RESPONSE OF BABY CORN (*Zea mays* L.) TO SOWING PERIODS AND CROP GEOMETRY

THESIS

Submitted to the
Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola
in partial fulfilment of the requirements
for the Degree of

DOCTOR OF PHILOSOPHY
IN
HORTICULTURE
(VEGETABLE SCIENCE)

By
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DECLARATION OF STUDENT

I hereby declare that, the experimental work and its interpretation of the thesis, **"RESPONSE OF BABY CORN (*Zea mays* L.) TO SOWING PERIODS AND CROP GEOMETRY"** or part thereof had neither been submitted for any other degree or diploma of any University, nor have the data been derived from any thesis, publication of any University or scientific organization. The source of materials used and all assistance received during the course of investigation have been duly acknowledged.

Place: Akola

Date: / /2017

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CERTIFICATE

This is to certify that the thesis entitled **"RESPONSE OF BABY CORN (*Zea mays* L.) TO SOWING PERIODS AND CROP GEOMETRY''** submitted in partial fulfillment of the requirement for the degree of **"Doctor of Philosophy in Horticulture (Vegetable Science)"** of Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola is a record of bonafide research work carried out by **Ms. Themmeichon Chamroy** under my guidance and supervision.

The subject of the thesis has been approved by the Student's Advisory Committee.

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ACKNOWLEDGEMENT

"Dream become reality when the effort you put in are sincere"

I would fail in my duties if I do not acknowledge to all the beautiful minds and generous hearts, who have had helped and supported me in various ways and means during the entire duration of my degree program.

First and foremost, all praises and thanks to the almighty God by whose grace bestowed upon me the strength and zeal as a result of which this arduous task has been completed successfully.

I am grateful to the government of the India for providing me the fellowship under the Inspire Programme funded by Department of Science and Technology to pursue full time Ph.D. programme in Horticulture (Vegetable science). I equally owe my special debt of gratitude to the university, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola for allowing me to attain the study.

I consider it a great fortune and privilege to have esteemed Dr. V. S. Kale, Associate Professor, Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola as my Chairman of Advisory committee, who through his noble advice, constructive criticism, unceasing encouragement, strong commitment and endeavour for perfection guided me from the very conception to the end of this work. I owe my deepest sense of gratitude and respect for all his whole hearted devotion and determination in guiding me throughout this entire period of investigation. It would have never been possible for me to present this thesis, in its present form, but for his exceptional analytical and outstanding supervision.

I'm equally indebted and convey my sincere gratitude to all the members of my advisory committee, Dr. V. N. Dod, Former Head Department of Horticulture (Retired), Dr. P. K. Nagre, Professor and Head Department of Horticulture, Dr. S. S. Wanjari, Associate Professor of Agronomy, Dr. S. W. Jahagirdar, Retired Associate Professor of Agriculture Economics and Statistics, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, for their constant valuable suggestions, guidance and co-operations from time to time during the investigation.

I am obliged to Dr. V. M. Bhale, Dean, Faculty of Agriculture, Dr. PDKV, Akola for providing all the necessary facilities in carrying out my research work.

I am grateful to Dr. V. K. Kharche, Associate Dean, Post Graduate Institute, Dr. PDKV, Akola for giving the essential resources for my doctoral degree programme.

Department of Horticulture, a prominent centre for learning, open for all and to all has always made me believed in the greater side. I'm indeed privileged to be a part of this Department. I'm deeply obliged and grateful to Dr. S. G. Bharad, Associate Professor of Horticulture, Shri A. P. Wagh, Associate Professor of Horticulture, Dr. P. M. Chandan, Assistant Professor of Horticulture, Shri A. M. Sonkamble, Associate Professor, Dr. P. S. Joshi, Assistant Professor, Dr. U. A. Raut, Assistant Professor and Shri. P. S. Umbarkar, Senior Research Assistant, for their kind gestures, constant encouragement and worthy guidance throