cm) was found in CHBR-3, which was found statistically similar with CHBR-1, KS-224 and Mukta Keshi. The minimum shoot diameter (0.97 cm) was measured in Golianda Local (purple), which was found at par with Bhegra Local and Golianda Local (green). Significant difference was also not observed among KS-224, Mukta Keshi, CHBR-2 and ABR-1.

#### 4.3.13 Plant spread (cm)

The average plant spread was noted at 40, 80 and 120 days after transplanting are presented in Table 12 and depicted in Fig. 8.

Plant spread at 40 days after transplanting ranged from 24.51 cm to 43.70 cm with mean of 34.76 cm. The maximum plant spread (43.70 cm) was measured in ABR-1, which was found statistically similar with KS-224, KS-227 and CHBR-3. The minimum plant spread (24.51 cm) was measured in CHBR-1, which was found at par with Golianda Local (green) Bhegra Local and Golianda Local (purple) However, significant difference was not observed among KS-224, KS-227, CHBR-3 and CHBR-2 for this attribute at this initial stage of growth.

It was observed from the data recorded at 80 days after transplanting that the plant spread ranged from 35.86 cm to 73.02 cm with the mean of 55.20 cm. The maximum plant spread (73.02 cm) was noted in KS-227, which was found at

**Table 12 : Plant spread at different interval (cm)**

Treatments (Varieties)	Plant spread (cm)		
	40DAT	80DAT	120DAT
T <sub>1</sub> -KS-224	42.39	58.97	64.19
T <sub>2</sub> -ABR-1	43.70	61.46	64.25
T <sub>3</sub> -Mukta Keshi	36.33	57.27	62.14
T <sub>4</sub> -KS-227	41.58	73.02	77.29
T <sub>5</sub> -DBR-8	34.70	51.90	56.97
T <sub>6</sub> -CHBR-1	24.51	56.51	61.68
T <sub>7</sub> -CHBR-2	38.28	54.20	59.48
T <sub>8</sub> -CHBR-3	41.19	66.66	72.05
T <sub>9</sub> -D-2-88-6	37.36	53.16	58.93
T <sub>10</sub> -Golianda Local (purple)	26.17	37.03	42.07
T <sub>11</sub> -Golianda Local (green)	25.22	35.86	40.62
T <sub>12</sub> -Bhegra Local	25.64	51.37	55.12
SE(m)±	1.67	3.31	1.93
CD at 5%	4.83	9.55	5.56

DAT-Days after transplanting

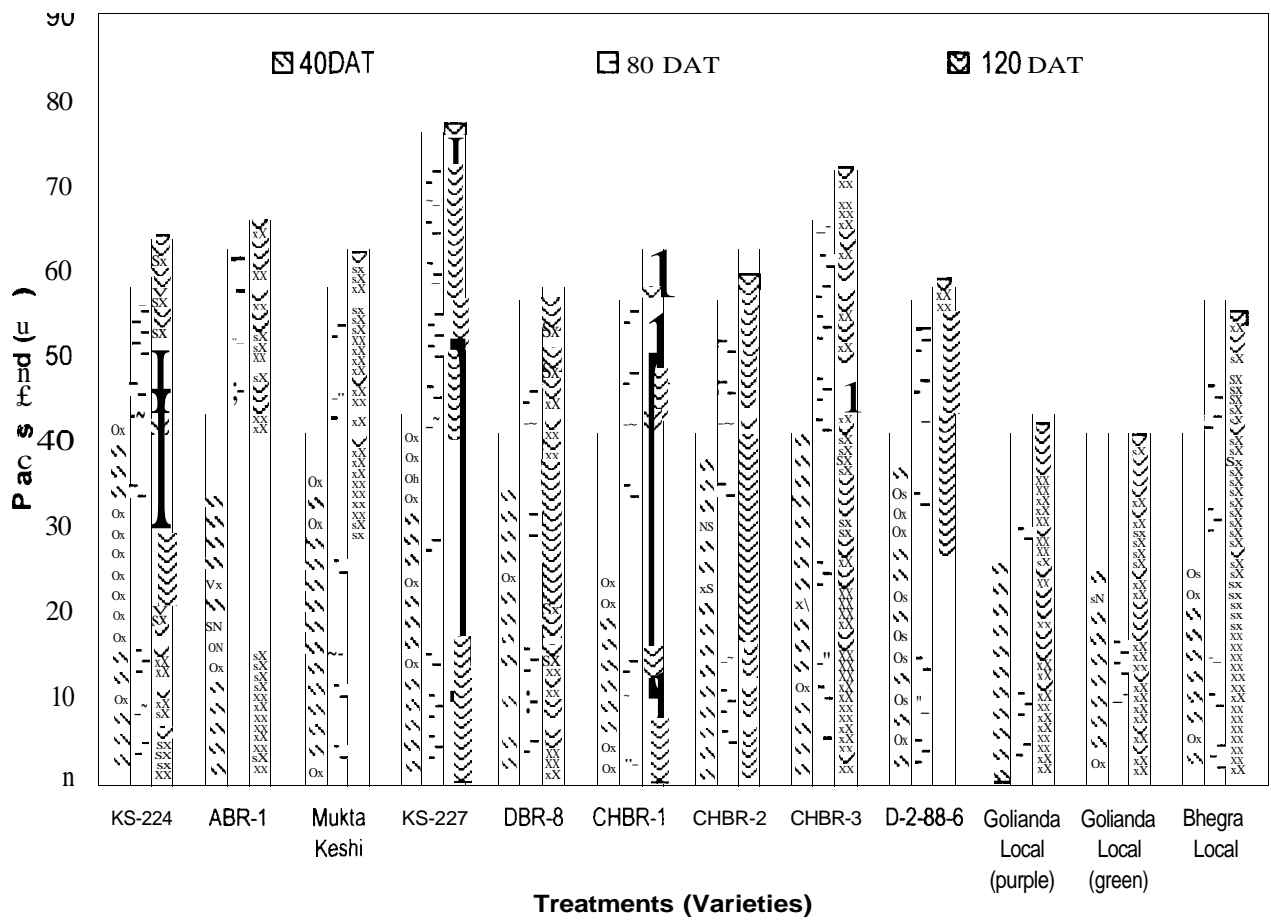


Fig. 8 : Plant spread at different interval (cm)

par with CHBR-3. On other hand, the minimum plant spread (35.86 cm) was noted in Golianda Local (green ), which was found non significant with Golianda Local (purple). Similarly, significant difference was also not observed among CHBR-3, CHBR-1, ABR-1, KS-224 and Mukta Keshi.

At 120 days after transplanting, plant spread ranged from 40.62 cm to 77.29 cm with an overall mean of 59.57. The maximum plant spread (77.29 cm) recorded in KS-227, which was found statistically similar with CHBR-3. The minimum plant spread (40.62 cm) was noted in Golianda Local (green), which was found at par with Golianda Local (purple). Remarkable difference was also not noted among ABR-1, KS-224, Mukta Keshi, CHBR-1, CHBR-2 and D-2-88-6 at this stage.

#### **4.4 Yield parameters**

##### **4.4.1 Number of flowers per cluster**

The number of flowers per cluster are presented in Table 13.

Significant variations were recorded for number of flowers per cluster amongst the varieties tested in this investigation. The maximum number of flowers per cluster (3.55) were recorded in KS-224, which was found at par with D-2-88-6, CHBR-3 and Golianda Local (purple). The minimum number of flowers per cluster (1.35) were recorded in CHBR-1, KS-227 and Mukta Keshi, followed by Golianda Local (green). However, significant difference was also not observed among CHBR-3, Golianda Local (purple) and DBR-8 for number of flowers per cluster.

**Table 13 : Number of flowers per cluster**

Treatments (Varieties)	Number of flowers/cluster
T <sub>1</sub> -KS-224	3.55
T <sub>2</sub> -ABR-1	2.77
T <sub>3</sub> -Mukta Keshi	1.35
T <sub>4</sub> -KS-227	1.35
T <sub>5</sub> -DBR-8	3.10
T <sub>6</sub> -CHBR-1	1.35
T <sub>7</sub> -CHBR-2	1.75
T <sub>8</sub> -CHBR-3	3.27
T <sub>9</sub> -D-2-88-6	3.50
T <sub>10</sub> -Golianda Local (purple)	3.17
T <sub>11</sub> -Golianda Local (green)	1.47
T <sub>12</sub> -Bhegra Local	2.80
SE(m)±	0.13
CD at 5%	0.39

#### **4.4.2 Percentage of long styled flowers**

Data presented in Table 14 (Fig.9) revealed non significant difference amongst genotypes with regard to percentage of long styled flowers. The variation ranged between 35.00% to 57.50% with an overall mean of 43.95%. The maximum percentage of long styled flowers (57.50%) was observed in ABR-1, whereas the minimum percentage of long styled flowers (35.00%) was recorded in CHBR-1.

#### **4.2.3 Percentage of medium styled flowers**

The data recorded under the treatments included in this study for percentage of medium styled flowers are presented in Table 14 & shown in Fig. 9.

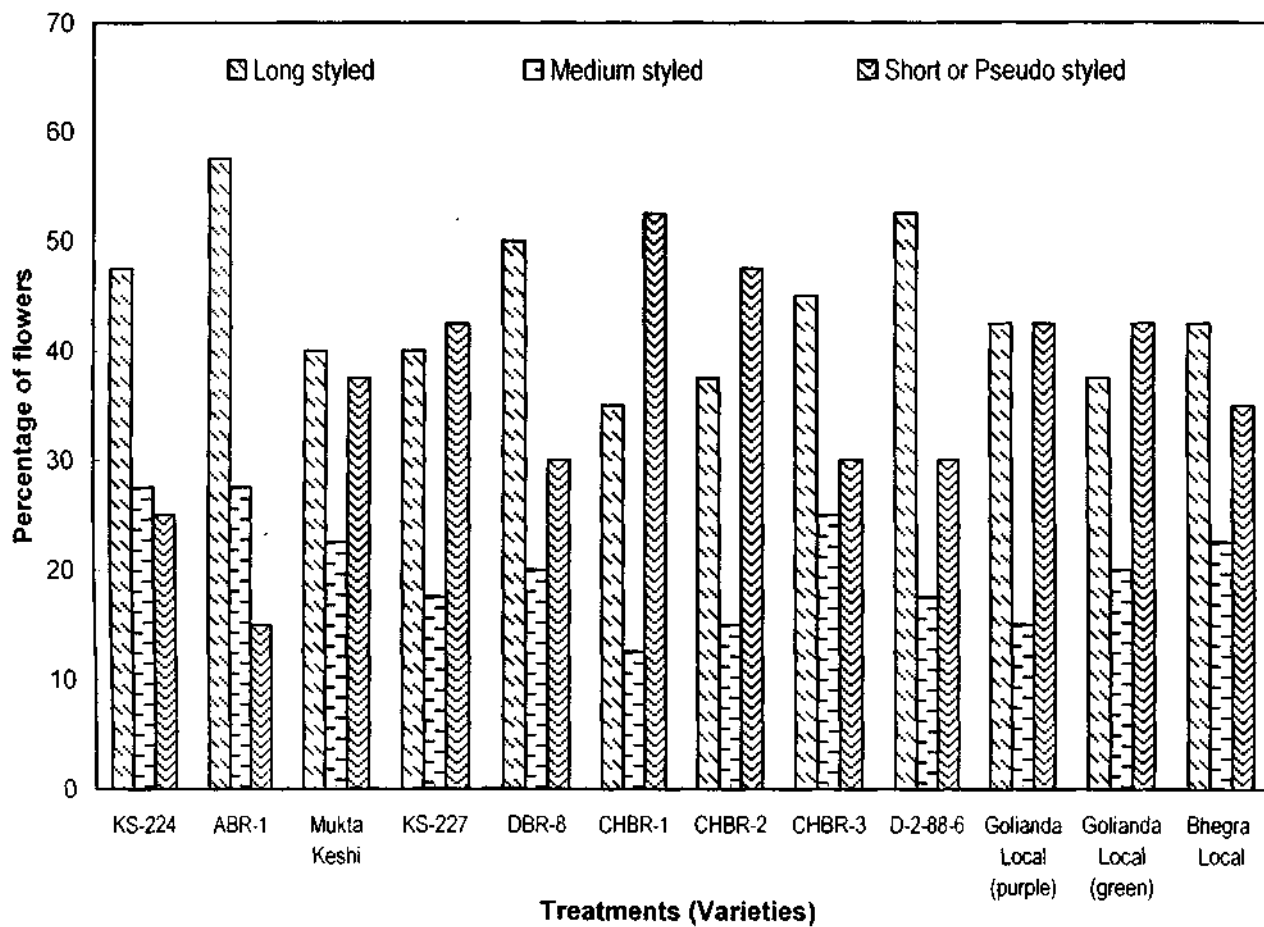
It is clear from the available data that the variation ranged between 12.50% to 27.50% for medium styled flowers. Higher percentage of medium styled flowers (27.50%) was found in KS-224 and ABR-1, which were found statistically similar with CHBR-3, Mukta Keshi and Bhegra Local. Lower percentage of medium styled flowers (12.50%) was found in CHBR-1, which was found statistically similar with CHBR-2, Golianda Local (purple), D-2-88-6 and KS-227. Similarly, significant difference was also not observed among CHBR-3, Mukta Keshi, Bhegra Local, Golianda Local (green) and DBR-8 for this attribute

#### **4.4.4 Percentage of short or pseudo styled flowers**

Data presented in Table 14 revealed significant difference among genotypes considered for this study with regard to percentage of short or pseudo styled flowers. The variation ranged between 15.00% to 52.50% for short or pseudo styled flowers with a mean of 35.83%. The maximum percentage of short

**Table 14 : Percentage of long, medium and short or pseudo styled flowers**

Treatments (Varieties)	Percentage of types of flowers		
	Long styled	Medium styled	Short or Pseudo styled
T <sub>1</sub> -KS-224	47.50	27.50	25.00
T <sub>2</sub> -ABR-1	57.50	27.50	15.00
T <sub>3</sub> -Mukta Keshi	40.00	22.50	37.50
T <sub>4</sub> -KS-227	40.00	17.50	42.50
T <sub>5</sub> -DBR-8	50.00	20.00	30.00
T <sub>6</sub> -CHBR-1	35.00	12.50	52.50
T <sub>7</sub> -CHBR-2	37.50	15.00	47.50
T <sub>8</sub> -CHBR-3	45.00	25.00	30.00
T <sub>9</sub> -D-2-88-6	52.50	17.50	30.00
T <sub>10</sub> -Golianda Local (purple)	42.50	15.00	42.50
T <sub>11</sub> -Golianda Local (green)	37.50	20.00	42.50
T <sub>12</sub> -Bhegra Local	42.50	22.50	35.00
SE(m)±	4.35	2.38	3.51
CD at 5%	NS	6.88	10.14



**Fig. 9 : Percentage of long, medium and short or pseudo styled flower**

or pseudo styled flowers (52.50%) was found in CHBR-1, which was found at par with CHBR-2, Golianda Local (purple), KS-227 and Golianda Local (green). The minimum percentage of short or pseudo styled flowers (15.00%) was found in ABR-1, which was found non-significant with KS-224. However, significant difference was also not observed among CHBR-2, Golianda Local (purple), KS-227 and Golianda Local (green)

#### **4.4.5 Number of fruits per plant**

Significant variation was recorded for number of fruits per plant amongst the genotypes included in this study. It is clear from the data (Table 15) recorded on this character that the variation ranged between 1.82 to 9.85 fruits per plant with a mean of 5.01. Maximum number of fruits per plant (9.85) were recorded in D-2-88-6, which was found significantly better than all the other treatments included under this study. The minimum number of fruits per plant (1.82) were noted in CHBR-2, which was found statistically similar with CHBR-1, Golianda Local (purple) and Golianda Local (green). Similarly, significant difference was also not observed among ABR-1, KS-224, DBR-8, CHBR-3 and KS-227 for number of fruits per plant.

#### **4.4.6 Number of fruits per plot**

Data recorded on number of fruits per plot (Table 15) revealed that it ranged from 96.50 to 525.75 with an overall mean of 265.50. The highest number of fruits per plot (525.75) were noted in D-2-88-6, which was found significantly superior than all the other treatments included under this study. The lowest number of fruits per plot (96.50) were recorded in Golianda Local (purple), which

**Table 15 : Number of fruits per plant and Number of fruits per plot**

Treatments (Varieties)	Number of fruits	
	Per plant	Per plot
T <sub>1</sub> -KS-224	6.05	333.75
T <sub>2</sub> -ABR-1	6.60	370.75
T <sub>3</sub> -Mukta Keshi	3.87	219.00
T <sub>4</sub> -KS-227	5.55	314.50
T <sub>5</sub> -DBR-8	5.82	332.00
T <sub>6</sub> -CHBR-1	2.00	116.50
T <sub>7</sub> -CHBR-2	1.82	104.50
T <sub>8</sub> -CHBR-3	5.57	320.25
T <sub>9</sub> - D-2-88-6	9.85	525.75
T <sub>10</sub> -Golianda Local (purple)	2.15	96.50
T <sub>11</sub> -Golianda Local (green)	3.10	115.75
T <sub>12</sub> -Bhegra Local	7.77	336.75
SE(m)±	0.44	26.09
CD at 5%	1.29	75.27

was found statistical similar with **CHBR-2**, Golianda Local (green) and **CHBR-1**. However, significant difference was also not observed among **ABR-1**, Bhegra Local, **KS-224**, **DBR-8**, **CHBR-3** and **KS-227** for this trait.

#### 4.4.7 Fruit girth (cm)

The data on fruit girth was statistically analysed and the averages are given in Table 16.

Data noted for the girth of fruit indicate that the values ranged from 16.06 cm to 24.61 cm with an overall mean of 20.88 cm. The maximum girth of fruit (24.61 cm) was measured in Golianda Local (purple), which was found at par with **ABR-1**. The minimum girth of fruit (16.06 cm) was noted in Bhegra Local, which was found inferior than all the treatments. However, remarkable difference was also not observed in between **ABR-1** and Golianda Local (green) for fruit girth.

#### 4.4.8 Weight per fruit (g)

Data regarding weight of individual fruit are presented in Table 16, which showed that the fruit weight ranged from 37.64 g to 208.35 g with a mean of 141.61 g.

The maximum fruit weight (208.35 g) was recorded in Golianda Local (purple), which was found statistically superior than all the treatments. The minimum weight per fruit (37.64 g) was noted in Bhegra Local, which was found significantly inferior than all the treatments included in this study. However, no significant difference was found in between **CHBR-3** and Golianda Local (green) as well as in between Golianda Local (green) and **ABR-1** for this character.

**Table 16 : Fruit girth (cm), Weight per fruit (g) and Fruit stalk length (cm)**

Treatments (Varieties)	Fruit girth (cm)	Weight per fruit (g)	Fruit stalk length (cm)
T <sub>1</sub> -KS-224	20.93	149.35	5.25
T <sub>2</sub> -ABR-1	23.16	166.12	4.24
T <sub>3</sub> -Mukta Keshi	20.66	157.65	7.23
T <sub>4</sub> -KS-227	19.64	145.37	5.43
T <sub>5</sub> -DBR-8	20.61	160.87	5.51
T <sub>6</sub> -CHBR-1	19.80	92.50	5.19
T <sub>7</sub> -CHBR-2	20.76	109.92	5.17
T <sub>8</sub> -CHBR-3	21.36	183.52	5.63
T <sub>9</sub> -D-2-88-6	21.23	108.37	5.29
T <sub>10</sub> -Golianda Local (purple)	24.61	208.35	4.86
T <sub>11</sub> -Golianda Local (green)	21.70	179.62	4.28
T <sub>12</sub> -Bhegra Local	16.06	37.64	3.84
SE(m)±	0.57	5.75	0.24
CD at 5%	1.65	16.60	0.70

#### **4.4.9 Fruit stalk length (cm)**

An average stalk length of fruit was shown in Table 16.

The data recorded on this trait indicate that the fruit stalk length ranged from 3.84 cm to 7.23 cm. The maximum stalk length of fruit (7.23) was recorded in Mukta Keshi, which was found significantly superior than all the treatments. The minimum stalk length of fruit (3.84 cm) was noted in Bhegra Local, which was found at par with ABR-1 and Golianda Local (green). However, no significant difference was also found among CHBR-3, DBR-8, KS-227, D-2-88-6, KS-224, CHBR-1 and CHBR-2 for stalk length of fruit.

#### **4.4.10 Yield**

The data on yield per plant (g), yield per plot (Kg) and yield per hectare (q) were statistically analysed and the average values are given in Table 17.

Yield of fruits per plant ranged from 259.98 g to 844.52 g with an average of 574.94 g. It is clear from table that the maximum weight of fruits per plant (844.52 g) was found in CHBR-3, which was followed by KS-224, ABR-1, DBR-8, and D-2-88-6. On other hand, the minimum weight of fruits per plant (259.98 g) was found in CHBR-2, which was found non significant with Bhegra Local and CHBR-1 for yield per plant.

Yield per plot ranged from 12.06 kg to 47.76 kg with an overall mean of 31.12 kg. The maximum yield of fruits per plot (47.76 kg) was found in CHBR-3, which was found at par with ABR-1, KS-224 and DBR-8. However, significant difference was not observed among ABR-1, KS-224, DBR-8 and D-2-88-6. The lowest yield of per plot (12.06 kg) was observed in Bhegra Local, which was

**Table 17 : Yield**

Treatments (Varieties)	Yield		
	Per plant (g)	Per plot (kg)	Per hectare (q)
T <sub>1</sub> -KS-224	809.10	44.92	297.12
T <sub>2</sub> -ABR-1	805.00	45.02	297.77
T <sub>3</sub> -Mukta Keshi	630.10	35.19	232.76
T <sub>4</sub> -KS-227	646.55	36.92	244.19
T <sub>5</sub> -DBR-8	782.93	43.73	289.26
T <sub>6</sub> -CHBR-1	304.10	17.70	117.05
T <sub>7</sub> -CHBR-2	259.98	14.83	98.12
T <sub>8</sub> -CHBR-3	844.52	47.76	315.88
T <sub>9</sub> - D-2-88-6	725.44	38.86	257.02
T <sub>10</sub> -Golianda Local (purple)	439.48	19.61	129.70
T <sub>11</sub> -Golianda Local (green)	391.84	16.83	111.35
T <sub>12</sub> -Bhegra Local	260.20	12.06	79.75
SE(m)±	42.77	2.20	42.01
CD at 5%	123.37	6.35	14.56

found statistically similar with CHBR-2, Golianda Local (green) and CHBR-1 for this character.

Yield per hectare ranged from 79.75 q to 315.88 q with an average of 205.83 q. The maximum yield per hectare (315.88 g) was recorded in CHBR-3 and this treatment was found statistically similar with ABR-1, KS-224 and DBR-8. The lowest yield per hectare (79.75 g) was recorded in Bhegra Local, which was found statistically similar with CHBR-2, Golianda Local (green) and CHBR-1. However, remarkable difference was not observed among ABR-1, KS-224, DBR-8 and D-2-88-6.

#### **4.5 Parameters recorded to screen varieties for infestation of fruit borer**

##### **4.5.1 Calyx diameter (cm)**

The data on calyx diameter were statistically analysed and the average values are presented in Table 18.

It was noticed from the data recorded on calyx diameter that it ranged from 0.78 cm to 1.09 cm and mean value was found 0.89 cm. The maximum calyx diameter (1.09 cm) was found in CHBR-1, which was found statistically similar with CHBR-2 and Bhegra Local. The minimum calyx diameter (0.78 cm) was measured in KS-227, which was found non-significant with ABR-1, CHBR-3, D-2-88-6, DBR-8, Mukta Keshi and KS-224. However, significant difference was also not seen in between Bhegra Local and Golianda Local (purple), for calyx diameter.

##### **4.5.2 Number of spines on calyx**

The data on number of spines on calyx was statistically analysed and the average values are presented in Table 18

**Table 18 : Calyx diameter (cm), Number of spines on calyx and Pedicel length (cm)**

Treatments (Varieties)	Calyx diameter (cm)	Number of spines on calyx	Pedicel length (cm)
T <sub>1</sub> -KS-224	0.86	0.00	2.41
T <sub>2</sub> -ABR-1	0.80	4.08	1.97
T <sub>3</sub> -Mukta Keshi	0.81	7.38	2.86
T <sub>4</sub> -KS-227	0.78	2.00	2.06
T <sub>5</sub> -DBR-8	0.81	1.00	2.20
T <sub>6</sub> -CHBR-1	1.09	3.41	2.03
T <sub>7</sub> -CHBR-2	1.09	10.76	2.16
T <sub>8</sub> -CHBR-3	0.80	4.89	2.12
T <sub>9</sub> - D-2-88-6	0.81	0.00	1.71
T <sub>10</sub> -Golianda Local (purple)	0.96	5.37	1.96
T <sub>11</sub> -Golianda Local (green)	0.88	0.52	1.86
T <sub>12</sub> -Bhegra Local	1.05	7.07	1.54
SE(m)±	0.04	0.31	0.14
CD at 5%	0.12	0.90	0.42

It was seen the table that the number of spines on calyx ranged from 0.00 to 10.76 with a mean of 3.87. The maximum number of spines on calyx (10.76) were observed in CHBR-2, which was found significantly superior than all the treatments. No spine was observed on calyx in D-2-88-6, which was found at par with KS-224 and Golianda Local (green). However, no significant difference was observed in between Mukta Keshi and Bhegra Local for this character.

#### **4.5.3 Pedicel length (cm)**

The data on pedicel length were statistically analysed and the average values are presented in Table 18.

It was noticed from the data recorded on pedicel length that it ranged from 1.54 cm to 2.86 cm and mean value was found 2.07 cm. The maximum pedicel length (2.86 cm) was found in Mukta Keshi, which was found statistically superior than all the treatments. The minimum pedicel length (1.54 cm) was measured in Bhegra Local, which was found at par with D-2-88-6, Golianda Local (green) and Golianda Local (purple). However, significant difference was also not seen among KS-224, DBR-8, CHBR-2, CHBR-3, KS-227 and CHBR-1 for pedicellength.

#### **4.5.4 Fruit diameter (cm)**

Data recorded on diameter of fruit (Table 19) indicate that the maximum diameter of fruit (6.51 cm) was observed in Golianda Local (purple), which was found non significant with CHBR-2, CHBR-3 and KS-227. The minimum diameter of fruit (4.37 cm) was found in Bhegra Local, which was found significantly inferior than all the treatments. However, no significant difference

**Table 19 : Fruit diameter (cm), Number of holes per fruit and Number of larvae per fruit**

Treatments (Varieties)	Fruit diameter (cm)	Number of holes/fruit	Number of larvae per fruit
T <sub>1</sub> -KS-224	5.75	1.72	1.65
T <sub>2</sub> -ABR-1	5.81	1.85	0.75
T <sub>3</sub> -Mukta Keshi	5.02	1.75	1.40
T <sub>4</sub> -KS-227	6.16	1.35	0.70
T <sub>5</sub> -DBR-8	5.34	1.15	1.00
T <sub>6</sub> -CHBR-1	5.40	3.22	1.80
T <sub>7</sub> -CHBR-2	6.48	2.72	2.10
T <sub>8</sub> -CHBR-3	6.23	1.52	1.10
T <sub>9</sub> - D-2-88-6	5.38	1.50	1.75
T <sub>10</sub> -Golianda Local (purple)	6.51	1.90	1.85
T <sub>11</sub> -Golianda Local (green)	5.92	1.85	1.85
T <sub>12</sub> -Bhegra Local	4.37	2.82	2.30
SE(m)±	0.18	0.171	0.13
CD at 5%	0.54	0.494	0.40

was also observed among CHBR-3, KS-227, Golianda Local (green), ABR-1 and KS-2254 for fruit diameter.

#### **4.5.5 Number of holes per fruit**

Data recorded under the treatment included in this study for number of holes per fruit has been presented in Table 19.

The variation ranged between 1.15 to 3.22. The maximum number of exit holes per fruit (3.22) were recorded in CHBR-1, which was found at par with Bhegra Local. The minimum number of number of holes per fruit (1.15) were noted in DBR-8, which was found statistically similar with KS-227, D-2-88-6 and CHBR-3. However, significant difference was not observed in between Bhegra Local and CHBR-2. Similarly, significant difference was also not observed among Golianda Local (purple), ABR-1, Golianda Local (green), Mukta Keshi, KS-224, CHBR-3 and D-2-88-6 for this trait.

#### **4.5.6 Number of larvae per fruit**

The data on number of larvae per fruit were statistically analysed and the average values are given in Table 19.

Number of larvae per fruit ranged from 0.70 to 2.30 with an average of 1.52. The highest number of larvae per fruit (2,30) were noted Bhegra Local, which was found at par with CHBR-2. The lowest number of larvae per fruit (0.700) was found in KS-227, which was found at par with ABR-1, DBR-8, and CHBR-3. However, significant difference was not observed among D-2-88-6, CHBR-1, Golianda Local (green), Golianda Local (purple) and CHBR-2 for this attribute

#### **4.5.7 Fruit borer infestation percentage**

Data regarding fruit borer infestation percentage on the basis of weight as well as number are presented in Table 20 and graph shown in Fig 10.

##### **4.5.7.1 Fruit borer infestation percentage (weight basis)**

It was revealed from the data that fruit borer infestation percentage on the basis of weight (22.30%) was lowest in KS-227, which was found statistically similar with D-2-88-6, DBR-8, ABR-1, Mukta Keshi and CHBR-3. Whereas, the highest fruit borer infestation percentage on the basis of weight (52.70%) was noted in CHBR-1, which was found at par with CHBR-2, However, significant difference was also not observed among Bhegra Local, KS-224, Golianda Local (green), Golianda Local (purple) and CHBR-3. For fruit borer infestation percentage on the basis of weight.

##### **4.5.7.2 Fruit borer infestation percentage (number basis)**

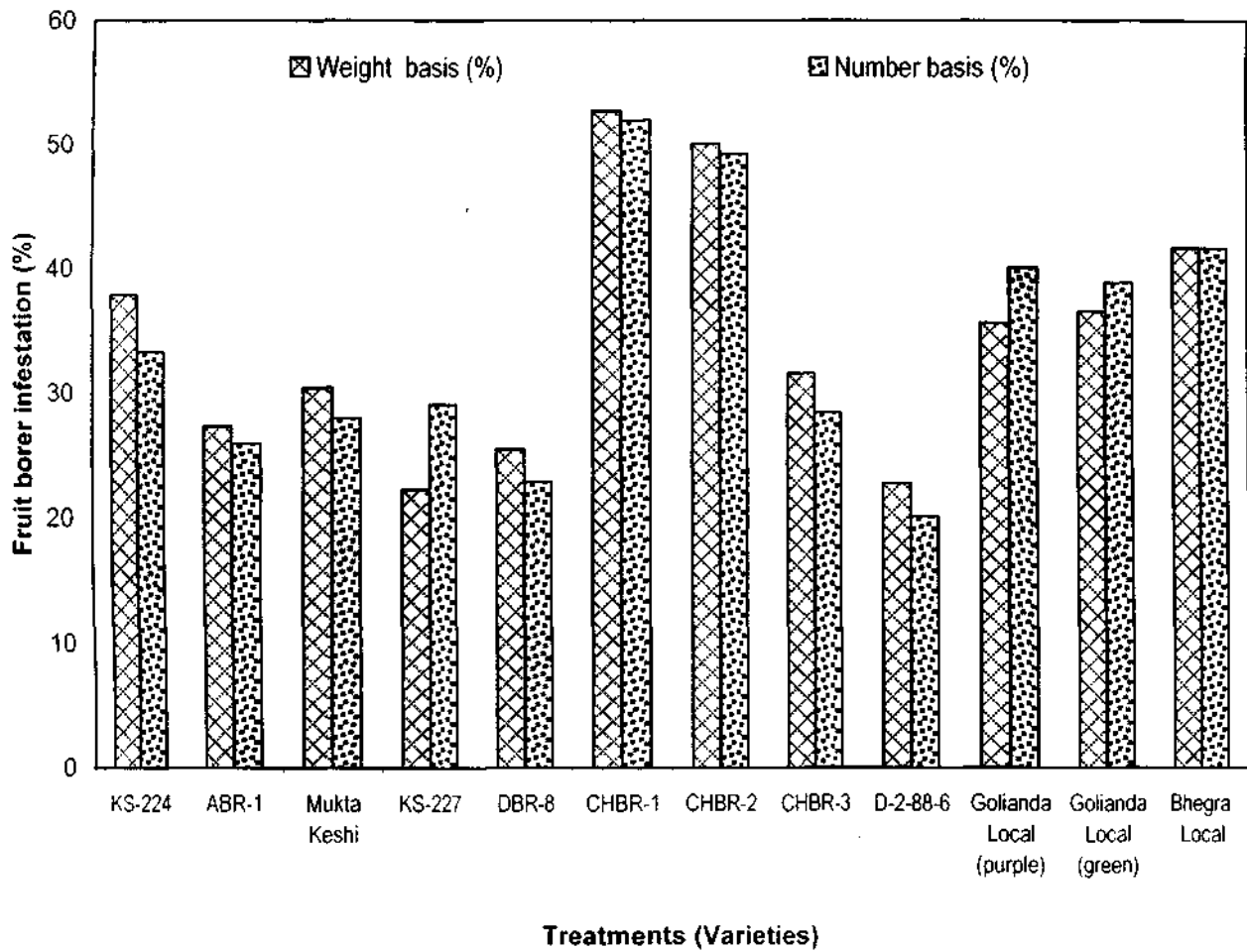
The lowest fruit borer infestation percentage on the number basis (20.11%) was noted in D-2-88-6, which was found at par with DBR-8 and ABR-1, whereas, the highest fruit borer infestation percentage on the number basis (51.96%) was noted in CHBR-1, which was found statistically similar with CHBR-2. No significant difference was observed in between CHBR-2 and Bhegra Local for fruit borer infestation percentage (number basis).

#### **4.5.8 Chlorophyll content (mg/g)**

The data on chlorophyll-a and chlorophyll-b at vegetative (60DAT) and fruiting (100DAT) stages were statistically analysed and the total chlorophyll values are given in Table 21 and the graphical presentation in Fig. 11.

**Table 20: Fruit borer infestation percentage**

Treatments (Varieties)	Borer affected fruits	
	Weight basis (%)	Number basis (%)
T <sub>1</sub> -KS-224	37.94	33.36
T <sub>2</sub> -ABR-1	27.31	25.97
T <sub>3</sub> -Mukta Keshi	30.47	28.01
T <sub>4</sub> -KS-227	22.30	29.10
T <sub>5</sub> -DBR-8	25.51	22.90
T <sub>6</sub> -CHBR-1	52.70	51.96
T <sub>7</sub> -CHBR-2	50.05	49.25
T <sub>8</sub> -CHBR-3	31.67	28.49
T <sub>9</sub> -D-2-88-6	22.78	20.11
T <sub>10</sub> -Golianda Local (purple)	35.72	40.12
T <sub>11</sub> -Golianda Local (green)	36.66	38.96
T <sub>12</sub> -Bhegra Local	41.72	41.71
SE(m)±	3.62	2.62
CD at 5%	10.44	7.58



**Fig. 10 : Fruit borer infestation percentage**

It was revealed from the data recorded at vegetative stage that the maximum chlorophyll-a (0.015 mg/g) and chlorophyll-b (0.090 mg/g) was noted in CHBR-1, which was found significantly superior than all the treatments for both chlorophyll-a and chlorophyll-b content. On other hand, the minimum chlorophyll-a (0.002 mg/g) was noted in D-2-88-6, which was found at par with CHBR-3, whereas the minimum chlorophyll-b (0.007mg/100g) was noted in D-2-88-6, which was found statistically similar with CHBR-3, ABR-1, Bhegra Local and KS-224.

It was noticed from the data recorded at fruiting stage that the maximum chlorophyll-a (0.026 mg/g) was noted in CHBR-2, but the maximum chlorophyll-b (0.093 mg/g) was noted in the variety CHBR-1. Both the varieties were found significantly superior than all the other treatments. On other hand the minimum chlorophyll-a (0.007 mg/g) was found in Mukta Keshi, which was found at par with ABR-1, DBR-8, D-2-88-6 and CHBR-3. The minimum chlorophyll-b (0.013 mg/g) was recorded in ABR-1, which was found statistically similar with D-2-88-6, CHBR-3, and DBR-8.

The Table-21 indicates that the maximum total chlorophyll content (0.105 mg/g), at vegetative and 0.111 mg/g at fruiting stage was noticed in CHBR-1, but the minimum chlorophyll content (0.009 mg/g) at vegetative stage was noticed in D-2-88-6 and the minimum total chlorophyll content (0.020 mg/g) at fruiting stage was noticed in ABR-1.

**Table 21 : Chlorophyll content (mg/g)**

Treatments (Varieties)	At vegetative stage ( 60DAT )			At fruiting stage ( 100 DAT )		
	Chlo-a (mg/g)	Chlo-b (mg/g)	Total chlo (mg/g)	Chlo-a (mg/g)	Chlo-b (mg/g)	Total chlo (mg/g)
T <sub>1</sub> -KS-224	0.009	0.013	0.022	0.017	0.020	0.037
T <sub>2</sub> -ABR-1	0.006	0.01	0.016	0.007	0.013	0.020
T <sub>3</sub> -MuktaKeshi	0.005	0.014	0.019	0.007	0.021	0.028
T <sub>4</sub> -KS-227	0.009	0.015	0.024	0.017	0.022	0.039
T <sub>5</sub> -DBR-8	0.007	0.016	0.023	0.008	0.019	0.027
T <sub>6</sub> -CHBR-1	0.015	0.090	0.105	0.018	0.093	0.111
T <sub>7</sub> -CHBR-2	0.008	0.014	0.022	0.026	0.032	0.058
T <sub>8</sub> -CHBR-3	0.004	0.009	0.013	0.009	0.017	0.026
T <sub>9</sub> -D-2-88-6	0.002	0.007	0.009	0.009	0.016	0.025
T <sub>10</sub> -Golianda Local (purple)	0.011	0.021	0.032	0.018	0.024	0.042
T <sub>11</sub> -Golianda Local (green)	0.009	0.023	0.032	0.016	0.033	0.049
T <sub>12</sub> -Bhegra Local	0.010	0.013	0.023	0.018	0.021	0.039
SE(m) <sub>±</sub>	0.001	0.002		0.001	0.002	
CD at 5%	0.002	0.006		0.004	0.006	

DAT-Days after transplanting

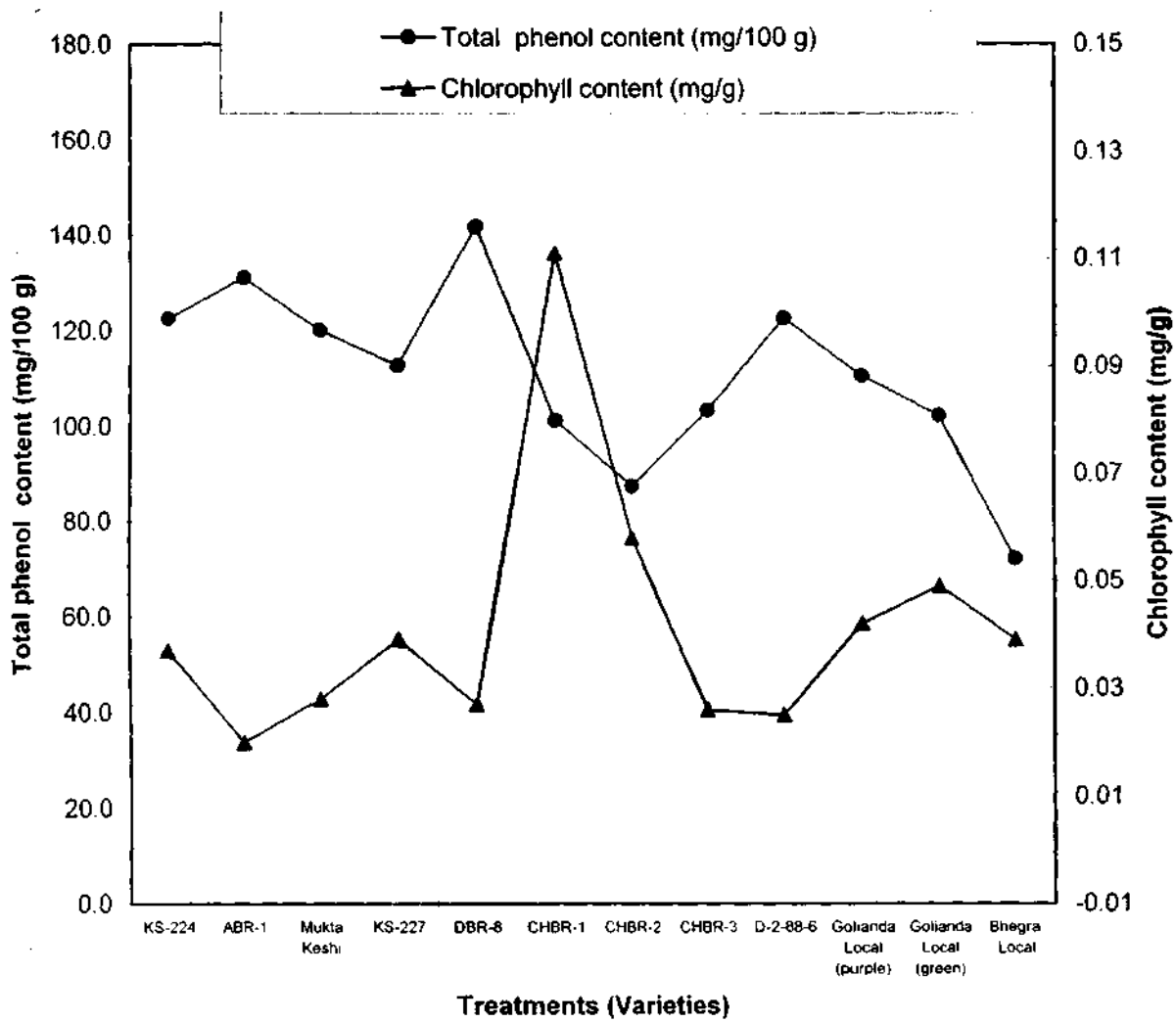


Fig.11 : Chlorophyll content (mg/g) and total phenol content (mg/100g)

**Table 22 : Total phenol content (mg/100 g)**

Treatments (Varieties)	1 <sup>st</sup> Picking (60 DAT) <b>(mg/100g)</b>	3 <sup>rd</sup> Picking (80 DAT) (mg/100g)
T <sub>1</sub> -KS-224	109.13	122.48
T <sub>2</sub> -ABR-1	121.35	130.96
T <sub>3</sub> -Mukta Keshi	108.00	119.98
T <sub>4</sub> -KS-227	96.19	112.63
T <sub>5</sub> -DBR-8	126.71	141.63
T <sub>6</sub> -CHBR-1	87.82	101.23
T <sub>7</sub> -CHBR-2	66.16	87.35
T <sub>8</sub> -CHBR-3	89.42	103.23
T <sub>9</sub> -D-2-88-6	109.13	122.48
T <sub>10</sub> -Golianda Local (purple)	95.92	110.47
T <sub>11</sub> -Golianda Local (green)	89.30	102.16
T <sub>12</sub> -Bhegra Local	58.90	72.06
SE(m)±	6.13	6.69
CD at 5%	17.68	19.31

DAT-Days after transplanting

#### **4.5.9 Total phenol content (mg/100g)**

The total phenol content recorded at first picking (60 DAT) and third picking (80 DAT) of different varieties are presented in Table 22 and their graphical presentations have been demonstrated in Fig 11.

Data recorded at first picking (60 DAT) on total phenol content ranged from 58.90 mg/100 g to 126.71 mg/100 g with mean 96.50 mg/100g. A high total phenol content (126.71 mg/100g) was observed in DBR-8, which was found statistically similar with ABR-1, KS-224 and D-2-88-6. On the other hand, a low total phenol content (58.90 mg/100 g) was observed in Bhegra Local, which was found at par with CHBR-2. However, significant difference was also not observed among ABR-1, KS-224, D-2-88-6 and Mukta Keshi for total phenol content at this stage.

It is revealed from the table that total phenol content at third picking stage (80 DAT) ranged from 72.06 mg/100 g to 141.63 mg/100g with mean of 110.55 mg/100 g. The highest total phenol content (141.63 mg/100g) was observed in DBR-8, which was found statistically similar with ABR-1, KS-224 and D-2-88-6. On other hand, the lowest total phenol content (72.06 mg/100g) was noted in Bhegra Local, which was found non significant with CHBR-2. However, significant difference was also not observed among ABR-1, KS-224, D-2-88-6, Mukta Keshi and KS-227 for total phenol content at this stage.

#### **4.5.10 Total soluble solids (%)**

Data recorded on total soluble solids (Table 23) revealed that it ranged from 4.15 per cent to 6.82 per cent with an overall average mean of 5.44 per cent.

**Table 23 : Total soluble solids (%)**

Treatments (Varieties)	Total soluble solids (%)
T <sub>1</sub> -KS-224	5.60
T <sub>2</sub> -ABR-1	5.82
T <sub>3</sub> -Mukta Keshi	5.32
T <sub>4</sub> -KS-227	6.52
T <sub>5</sub> -DBR-8	5.10
T <sub>6</sub> -CHBR-1	4.35
T <sub>7</sub> -CHBR-2	4.80
T <sub>8</sub> -CHBR-3	6.27
T <sub>9</sub> - D-2-88-6	4.52
T <sub>10</sub> -Golianda Local (purple)	6.82
T <sub>11</sub> -Golianda Local (green)	6.07
T <sub>12</sub> -Bhegra Local	4.15
SE(m)±	0.14
CD at 5%	0.40

The highest total soluble solids (6.82%) was noted in Golianda Local (purple), which was found significantly better than all the treatments except KS-227. The lowest total soluble solids (4.15%) was noted in Bhegra Local, which was found statistically similar with CHBR-1 and D-2-88-6. However, no significant difference was also observed in between KS-227 and CHBR-3 for this attribute.

#### **4.6 Correlation studies**

Galton (1988) was first to suggest the use of correlation to desirable the degree of association between two variables. The degree of association also effects the effectiveness of selection process and helps to select desirable genotype. In the present study, the correlation studies have been made to understand the degree of association between two characters.

##### **4.6.1 Correlation coefficient for yield and its traits in brinjal (round)**

The correlation studies revealed that total yield (q/ha) was positively associated with number of primary branches per plant, percentage of long styled flowers, number of fruits per plot, number of secondary branches per plant, percentage of medium styled flowers and plant spread. On other hand, days to 50% flowering, percentage of short or pseudo styled flowers and days to first fruit set showed significant and negative correlation with yield.

Number of fruits per plant had positive correlation with percentage of long styled flowers, number of flowers per cluster and whereas, percentage of short or pseudo styled flowers showed negative association with this important trait (Number of fruits per plant)

**Table 24 : Correlation coefficient for yield and its traits in brinjal (round)**

	$X_1$	$X_2$	$X_3$	$X_4$	$X_5$	$X_6$	$X_7$	$X_8$	$X_9$	$X_{10}$	$X_{11}$	$X_{12}$	$X_{13}$	$X_{14}$	$X_{15}$	$X_{16}$	$X_{17}$	$X_{18}$	$X_{19}$	$X_{20}$
$X_1$	0.8124**	0.8342**	0.5691	0.8531**	0.1301	-0.3427	-0.1657	0.9409**	0.7999**	-0.2232	-0.0071	0.0446	-0.0164	-0.0331	0.1565	-0.0611	-0.0428	0.6280	0.4901	
$X_2$		0.8135*	0.8698**	0.7070*	0.0983	-0.4415	-0.1196	0.7287**	0.9228**	-0.1358	0.2042	0.1836	-0.2190	0.2795	0.4280	-0.2211	-0.1679	0.2991	0.5551	
$X_3$			0.8749**	0.6031*	-0.1804	-0.6340	-0.4021	0.7511**	0.7840**	0.1807	0.4374	0.2427	-0.3980	0.4654	0.6376**	-0.0439	-0.0575	0.4831	0.7646**	
$X_4$				0.7567**	-0.0947	-0.5575	-0.3401	0.7335**	0.8287**	-0.1225	0.2627	0.1032	-0.2189	0.2262	0.4146	-0.1288	-0.1004	0.5096	0.6224*	
$X_5$					-0.2718	-0.6992	-0.5894	0.5825*	0.6748*	0.1460	0.5300	0.4472	-0.5545	0.2261	0.3714	-0.0185	-0.0468	0.0830	0.5891*	
$X_6$						0.6263*	0.7179**	0.0847	0.0772	-0.2987	-0.6718*	-0.5082	0.6752*	-0.4078	-0.4291	-0.3161	-0.3140	0.2170	-0.4669	
$X_7$							0.8831**	-0.3638	-0.3695	-0.4778	-0.8203**	-0.5120	0.7733**	-0.3949	-0.5483	-0.4907	-0.4266	-0.1063	-0.8536**	
$X_8$								-0.2585	-0.1064	-0.4584	-0.7703**	-0.5171	0.7433**	-0.2671	-0.3788	-0.5420	-0.3623	-0.0363	-0.6240*	
$X_9$									0.7368**	-0.1526	-0.0160	0.2166	-0.0919	-0.0891	0.0922	-0.0333	-0.0184	0.5046	0.4640	
$X_{10}$										-0.0475	0.1951	0.2975	-0.2668	0.3155	0.4635	-0.2587	-0.1321	0.3686	0.6049*	
$X_{11}$											0.7293**	0.4249	-0.6732*	0.5857*	0.5849*	0.2140	0.1208	-0.2158	0.4620	
$X_{12}$												0.5840	-0.9237	0.7236**	0.7786**	0.2966	0.1742	-0.1551	0.7028*	
$X_{13}$													-0.8505	0.4873	0.4962	-0.0046	0.1953	-0.0379	0.6156*	
$X_{14}$														-0.6989*	-0.7388**	-0.1900	-0.2050	0.1184	-0.7460**	
$X_{15}$															0.9724**	-0.3014	-0.3048	-0.1538	0.5098	
$X_{16}$																-0.2055	-0.2081	-0.0067	0.6688*	
$X_{17}$																	0.8399**	0.0934**	0.2763	
$X_{18}$																		0.2613	0.4315	
$X_{19}$																			0.4015	
$X_{20}$																				

\*\* - Significant at 1% level; \* - Significant at 5% level

$X_1$  - Plant height (120 DAT)

$X_2$  - Number of leaves per plant (120 DAT)

$X_3$  - Number of primary branches per plant (120 DAT)

$X_4$  - Number of secondary branches per plant (120 DAT)

$X_5$  - Number of tertiary branches per plant (120 DAT)

$X_6$  - Days to first flowering

$X_7$  - Days to 50% flowering

$X_8$  - Days to first fruit set

$X_9$  - Shoot diameter (120 DAT)

$X_{10}$  - Plant spread (120 DAT)

$X_{11}$  - Number of flowers per cluster

$X_{12}$  - Percentage of long styled flower

$X_{13}$  - Percentage of medium styled flower

$X_{14}$  - Percentage of short or pseudo styled flower

$X_{15}$  - Number of fruits per plant

$X_{16}$  - Number of fruits per plot

$X_{17}$  - Fruit girth

$X_{18}$  - Fruit weight

$X_{19}$  - Fruit stalk length

$X_{20}$  - Yield per hectare

Number of fruits per plot showed positive correlation with number of fruits per plant, percentage of long styled flowers, number of primary branches, number of flowers per cluster, whereas number of fruits per plot had negative correlation with percentage of short or pseudo styled flowers.

Number of leaves was also positively associated with plant height, whereas fruit weight showed positive correlation with fruit girth.

Shoot diameter was positively correlated with plant height, number of primary branches per plant, number of secondary branches per plant, number of leaves and number of tertiary branches per plant.

Days to first fruit set and days to 50% flowering showed positive correlation with days to first flowering.

Number of primary branches per plant showed positive association with plant height and number of leaves, whereas number of secondary branches per plant was positively correlated with number of leaves and plant height.

Plant spread showed positive correlation with number of leaves, number of secondary branches per plant, number of primary branches per plant, shoot diameter and number of tertiary branches per plant.

#### **4.6.2 Correlation coefficient of parameters relevant to screen varieties for resistant to fruit borer**

Fruit borer infestation percentage on weight basis showed positive association with fruit borer infestation percentage on number basis, calyx diameter, number of holes per fruit, total chlorophyll content and number of

**Table 25 : Correlation coefficient of parameters relevant to screen varieties for resistant to fruit borer**

	Number of spines on calyx	Pedical length	Fruit diameter	No. of holes per fruit	Chlorophyll content	Total phenol content	Total soluble solids	Plant stand/ plot (120 DAT)	Number of larvae per fruit	Fruit borer infestation percentage (number basis)	Fruit borer infestation percentage (weight basis)
Calyx diameter	0.5370	-0.2924	-0.0757	0.9284**	0.7453**	-0.7462**	-0.5014	-0.3292	0.7818**	0.9262**	0.9219**
Number of spines on calyx		0.1599	0.0480	0.5324	0.1199	-0.5843*	-0.1724	-0.0310	0.3252	0.4802	0.4806
Pedical length			0.0904	-0.2543	-0.0924	0.4022	0.1913	0.5140	-0.3161	-0.1579	-0.0550
Fruit diameter				-0.2169	0.0303	0.0593*	0.7002*	0.0827	-0.2228	0.1232	0.0053
No. of holes per fruit					0.7661**	-0.7212**	-0.5661	-0.2097	0.6755*	0.8808**	0.9033**
Chlorophyll content						-0.4280	-0.3393	-0.0197	0.4224	0.8254**	0.7923**
Total phenol content							0.2799	0.4448	-0.6915*	-0.7413**	-0.6731*
Total soluble solids								-0.1162	-0.4991	-0.2367	-0.4112
Plant stand/plot (120 DAT)									-0.6077*	-0.3355	-0.2078
Number of larvae per fruit										0.6652*	0.7068*
Fruit borer infestation percentage ( number basis)											0.9460**

\*\* - Significant at 1%. \* - Significant at 5% levels

larvae per fruit, whereas total phenol content showed negative association with this important trait (fruit borer infestation percentage on weight basis).

Fruit borer infestation percentage on number basis showed also positive association with calyx diameter, number of holes per fruit, total chlorophyll content and number of larvae per fruit. On other hand, fruit borer infestation percentage on number basis was also negatively associated with total phenol content.

Number of larvae per fruit showed positive association with calyx diameter and number of holes per fruit, whereas number of larvae per fruit negatively correlated with total phenol content and plant stand.

Total chlorophyll content showed positive correlation with number of holes per fruit.

Total phenol content was negatively correlated with calyx diameter and number of larvae per fruit, whereas total phenol content showed positive association with fruit diameter.

Total soluble solids was also positively correlated with fruit diameter, whereas number of holes per fruit showed positive correlation with calyx diameter and number of larvae per fruit.

## *Discussion*

## CHAPTER - V

### **DISCUSSION**

The experimental findings obtained during the investigation have been thoroughly discussed and corroborated in the light of the research work done in past by various workers on the aspects related to the present experiment. It has been endeavored to ascertain and explain the reason for variation in the crop performance of twelve brinjal (round) varieties.

There are some plant characteristics, which do not have direct influence on yield but they contribute the yield indirectly, which play vital role to boost up the crop yield. Hence, it is obviously essential to make a genuine discussion on the influence of various treatments on growth attributes, yield components as well as yield.

On the other hand, screening for resistance against fruit borer was studied in this investigation and the silent points of results are also discussed in this chapter.

#### **5.1 Growth, Flowering and Fruiting characters**

##### **5.1.1 Plant height (cm)**

Significant difference was recorded among the genotypes with regard to plant height at all the stages of crop growth (i.e. 20, 40, 60, 80, 100, 120 days after transplanting) under this study. Significantly higher plant height was noted in CHBR-1 (74.88 cm ) and CHBR-3 (72.01 cm), which may be due to specific characteristic of both the varieties to produce taller plants. The taller plant was

noted in CHBR-1, which may also be due to higher chlorophyll content noted under this treatment (CHBR-1). Deotale *et al.* (1998) reported higher plant height (79.98 cm) in variety selection-I and Nandi (1992) also reported the highest plant height of genotype BB-11 in case of brinjal.

On other hand, the dwarf plants (29.66 cm) were noted in Golianda Local (purple) under this study, which may be due to determinate plant type of this genotype. However, Nandi (1992) also reported the lowest plant height for BB-7.

Variation in plant height among varieties studied in the experiment may also be due to inherent genetic make up of the genotypes. Variation for plant height in brinjal have also been reported by Singh and Singh (1994), Upadhaya *et al.* (1995), Rajput *et al.* (1996) and also by Sharma and Swaroop (2000).

### **5.1.2 Number of leaves per plant**

Number of leaves per plant varied significantly among the genotypes at all the stages of growth. Remarkably higher number of leaves per plant (144.37) were counted in KS-227 under this study, which may be due to the maximum plant spread as well as higher number of secondary branches per plant observed in this treatment. Anserwadekar *et al.* (1979) also observed variation in number of leaves per plant in different genotypes. The correlation studies revealed that the number of leaves per plant was positively associated with plant height.

### **5.1.3 Number of branches per plant**

Number of primary branches per plant varied significantly among the genotypes at all the stages of growth (i.e. 40, 80 and 120 days after transplanting) under this study. Significantly higher number of primary branches per plant was

observed in D-2-88-6 (7.27) and **CHBR-3** (6.65) as compared to other genotypes. Probable reasons for higher number of primary branches per plant recorded by this treatment (D-2-88-6) is its second position in case of attaining higher plant spread and higher plant height.

Remarkably higher number of secondary branches per plant was observed in **KS-227** (11.35), **DBR-8** (10.57), **CHBR-1** (10.17), **ABR-1** (10.15) and **Mukta Keshi** (9.80). The higher number of secondary branches per plant was noted in **KS-227**, which may be due to higher plant spread under this study.

Investigation on number of tertiary branches per plant indicated that all the varieties differed significantly at all the stages of observation. Significantly higher number of tertiary branches per plant (9.42) was noted under **ABR-1** than rest of the genotypes included in this study. The correlation studies revealed that the number of tertiary branches per plant showed positive association with the number of primary branches per plant and the number of secondary branches per plant.

The high variability for number of branches (primary, secondary and tertiary) per plant (3 to 9) have also been reported by Thomas *et al.* (1990) in brinjal. Variation in number of branches per plant due to genotypes was also observed by the Deotale *et al.* (1998) as well as Singh and Singh (1994).

#### 5.1.4 Days to first flowering

The number of days required for first flowering differed significantly amongst the varieties tested in this trial. Remarkably early flowering was observed in **ABR-1**, **Golianda Local (green)**, **DBR-8** and **D-2-88-6**. Whereas

significantly late flowering was noted in CHBR-1, Golianda Local (purple), Bhegra Local, KS-227, Mukta Keshi and CHBR-2 under this investigation.

The variation (51.82 to 67.27 days after transplanting) in flowering time observed in this study may probably be due to the variation in level of hormones especially gibberellin in the plants of varying genotypes. The variation in flowering time had also been reported by Chadha and Paul (1984) as well as Singh and Singh (1984) in brinjal.

#### **5.1.5 Days to 50% flowering**

Remarkably earliest flowering was noted in ABR-1, KS-224 and DBR-8 under the present investigation may be due to genetic character of these genotypes. The maximum variability for this crop (i.e. brinjal) available in India is also one of the reasons for availability of genotypes which found early for flowering in this region/country. Although, early genotypes mentioned above did not show marked difference for days to 50% flowering, but ABR-1 showed relatively earliest flowering which is of much significance for fetching good price in the market. Deotale *et al.* (1998) observed that Poona spiny was the earliest to reach 50% flowering among 11 brinjal cultivars. Dalai *et al.* (2000) also reported that CHES-249 was earliest to 50% flowering (30 days after transplanting) among brinjal genotypes tested by him for this attribute

Significantly higher days required to 50% flowering recorded by Bhegra Local, Golianda Local (green), CHBR-2 and CHBR-1 in this study may also be due to genetic factor responsible for late flowering under these treatments.

Results of the present investigation regarding variation in different genotypes for days to 50% flowering (159.25 to 86.25 days after transplanting) are contrary to the findings of Thomas *et al.* (1990) who reported wide variability (21 to 50 days after transplanting) in brinjal for this trait.

#### **5.1.6 Days to first fruit set**

63.37 to 93.35 days to first fruit set observed in different genotypes of this investigation show wide variability for this parameter. Thomas *et al.* (1990) also observed wide variability for days to first fruit set (32-91 DAT), while evaluating 319 germplasm of brinjal.

#### **5.1.7 Shoot diameter (cm)**

Shoot diameter varied significantly among the genotypes at all the stages of growth under this study except 40 days after transplanting. Significantly higher value for shoot diameter was noted under CHBR-3 (1.41 cm), CHBR-1 (1.41 cm), KS-224 (1.36 cm) and Mukta Keshi (1.32 cm) than the others treatments included under this study may be due to genetic character of these genotypes.

#### **5.1.8 Number of sepals, petals and stamens per flower**

Significantly higher number of sepals per flower was counted in CHBR-2 (5.97), Mukta Keshi (5.87) CHBR-1 (5.85) than rest of the genotypes included under this study may be due to inherent genetic make up of these genotypes.

Remarkably higher number of petals per flower was observed under the treatments like CHBR-2 (5.87), Mukta Keshi (5.82), Golianda Local (purple) (5.80) and CHBR-1 (5.65) than the other treatments included in this investigation may also be due to genetic character of these genotypes.

Significantly higher number of stamens per flower was counted in **CHBR-2** (5.95), **KS-224** (5.82) and **CHBR-1** (5.77) than rest of the genotypes included in this experiment. This may also be due to genetic potential of these genotypes to produce higher number of stamens per flower.

### **5.1.9 Plant spread (cm)**

Plant spread varied significantly among the genotypes at all the stages of growth in this investigation. It ranged from 40.62 to 77.29 cm at final stage of observation i.e. 120 days after transplanting. Rajgopal (1978) also reported that the spread of plant in brinjal ranged from 80.1 cm to 91.6 cm with maximum in A-66 and the minimum in Arka Shirish. Significant difference among the brinjal lines for plant spread was also reported by Singh and Singh (1994).

Significantly higher value for plant spread was noted under **KS-227** (77.29 cm) and **CHBR-3** (72.05 cm) than the other treatments included under this study which may be due to higher number of secondary branches per plant which would have enhanced the plant area and ultimately the plant spread per plant under these treatments.

## **5.2 Yield parameters**

### **5.2.1 Number of flowers per cluster**

Significantly higher number of flowers per cluster was noted in genotypes **KS-224** (3.55), **D-2-88-6** (3.50), **CHBR-3** (3.27) and **Golianda Local** (purple) (3.17) than rest of the genotypes included in this study. On other hand, the lowest number of flowers per cluster was observed in **CHBR-1** (1.35). Thus the number of flowers per cluster ranged from 1.35 to 3.55 in the present study which may be

genetic characteristics of different genotypes included in this investigation. However, Sharma and Swaroop (2000) reported 2.00 to 6.00 flowers per cluster in brinjal. Significant difference for number of flowers per cluster in brinjal varieties was also reported by Chadha and Saimbhi (1977) who found 2.0 to 2.5 flowers per cluster.

### 5.2.2 Percentage of long, medium and short of pseudo styled flowers

Percentage of different types of flowers differ significantly among the different genotypes included under this study except long styled flowers. However, percentage of long styled flowers was ranged from 35.00 to 57.50 in this investigation. Non significant difference observed for percentage of long styled flowers among varying varieties tested in this trial proved narrow variability for this trait in the varieties of brinjal. The findings of Mohiedeen *et al.* (1977) are neither closer nor contrary to the results of the present investigation as he reported 25.00% to 49.00% long styled flowers in all the egg plant varieties.

Remarkably higher percentage of medium styled flowers was observed under KS-224 (27.50%), ABR-1 (27.50%), CHBR-3 (25.00%), Mukta Keshi (22.50%) and Bhegra Local (22.50%) in this investigation may be due to genetical characteristics of the particular genotype. Results of the present investigation regarding variation in different genotypes for percentage of medium styled flowers (12.50% to 27.50%) are contrary to the findings of Mohiedden *et al.* (1977) who reported wide variation in brinjal genotypes for percentage of medium styled flowers (6.1% to 31.7%).

Significantly higher percentage of short or pseudo styled flowers was observed in CHBR-1 (52.50%), CHBR-2 (47.50%), Golianda Local (purple) (42.50%), KS-227 (42.50%) and Golianda Local (green) (42.50%) than the other genotypes included under this study may be due to genetic character of these genotypes. Wide range in percentage of short or pseudo styled flowers (15.00% to 52.50%) among different treatments studied in this investigation may be due to wide variability in for this attribute. These findings are in close proximity with the results of Mohiedden *et al.* (1977) who also reported that the percentage of short or pseudo styled flowers ranged from 19.3 to 58.7 in all egg plant varieties.

Variation in types of flowers in brinjal due to genetic factor was also reported by several workers i.e. Popova (1961), Muthukrishnan and Shrinivasan (1963) and Chadha & Saimbhi (1977).

### **5.2.3 Number of fruits per plant**

Significantly higher number of **fruits** per plant (9.85) was recorded in variety D-2-88-6 than all varieties included in this study. This may be due to higher number of primary branches per plant, relatively higher percentage of long styled flowers and more number of flowers per cluster recorded under this treatment in the present investigation. On other hand, the minimum number of fruits per plant (1.82) was noted in the genotype CHBR-2.

Variation in number of fruits per plant among the genotypes included in this study may be due to inherent character of the genotypes. Chadha and Sidhu (1983) also reported that the number of fruits per plant is genetically controlled in brinjal and less influenced by environmental factors. However, the result of the

present investigation differ from the findings of Upadhaya *et al.* (1995) who reported higher number of fruits per plant (22.7) in Pusa Purple Custer variety of brinjal.

Wide range in number of fruits per plant in brinjal has also been observed by Chadha and Paul (1984), Yadav *et al.* (1994), Singh and Singh (1994), Upadhaya *et al.* (1995), Rajput *et al.* (1996) and also by Deotale *et al.* (1998).

#### **5.2.4 Number of fruits per plot**

The maximum number of fruits per plot (525.75) was noted in D-2-88-6, which was found significantly superior than all the other treatments included under this study. This may be due to higher number of primary branches per plant, relatively higher percentage of long styled flowers as well as higher number of fruits per plant noted under this treatment.

#### **5.2.5 Fruit girth (cm)**

Significantly higher fruit girth recorded in Golianda Local (purple) (24.61 cm) and ABR-1 (23.16 cm) than rest of the genotypes included in this investigation may be due to genetic character of both the genotypes (Golianda Local (purple) and ABR-1) of brinjal.

Fruit girth varied from 16.06 cm to 24.61 cm among the different genotypes studies in this investigation. These results are too close with the findings of Nandi (1992) who observed maximum fruit girth of 22.12 cm in BB-1 genotype and the minimum fruit girth of 17.33 cm in case of BB-11 variety of brinjal. However, Tanaka (1972) reported that the highest and the lowest fruit girth was 11.78 cm and 9.82 cm respectively in brinjal variety “Waimanalo

Long." Rajgopal *et al.* (1978) reported that fruit girth was ranged from 8.8 cm to 15.6 cm in brinjal.

#### **5.2.6 Weight per fruit (g)**

Remarkably higher weight of individual fruit in genotype Golianda Local (purple) may be due to the higher fruit diameter (6.51 cm) noted in this variety. It may also be due to positive correlation of fruit girth with fruit weight observed in the results of correlation studies of this investigation (Table 24).

Weight per fruit ranged from 37.64 g to 208.35 g under different genotypes studied in this investigation. However, the results of the present study are contrary to the findings of Nandi (1992) who found highest weight (118.08 g) of individual fruit in BB-1 as well as Tanaka (1972) who reported 85.04 g to 113.39 g weight of individual fruit in brinjal.

Variation in fruit weight due to genotypes have also been reported by Upadhaya *et al.* (1995) and Rajput *et al.* (1996).

#### **5.2.7 Fruit stalk length (cm)**

The maximum stalk length of fruit (7.23 cm) was noted in Mukta Keshi, which was found significantly superior than all the treatments tested in this study. This may be due to remarkably higher pedicel length (2.86 cm) recorded in this genotype (Mukta Keshi) under the present investigation.

#### **5.2.8 Yield**

Remarkably higher yield per plant recorded in CHBR-3 (844.52 g), KS-224 (809-10 g), ABR-1 (805.00 g), DBR-8 (782.93 g) and D-2-88-6 (725.44 g) than rest of the varieties included under this investigation. It may be due to

positive correlation of number of fruits per plant with number of flowers per cluster and percentage of long styled flowers observed in the results of correlation studies of this investigation (Table 24).

Yield per plant ranged from 259.98 g to 844.52 in this experiment. Variation in yield per plant in brinjal was observed by Bhutai *et al.* (1971), Rao (1988), Upadhaya *et al.* (1995) and Sanwel *et al.* (1998).

It has been observed that genotype CHBR-3 proved best amongst all the genotypes studied in this investigation for harvesting the highest yield per plot (47.76 kg/plot) as well as per hectare (315.88 q/ha). But this genotype (CHBR-3) was found non significant with ABR-1, KS-224 and DBR-8 for both the attributes i.e. yield per plot and yield per hectare.

The above findings are also in close proximity with the results of Kalloo *et al.* (1993) who reported that the yield of 320.1 q/ha from Hisar Jamuni variety of brinjal.

The findings of present study are also confirmed by Chadha and Sidhu (1987) who observed that the Sada bahar Baingan gave yield of 313 q/ha.

However, the results of the present investigation differ from the findings of Upadhaya *et al.* (1995), who reported yield of 373.90 q/ha in Nurki and Deotale *et al.* (1998) who recorded higher yield of 393.92 q/ha in Poona Spiny variety of brinjal.

The higher value for plant height (72.01 cm), number of primary branches per plant (6.65), shoot diameter (1.41 cm), number of flowers per cluster (3.27), percentage of medium styled flowers (25.00%), weight of individual fruit

(183.52 g), plant spread (72.05 cm), plant stand (55.50/plot) and fruit diameter (6.23 cm) noted in genotype CHBR-3 would have resulted in harvesting the higher yield per unit area. Other genotypes like ABR-1, KS-224 and DBR-8 which were found at par with CHBR-3 for harvesting yield from an unit area showed relatively higher values for most of the yield attributes in this study and the cumulative effect of these characters may have resulted in harvesting higher yield of these genotypes. Higher yield in different genotypes due to higher values of some yield attributing characters were also reported by Rajgopal *et al.* (1976), Jaiswal *et al.* (1997), Nandi (1992), Deotale *et al.* (1998) and Dalai *et al.* (2000).

### **5.3 Parameters recorded to screen varieties for infestation of fruit borer**

#### **5.3.1 Calyx diameter (cm)**

Remarkably higher calyx diameter recorded by the treatments CHBR-1 (1.09 cm), CHBR-2 (1.09 cm) and Bhegra Local (1.05 cm) than rest of the treatments included in this investigation which may be due to genetical characteristics of the particular genotype.

#### **5.3.2 Number of holes per fruit**

Remarkably lower number of holes per fruit counted in DBR-8 (1.15), KS-227 (1.35), D-2-88-6 (1.50) and CHBR-3 (1.52) than rest of the genotypes included in this study which may be due to lower calyx diameter as well as lower number of larvae noted in these variety. Panda (1999) also reported that tight calyx increased the resistance of the fruits to attack against borer in brinjal.

Significantly higher number of holes per fruit in CHBR-1 (3.22) than all the treatments except Bhegra Local may be due to which would have higher total chlorophyll content (0.111 mg/g) noted in this variety.

Genotype Bhegra Local ranked second amongst all the genotypes for number of holes per fruit may be due to higher number of larvae per fruit as well as lower phenol content and total soluble solids recorded by this genotype in this study. Chadha (1990) reported that bitterness increased with increasing percentage of total phenol in brinjal.

Dash and Singh (1990) reported highest mean number of holes per fruit in Mukta Keshi variety of brinjal.

### **5.3.3 Number of spines on calyx**

Remarkably higher number of spines on calyx (10.76) was observed in CHBR-2 than rest of the genotypes included in this investigation may be due to the genetical character of that genotype to produce higher number of spines on calyx.

### **5.3.4 Pedicel length (cm)**

Remarkably higher pedicel length (2.86 cm) was recorded by Mukta Keshi than the rest of the varieties included in this study may be due to specific characteristic of that variety to produce longer pedicel length.

### **5.3.5 Fruit diameter (cm)**

Significantly higher fruit diameter was noted in genotypes Golianda Local (purple) (6.51 cm), CHBR-2 (6.48 cm), CHBR-3 (6.23 cm) and KS-227 (6.16 cm) than rest of the genotypes included in this study. Genotype Golianda Local (purple) ranged first amongst all the genotypes for fruit diameters. This may be due to the highest value of weight of individual fruit (208.35 cm) recorded by this genotype in this study.

### **5.3.6 Number of larvae per fruit**

Remarkably lower number of larvae per fruit was noted in KS-227 (0.70), ABR-1 (0.75), DBR-8 (1.00) and CHBR-3 (1.10) than rest of the treatments included in this experiment which may be due higher total phenol content noted in these varieties. Darekar *et al.* (1991) also reported that the phenol content was negatively correlated with attack of fruit borer in brinjal.

### **5.3.7 Fruit borer infestation percentage**

On the basis of weight remarkably lower fruit borer infestation was recorded by KS-227 (22.30%), D-2-88-6 (22.78%), DBR-8 (25.51%), ABR-1 (27.31%), Muktas Keshi (30.47%) and CHBR-3 (31.67%). As regards fruit borer infestation on the basis of number significantly lower infestation was noted in the genotypes D-2-88-6 (20.11%), DBR-8 (22.90%) and ABR-1 (25.97%). Lower fruit borer infestation observed in the above mentioned genotypes than the other genotypes in this study may be due to the tightly arranged seeds in the mesocarp, thick skin and closely packed vascular bundles in the pulp (Mishra *et al.* 1988).

The higher fruit borer infestation percentage on fruit weight basis and on fruit number basis per unit area was recorded by CHBR-1 and CHBR-2 respectively which may be due to higher number of holes per fruit and more chlorophyll content noted in both the genotypes. Fruit borer infestation percentage on the basis of weight of fruit ranged from 22.30% to 52.70% and on the basis of number of fruits ranged from 20.11% to 51.96% in the present study among different genotypes.

The present findings under the study are in close proximity with the findings of Dhankar and Sharma (1986) who reported per cent infested fruits on weight basis in brinjal varied from 27.08 (Pusa Purple Cluster-2) to 56.43 (Sel-1).

These findings are also in close proximity with the result of Sharma *et al.* (1994), who reported minimum fruit borer infestation per cent on number basis (23.4%) and weight basis (20.5%) in PBR-129-5 variety of brinjal.

Sah *et al.* (1995) also reported in brinjal that the lowest infestation on the basis of number (25.29%) was recorded for Kachbachia and for Anpurna on the basis of weight (25.34%).

The above findings are in agreement with the results reported by Mishra and Mishra (1996), who reported pest of brinjal causing even upto 30% to 50% damage in the tribal dominated North Eastern Ghat of Orissa.

However, Tripathi *et al.* (1996) reported that the pest accounted for 4.4%-62.5% and 4.0-55.4% fruit infestation on number and weight basis respectively in brinjal crop. Panda (1999) also reported that fruit damage varied from 8.5%-100% in brinjal crop.

### 5.3.8 Total chlorophyll content (mg/g)

Remarkably higher total chlorophyll content (0.111 mg/g) was noted in CHBR-1 than rest of the genotypes included in this study, which may be due to higher number of leaves per plant recorded in this treatment. Whereas the minimum total chlorophyll content (0.020 mg/g) was noted in the genotype ABR-1. This may also be due to inherent genetic make up of the genotypes.

The above results are in close proximity with the findings of Sidhu *et al.* (1982), who reported that total chlorophyll content was maximum in PBR-91-1 (0.126 mg/g) and minimum in P-8 (0.026 mg/g).

The above findings are also in close proximity with the results of Bajaj *et al.* (1981) who reported that the total chlorophyll content in brinjal was maximum (0.122 mg/g) in the variety 17(4) and minimum (0.025 mg/g) in S-16.

However, Singh *et al.* (1988) reported total chlorophyll content ranged from 0.023-0.050 mg/g in brinjal.

### 5.3.9 Total phenol content (mg/100g)

Remarkably higher total phenol content was recorded by DBR-8 (141.63 mg/100 g), ABR-1 (130.96 mg/100 g), KS-224 (122.48 mg/100 g) and D-2-88-6 (122.48 mg/100 g) under this study, where as the minimum total phenol content was found in Bhegra Local (72.06 mg/100 g). A considerable variability noted under this study (72.06 to 141.63 mg/100 g) may be due to genetic factor responsible in each genotype to express this qualitative attribute. Variation for total phenol content in brinjal was also reported by several authors like i.e. Singh *et al.* (1981), Bajaj *et al.* (1981), Sidhu *et al.* (1982), Ingale and patil (1997) and Kaur *et al.* (1985).

The results of present in investigation towards range of total phenol content are supported by Awasthi *et al.* (1987) who reported that total phenol content was ranging from 58.30 to 175.00 mg/100 g in brinjal. Kaur *et al.* (1985) observed that the variety Punjab Chamkila had the maximum total phenol content at all stages of maturity.

Total phenol content seems to be one of the most important characters for selection a fruit borer resistance genotype/variety under the present investigation. We also observed that the parameters like number of holes per fruit, calyx diameter, total chlorophyll content, number of larvae per fruit are also not to be ignored while making selection to choose a variety/genotype resistant for fruit borer infestation.

#### **5.3.11 Total soluble solids (%)**

Significant variations have been recorded in different varieties with respect to total soluble solids under this trial. Higher total soluble solids (6.82%) was recorded in variety Golianda Local (purple), which was followed by KS-227 (6.52%). This may be due to higher pulp concentration in both the genotypes.

#### **5.4 Plant stand per plot**

Remarkably higher value for plant stand was noted in KS-227, CHBR-3, CHBR-1, ABR 1, DBR-8, Mukta Keshi KS-224 and CHBR-2 than rest of the genotypes included under this study. Higher number of plants per plot (55.75) was counted in KS-227 may be due lower number of larvae per fruit (0.70) under this genotype (KS-227).

#### **5.5 Correlation studies**

##### **5.5.1 Yield and its traits**

Yield is a complex character, which is the product of various factors responsible for making growth of plant. The degree of association of these attributes put forth the relative importance of the character and ultimately the most

important characters are selected in the prediction of yield of the crop from an unit area.

The correlation coefficient were worked out for all the possible combinations of all the important characters studied in the investigation. The result of correlation studies of the present investigation are discussed below in the light of literature available on this topic.

1. In the present investigation correlation studies revealed that total yield (q/ha.) was positively associated with number of primary branches per plant, percentage of long styled flowers, number of fruits per plot, number of secondary branches per plant, percentage of medium styled flowers and plant spread. On the other hand, days to 50% flowering, percentage of short or pseudo styled flowers and days to first fruit set showed significant and negative correlation with the yield.

In the present study, total yield had positive correlation with number of branches (primary and secondary) this is supported by the findings of Chadha and Sidhu (1983), Mishra and Mishra (1990), Mandal and Dana (1992), Tambe *et al.* (1992), Ushakumari and Subramanian (1993) and Kumar *et al.* (1995). Total yield was positively correlated with plant spread is in agreement with the findings of Gautam and Srinivas (1992).

Number of fruits per plot showed positive association with yield had similarity with Ushakumari and Subramanian (1993), Singh and Singh (1981) and Kumar (1997).

Negative correlation of days to first fruit set, days to 50% flowering with yield observed in the present study are in agreement with the findings of

Singh and Singh (1981), Dhankar and Kirti Singh (1983), Chadha and Paul (1984), Sharma and Swaroop (2000).

2. Number of fruits per plant had positive correlation with percentage of long styled flowers and number of flowers per cluster, whereas percentage of short or pseudo styled flowers showed negative association with this important trait (number of fruits per plant).

Number of fruits per plant had positive correlation with number of flowers per cluster is in agreement with the findings of Sharma and Swaroop (2000).

3. Number of fruits per plot showed positive correlation with number of fruits per plant, percentage of long styled flowers, number of primary branches per plant and number of flowers per cluster, whereas, number of fruits per plot had negative correlation with percentage of short or pseudo styled flowers.
4. Shoot diameter was positively correlated with number of primary branches per plant, number of secondary branches per plant, number of leaves per plant and number of tertiary branches per plant.
5. Days to first fruit set and days to 50% flowering showed positive correlation with days to first flowering, whereas number of leaves per plant was positively associated with plant height
6. Number of primary branches per plant showed positive association with plant height and number of leaves per plant , whereas number of secondary branches per plant was positively correlated with number of leaves per plant and plant height.

7. Plant spread showed positive correlation with number of leaves per plant, number of secondary branches per plant, shoot diameter and number of tertiary branches per plant.
8. Fruit girth showed positive correlation with fruit weight. It is confirmity with the findings of Mishra and Mishra (1990).

Therefore it can be concluded from the study that the total yield is the cumulative effect of number of primary and secondary branches per plant, percentage of long and medium styled flowers, number of fruits per plot, plant spread, days to 50% flowering and days to first fruit set. It can be suggested that the selection based on these characters can give better results for yield improvement in round genotypes of brinjal.

#### **5.5.2 Correlation coefficient of parameters relevant to screen varieties for resistance to fruit borer:**

The correlation coefficient were worked out for all possible combinations of all the parameters recorded to screen varieties for infestation of fruit borer.

1. Fruit borer infestation percentage on weight basis showed positive association with fruit borer infestation percentage on number basis, calyx diameter, number of holes per fruit, total chlorophyll content and number of larvae per fruit, whereas total phenol content showed negative association with this important trait (fruit borer infestation percentage on weight basis).

In the present study, fruit borer infestation percentage on weight basis was positively correlated with number of holes per fruit and number of larvae per fruit. This result is fairly comparable with those of Patil and Agri (1993).

Percentage of borer infested fruits on weight basis showed positive correlation with calyx diameter has similarity with Shukla *et al.* (1998).

2. Fruit borer infestation percentage on number basis also showed positive association with calyx diameter, number of holes per fruit, total chlorophyll content and number of larvae per fruit. On the other hand, fruit borer infestation percentage on number basis was also negatively associated with total phenol content.
3. Number of larvae per fruit showed positive association with calyx diameter and number of holes per fruit, whereas total phenol content and plant stand were negatively correlated with this trait (number of larvae per fruit).
4. Total chlorophyll content showed positive correlation with number of holes per fruit.
5. Total phenol content was negatively correlated with calyx diameter and number of larvae per fruit. Similar results have been reported by Darekar *et al.* (1991).
6. Total soluble solids was positively correlated with fruit diameter.
7. Number of holes per fruit showed positive correlation with calyx diameter.

Therefore, it can be concluded from the correlation study that the percentage of borer affected fruits is the cumulative effect of number of holes per fruit, total chlorophyll content, number of larvae per fruit, total phenol content and calyx diameter. It can be suggested that the selection based on these characters can give better result for screening against fruit borer in round brinjal.

*Summary, Conclusion and  
Suggestions for Future Research Work*

## CHAPTER-VI

### SUMMARY, CONCLUSION, SUGGESTION FOR FUTURE RESEARCH WORK

The present investigation entitled "Evaluation of brinjal (round) varieties under Chhattisgarh region", was carried out at Horticultural Research Farm, College of Agriculture, I.G.A.U., Raipur (C.G.) during *Rabi* 2000-2001. The experimental material comprised of nine varieties along with three local germplasm of brinjal round were replicated four times in Randomized Block Design. The correlation in between the all possible combinations of all the yield attributing characters as well as parameters recorded to screen varieties for infestation of fruit borer was also worked out by considering yield and fruit borer infestation percentage as dependent character separately. The results obtained during the study are summarized below.

1. Remarkably higher plant height was recorded in CHBR-1 (74.88cm) and CHBR-3 (72.01cm) at harvest, whereas, significantly lower plant height was noted in Golianda Local ( purple) (29.66 cm), Golianda Local (green) (31.69 cm) and Bhegra Local (32.28 cm) at harvest.
2. Remarkably highest number of leaves per plant (144.37) was counted in KS-227 at harvest.
3. Significantly higher number of primary branches per plant was counted in D-2-88-6 (7.27) and CHBR-3 (6.65) at harvest.

4. Remarkably higher number of secondary branches per plant was counted in KS-227(11.35), DBR-8(10.57), CHBR-1 (10.17), ABR-1(10.15) and Mukta Keshi (9.80) at harvest.
5. Significantly maximum number of tertiary branches per plant (9.42) was observed in ABR-1 at harvest.
6. Remarkably lower number of days for 50% flowering from the date of transplanting was recorded in ABR-1(59.25 DAT), KS-224 (65.00 DAT) and DBR-8 (66.50 DAT), whereas, Bhegra Local (86.25 DAT), Golianda Local ( green) (79.50 DAT), CHBR-2 (78.75 DAT) and CHBR-1 (78.25 DAT) required higher number of days for 50% flowering.
7. Significantly early first fruit set from the date of transplanting was observed in ABR-1 (67.37 DAT) and KS-224 (72.95 DAT), whereas, remarkably late first fruit set was recorded in Bhegra Local (93.35 DAT), KS-227 (90.32 DAT), CHBR-1 (89.37 DAT), Golianda Local (green) (85.17 DAT) and Golianda Local ( Purple) (85.15 DAT).
8. Significantly higher plant spread was noted in KS-227 (77.29 cm) and CHBR-3 (72.05 cm) at harvest.
9. Markedly higher number of flowers per cluster was observed in KS-224 (3.55), D-2-88-6 (3.50), CHBR-3 (3.27) and Golianda Local ( purple) (3.17).
10. Shoot diameter was recorded significantly higher in CHBR-3 (1.41 cm), CHBR-1 (1.41 cm), KS-224 (1.36 cm) and Mukta Keshi (1.32 cm) at harvest.

- \1. Significantly higher number of stamens per flower was noted in CHBR-2 (5.95), KS-224 (5.82) and CHBR-1 (5.77), whereas remarkably higher number of petals per flower was noted in CHBR-2(5.87), Mukta Keshi (5.82), Golianda Local ( purple) (5.80) and CHBR-1 (5.65). Higher number of sepals per flower was noted in CHBR-2 (5.97), which was followed by Mukta Keshi (5.87) and CHBR-1 (5.85).
12. Significantly higher percentage of medium styled flowers was noted by treatments KS-224 (27.50%), ABR-1(27.50%), CHBR-3 (25.00%).Mukta Keshi (22.50%) and Bhegra Local (22.50%), whereas remarkably higher percentage of short or pseudo styled flowers was noted in CHBR-1(52.50%), CHBR-2(47.50%), Golianda Local (purple) (42.50%), KS-227(42.50%) AND Goliand Local (green)(42.50%).
13. Markedly higher number of fruits per plant (9.85) and number of fruits per plot (525.75) were observed in D-2-88-6.
14. Significantly higher weight of individual fruit (208.25 g) was recorded by Golianda Local ( purple).
15. Fruit diameter was recorded significantly higher in Golianda Local ( purple) (6.51 cm), CHBR-2 (6.48 cm), CHBR-3 (6.23 cm) and KS-227 (6.16 cm), whereas remarkably maximum girth of fruit was noted by treatments Golianda Local ( purple) (24.61 cm) and ABR-1 (23.16 cm).
16. Markedly higher pedicel length (2.86 cm) and fruit stalk length (7.23 cm) was noted in Mukta Keshi.
17. Significantly higher calyx diameter was recorded in CHBR-1 (1.09cm), CHBR-2 (1.09 cm) and Bhegra Local (1.05 cm).

18. Significantly higher number of spines on calyx (10.76) was counted in CHBR-2, whereas, remarkably higher number of holes per fruit was counted in CHBR-1 (3.22) and Bhegra Local (2.82).
19. Remarkably higher number of larvae per fruit was noted by the treatments Bhegra Local (2.30) and CHBR-2(2.10).
20. Significantly higher value for plant stand was noted in KS-227(55.75), CHBR-3 (55.50), CHBR-1 (55.25), ABR-1 (54.75), Mukta Keshi (54.50), KS-224 (53.75) and CHBR-2 (53.50) at harvest.
21. Significantly higher total chlorophyll content (0.111mg/g) was noted in the variety CHBR-1 at fruiting stage (100 DAT), whereas, lowest total chlorophyll content (0.020 mg/g) was noted in ABR-1.
22. Remarkably higher phenol content was recorded in DBR-8(141.63 mg/100 g), ABR-1 (130.96 mg/100 g), KS-224 (122.48 mg / 100g) and D-2-88-6 (122.48 mg/100 g) at third picking, (80 DAY), whereas lowest phenol content (72.06 mg/ 100 g) was recorded in Bhepra Local at third picking (80 DAT).
23. Remarkably higher yield per plant was recorded in CHBR-3 (844.52 g), KS-224 (809.10 g), ABR-1 (805.00 g), DBR-8 (782.93 g) AND d-2-88-6 (725.44g).
24. Significantly higher yield was noted in CHBR-3 (47.76 kg/ plot and 315.88 q/ha), ABR-1 (45.02 kg/plot and 297.77 q/ha), KS-224 (44.92 kg/plot and 297.12 q/ha) and DBR-8 (43.73 kg/plot and 289.26 q/ha). The lowest yield (12.06 kg/plot and 79.75 q/ha) was recorded in Bhegra Local.

25. On the basis of weight remarkably lower fruit borer infestation was recorded by KS-227 (22.30%), D-2-88-6 (22.78%), DBR-8 (25.51%), ABR-1 (27.31%), Muktas Keshi (30.47%) and CHBR-3 (31.67%). As regards fruit borer infestation on the basis of number significantly lower infestation was noted in the genotypes D-2-88-6 (20.11%), DBR-8 (22.90%) and ABR-1 (25.97%).
26. Correlation studies showed that yield (q/ha) was positively associated with number of primary branches per plant, percentage of long styled flowers, number of fruits per plot, number of secondary branches per plant, percentage of medium styled flowers and plant spread.
27. Fruit borer infestation percentage on weight basis showed positive association with fruit borer infestation percentage on number basis, calyx diameter, number of holes per fruit, total chlorophyll content and number of larvae per fruit, whereas total phenol content showed negative association with this important trait (fruit borer infestation percentage on weight basis).

### **Conclusion**

Following conclusions were drawn on the basis of the results obtained from the present investigation are given below.

1. CHBR-3 proved its superiority for the most of the yield contributing characters i.e. plant height, number of primary branches per plant, shoot diameter, number of flowers per cluster, percentage of medium styled flowers, weight per fruit, plant spread, plant stand and fruit diameter.

2. Besides CHBR-3, ABR-1 (297.77 q/ha), KS-224 (297.12 q/ha) and DBR-8 (289.26 q/ha) also recorded remarkably higher yield, which may be due to the cumulative effect of higher values recorded by these genotypes for most of the yield contributing characters.
3. On the basis of weight remarkably lower fruit borer infestation was recorded by KS-227 (22.30%), D-2-88-6 (22.78%), DBR-8 (25.51%), ABR-1 (27.31%), Muktas Keshi (30.47%) and CHBR-3 (31.67%). As regards fruit borer infestation on the basis of number significantly lower infestation was noted in the genotypes D-2-88-6 (20.11%), DBR-8 (22.90%) and ABR-1 (25.97%).
4. Considerable variation was observed for morphological characters, growth, flowering and fruiting characters, yield attributing characters as well as parameters recorded to screen varieties for infestation of fruit borer under different varieties included in the study.
5. The correlation studies concluded that the number of primary branches per plant, percentage of long styled flowers, number of fruits per plot, number of secondary branches per plant, percentage of medium styled flowers and plant spread were found most important characters which may be given due to consideration while making selection for high yielding.
6. Total phenol content seems to be one of the most important characters for selection a fruit borer resistance genotype/variety under the present investigation. We also observed that the parameters like number of holes per fruit, calyx diameter, total chlorophyll content, number of larvae per fruit

are also not to be ignored while making selection to choose a variety/genotype resistant for fruit borer infestation.

### **Suggestions for future research work**

On the basis of experience gained and results obtained after completion of the present investigation, following suggestions may be given to conduct further research.

1. The genotypes included under this investigation may be evaluated under different climatic conditions of Chhattisgarh to know the stability of these genotypes and to select promising genotypes for wider adaptability.
2. Further evaluation trials with other commercial cultivars along with promising ones from the present investigation may be carried out. This will also help in the selection of suitable varieties for this region and also confirm the results of present investigation.
3. Further trials for screening the genotypes against fruit borer may be carried out, which will also confirm the results of present investigation.



Plate I: High yielding varieties of brinjal (round)



Plate I: High yielding varieties of **brinjal** (round)



Plate II : Varieties with least infestation of fruit borer



Plate II : Varieties with least infestation of fruit borer

# *Abstract*

# "EVALUATION OF BRINJAL (ROUND) VARIETIES UNDER CHHATTISGARH REGION"

by

**Bhagwat Saran Asati**

## *ABSTRACT*

The present investigation entitled "Evaluation of brinjal (round) varieties under Chhattisgarh region" was carried out at Horticultural Research Farm, College of Agriculture, I.G.A.U., Raipur (C.G.) India, during *Rabi* season 2000-2001. Twelve varieties were replicated four times in a randomized block design, to study the performance of these varieties under Chhattisgarh region.

The result of this research work showed that CHBR-3 as well as ABR-1, KS-224 and DBR-8 proved their superiority over other varieties studied in this investigation for most of the yield contributing characters i.e. plant height, number of primary branches per plant, shoot diameter, number of flowers per cluster, percentage of medium styled flowers, weight per fruit, plant spread, plant stand and fruit diameter.

On the basis of fruit weight, remarkably lower fruit borer infestation was recorded by KS-227 (22.30%), D-2-88-6 (22.78%), DBR-8 (25.51%), ABR-1 (27.31%), Mukta Keshi (30.47%) and CHBR-3 (31.67%). As regards fruit borer infestation on the basis of fruit number, significantly lower infestation was noted in the varieties D-2-88-6 (20.11%), DBR-8 (22.90%) and ABR-1 (25.97%).

The correlation studies concluded that the number of primary branches per plant, percentage of long styled flowers, number of fruits per plot, number of secondary branches per plant, percentage of medium styled flowers and plant spread were found most important characters which may be given due consideration while making selection for high yielding varieties in brinjal.

Total phenol content seems to be one of the most important characters for selecting a fruit borer resistance genotype/variety under the present investigation. We also observed that the parameters like number of holes per fruit, calyx diameter, total chlorophyll content and number of larvae per fruit are also not to be ignored while making selection to choose a variety/ genotype resistant for fruit borer infestation.

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## *Literature Cited*

## LITERATURE CITED

- Anonymous, 1998. Commissioner of Land Records, M.P.
- Anonymous, 2000. Udhyaniki Special Issue, Krishak Duniya.
- Anserwadekar, K.N., Warker, D.C. and Khedkar, D.M. 1979. varietal study of brinjal ( *Solanum melongara* L). Res. Bulletin Marathwada Agri. Uni.3 (6):72-75.
- Arumugam, T., Doraipandian, A., Paramaguru, P. and Suthanthirapandian, I.R. 1996. 'KKM-1' A high yielding brinjal variety. South Indian Hort. 44(3-4) : 98.
- Awasthi, C.P., Abidi, A.B. and Dixit, J. 1987. Biochemical constituents of promising cultivars of brinjal. Indian J. Hort 44(3-4) : 245-249.
- Bajaj, K.L., Kaur, Gurdeep, Chadha, M.L. and Singh, B.P. 1981. Polyphenol oxidase and other chemical constituents in fruits of egg plant (*Solanum melongena* L.) varieties. Vegetable Sci. 3(1) : 37-44.
- Chadha, K.L. and Kaloo, G. 1993. Vegetable crops. Advances in Horti.5(1):105.
- Chadha, M.L. and Paul, Balwinder. 1984. Genetic variability and correlation studies in egg plant (*Solanum melongena* L.). Indian J.Hort. 41(3-4) : 101-107.
- Chadha, M.L. and Saimbhi, M.S. 1977. Varietal variation in flower types in brinjal (*Solanum melongena* L.). Indian J.Hort. 34(4):426-429.
- Chadha, M.L. and Sidhu, A.S. 1983. Variability and correlation studies in brinjal. Indian J.Hort. 40(1-2):60-64.
- Chadha, M.L. and Sidhu, A.S. 1987. 'Sada Bahar Baingan' variety of brinjal (*Solanum melongena* L.). J.Res. Punjab Agri. Univ. 24 (2):358.
- Chadha, M.L.; Sharma, C.M. and Bajaj, K.L. 1990. Inheritance of bitterness in brinjal (*Solanum melongena* L.). Indian J.Hort. 47(2):244-249.
- Chauhan, D.V.S. 1981. Vegetable Production in India (3<sup>rd</sup> edn.), Ram Prasad and Sons, Agra, India.
- Choudhary, B. 1976. Vegetables. National Book Trust, New Delhi, pp. 50-58.

- Dalai, N.R., Dalal, S.R., Golliwar, V.J., Thombre, S.K. and Khobragade, R.I. 2000. Studies on growth and yield of some brinjal varieties. *J. Soils and Crops* 10(1):119-121.
- Darekar, K.S.; Gaikwad, B.P. and Chavan, U.D. 1991. Screening of egg plant cultivars for resistance to fruit and shoot borer. *J. Maharashtra Agri. Univ.* 16(3):366-369.
- Dash, A.N. and Singh, B.R. 1990. Field reaction of brinjal varieties against shoot and fruit borer, *Leucinodes orbonalis* Guen. *Environment and Ecology*. 8(2): 761-762.
- Deotale, A.B., Patange, N.R.; Purandare, N.D., Badole, S.B. and Dhamak, A.L. 1998. Evaluation of some brinjal varieties under Parbhani condition. *J. Soils and Crops*. 8(2):165-168.
- Dhankar, B.S. and Sharma, N.K. 1986. Variability in relation to shoot and fruit borer (*Leucinodes orbonalis* Guen.) infestation in brinjal (*Solanum melongena* L.). *Harayana J. Hort. Sci.* 15(3-4):243-248.
- Dhankhar, B.S. and Kirtisingh 1983. Genetic variability and correlation studies in brinjal. *Indian J. Hort.* 40 (3& 4): 221-227.
- Gautam, B. and Srinivas, T. 1992. Study on heritability genetic advance and character association in brinjal (*Solanum melongena* L.). *South Indian Horti.* 40(6): 316-318.
- India, Indian Council of Agriculture Research, 1998. Report. New Delhi.
- Ingale, B.V., Patil, S.J. and Basarkar 1997. Heterosis for biochemical composition of fruits in egg plant (*Solanum melongena* L.). *Indian J. Hort.* 54(4):327-332.
- Jaiswal, R.K., Upadhyay, P.C., Gour, B.B. and Tiwari Y.D. 1997. Performance of brinjal varieties during rabi (winter) season under the central Narmada valley conditions in Madhya Pradesh, India. *International J. Tropical Agri.* 15(1-4):199-201.
- Kaloo, Dixit, J. and Baswana, K.S. 1991. "Hisar Shyamal" is superior to "BR 112" brinjal. *Indian Horti.* 36(21):29,34.

- Kaloo, Sharma, N.K. and Baswana, K.S. 1993. The oblong brinjal "Hissar Jamuni". *Indian Horti.* 38(2): 10-11.
- Kaur, Gurdeep, Bajaj, K.L. and Chadha, M.L. 1985. Quality characters in fruits of egg plant (*Solanum melongena* L.) as affected by maturity. *Vegetable sci.* 12(2): 68-72.
- Krishnaiah, K. 1980. Methodology for assessing crop losses due to pests and diseases. UAS Tech. Series No. 33:259-267.
- Kumar Manoj, Ram, H.H, Singh, Y.V. and Kumar, M. 1997. Screening and breeding for resistance to shoot and fruit borer in brinjal. *Recent Horti.* 4:152-155.
- Kumar, Narendra and Kumar, N. 1995. Inter relationship of quantitative traits in brinjal. *Madras Agri. J.* 82(6-8):488-490.
- Mandal, N. and Dana, I. 1992. Correlation and path association of some yield contributing characters in brinjal. *Experimental Genetics.* 8(1-2):25-28.
- Miller, D.A. Williams, J.C., Robinson, H.F. and Comstock, K.B. 1958. Estimates of genotypic and environmental variances and covariances in upland cotton and their implication in selection. *Agronomy J.* 50:126-131.
- Mishra, N.C. and Mishra, S.N. 1996. Performance of brinjal varieties against fruit and shoot borer (*Leucinodes orbonalis* Guen.) and wilt, *Fusarium oxysporum*. *Indian J. Plant Prot.* 24(1-2):33-36.
- Mishra, P.N., Singh, Y.V. and Nautiyal, M.C. 1988. Screening of brinjal varieties for resistance to shoot and fruit borer (*Leucinodes orbonalis* Guen.). *South Indian Hort.* 36(4): 188-192.
- Mishra, S.N. and Mishra, R.S. 1990. Correlation and path coefficient analysis in brinjal (*Solanum melongena*). *Environment and Ecology.* 8(1A) : 162-166.
- Mohiedden, M.K., Muthukrishnan, C.R., Rajagopal, A. and Mehta, Y.A. 1977. Studies on rate of flowering, flower types and fruit set in relation to

yielding potential of certain egg plant (*Solanum melongena* L.) varieties with reference to weather conditions. South Indian Hort. 25(2):56-61.

Muthukrishnan, C.R. and Shrinivasan, K.M. 1963. Fruit set in *Solanum melongena* L. as influenced by the application of plant regulators. Indian J.Hort. 20:61-63.

Nandi, Alok 1992. A note on the evaluation of brinjal lines. Haryana J.Hort. Sci.

Panda, H.K. 1999. Screening of brinjal cultivars for resistance to (*Leucinodes orbonalis* Guen. Insect Environment. 4(4): 145-146.

Panse, V.G. and Sukhatme, P. 1978. Statistical method for Agricultural workers, 3<sup>rd</sup> revised edi. ICAR, New Delhi. pp-70-99.

Patil, B.R. and Ajri, D.S. 1993. Study on the biophysical factors associated with resistance to shoot and fruit borer (*Leucinodes orbonalis* Guen.) in brinjal (*Solanum melongena* L.). Maharashtra J.Hort. 7(2):75-82.

Popova, D. 1961. A contribution to the study of some problems related to the biology of flowering in the egg plant (*Solanum melongena* L.). Bulgarian with Russian french summaries. Izy. Centre nauc: Izlect. Inst. Rasten. 12:187-207.

Rajgopal, A. Muthukrihnan, C.R. and Mehta, V.A. 1978. Evaluation of long fruited brinjal types at coimbatore .South Indian Hort. 26 (27): 166-170.

Rajgopal, A; Muthukrishnan, C.R. Mehta, V.A. and Mohiedeen, M.K. 1976. Evaluation brinjal varieties (*Solanum melongena* L.). Madras Agri. J. 63:244.

Rajput, J.C; Pandit, S.S., Patil, S.L. and Patel, V.H. 1996. Variability, heritability and inter relationship of important qualitative characters in brinjal Annals Agri. Res. 17(3):235-240.

Sadasivam and Manikam 1992. In biochemical methods for Agri. Sci. Pub. By Willey Eastern Limited, 4835/24, Ansari Road, Daryaganj, New Delhi. 184,187.pp

- Sah, S.S.P., Gupta, S.C. and Yazdani, S.S. 1995. Relative resistance of brinjal cultivars to *Leucinodes orbonalis* Guen. J. Insect. Sci. 8(2): 194-195.
- Selvaraj, Y; Divakar, N.G. and Vijay, O.P. 1974. Note on the biochemical constituents of some improved varieties of brinjal. Indian J. Agri. Sci. 44(12):905-906.
- Sharma, S.S. 1994.. Field reaction of promising brinjal cultivars against Jassids and shoot and fruit borer. Haryana J. Hort. Sci. 23(4):338-340.
- Sharma, T.V.R.S. and Swaroop, Krishna 2000. Genetic variability and character association in brinjal (*Solanum melongena* L.) . Indian J. Hort. 57(1):59-55.
- Shukla, B.C; Gupta, Rajeev and Kaushik, V.K. 1998. Path coefficient analysis of plant and fruit characters affecting the fruit damage by *Leucinodes orbonalis* in brinjal. J. Appl. 2001. Res. (Accepted).
- Siddique, M.A. 1970. Studies on fruit qualities of six different varieties of brinjal (*Solanum melongena* L.) J. Agri. Res., Pakistan. 8(4): 407-409.
- Sidhu, A.S., Kaur, Gurdeep and Bajaj, K.L. 1982. Biochemical constituents of varieties of egg plant. Vegetable Sci. 9(2): 112-118.
- Singh, D.K., Gautam, N.C., Awasthi, C.P. and Singh, R.D. 1988. Biochemical composition of fruits of promising brinjal varieties and hybrids (*Solanum melongena* L.). Vegetable Sci. 15(2):141-148.
- Singh, S.N. and Singh, N.D. 1981. Correlation and path analysis in brinjal. Progressive Horti. 13(1):13-16.
- Singh, V.K and Singh, S.N. 1994. Genetic variability in brinjal (*Solanum melongena* L.). J. Appli. Biology. 4(1-2):16-18.
- Sonone, H.N. Deore, B.P. and Patil, S.K. 1984. Vaishali (RHR-51) a high yielding variety of brinjal for Maharashtra. J. Maharashtra Agri. Uni. 9(3):341-342.
- Tambe, T.B., Rane, D.A. and Kalew, P.N. 1992. Correlation studies in brinjal (*Solanum melongena* L.). Maharashtra J. Hort. 6(2):61-66.

- Tanaka, J.S. 1972. Waimanalo Long-a new egg plant. Hawaii Farm Sci. 21(2):10-11 (En. IPI). Hawaii Agri. Exp. Stn., USA.
- Thomas, T.A Rai, Chandra M., Pratibha, V., Brahmi, K.V. and Rana, R.S. 1990. Building up of genetic resources of vegetable crops, their characterization evaluation, seed increase, maintenance and Utilization at NBPGR (1988-90). Workshop on Vegetable Improvement project. Solan, India. K.L.Chadha and Kalloo (Eds) Adv.Hort. 5(1):107 p.
- Thompson, C.H. and Kelly, C.N. 1957. Vegetable crops. Mc.Graw Hill Book Co. Inc. USA, P.611.
- Tripathi, M.K. and Senapati, B. 1998. Seasonal incidence of *Leucinodes orbonalis* in relation to weather parameters and crop growth stage of brinjal at Bhubaneshwar, Orissa. Orissa J.Hort. 26(2): 37-41.
- Tripathi, M.K.; Senapati, B. and Patra, R. 1996. Seasonal incidence and population fluctuation of *Leucinodes orbonalis* Guen. At Bhubaneshwar, Orissa. Pest Management and Economic Zoology.
- Upadhyay, S.N; Singh, V.P., Singh, R. and Mishra, A.P. 1995. Varietal performance of egg plant (*Solanum melongena* L.). Recent Horti. 2(2):88-90.
- Ushakumari, R. and Subramanian, M. 1993. Causal influence of background traits on fruit yield in brinjal. Indian J.Hort. 50(1):64-67.
- Yadav, S.S., Balakrishnan, K.A., Tomar, B.S. and Singh, Narendra 1994. Assessment of genetic potentiality of brinjal genotypes for growth and yield characters under rainfed condition. Indian J.Hort. 51(3):288-292.

# *Appendix*

**Appendix : Meteorological observations (weekly) during crop growth period (October 22, 2000 to February 25, 2001)**

Month & Year	Standard week	Temperature (°C)		Rainfall (mm)	Relative humidity (%)		Sunshine (hrs)	
		Max.	Min		I	II		
2000								
Oct	22-28	43	34.8	17.7	0.0	86	35	9.5
	29-04	44	31.8	17.3	0.0	86	37	9.7
Nov.	05-11	45	32.2	14.2	0.0	88	25	9.8
	12-18	46	31.7	13.0	0.0	84	23	9.7
	19-25	47	32.0	13.7	0.0	86	28	9.4
Dec.	26-02	48	30.6	13.9	0.0	80	31	9.0
	03-09	49	28.5	7.9	0.0	84	17	9.8
	10-16	50	29.8	8.8	0.0	84	18	9.9
	17-23	51	28.8	8.7	0.0	86	23	9.7
	24-31	52	27.2	7.9	0.0	86	27	9.7
2001								
Jan	01-07	1	25.6	10.9	1.6	84	41	7.7
	08-14	2	28.3	12.0	0.0	78	34	8.4
	15-21	3	28.8	11.3	0.0	79	27	8.6
	22-28	4	28.6	8.9	0.0	75	18	9.8
	29-04	5	31.7	11.7	0.0	71	19	9.2
Feb	05-11	6	31.0	10.6	0.0	74	21	9.8
	12-18	7	32.5	13.0	0.0	65	23	9.7
	19-25	8	33.6	14.8	0.0	65	20	9.7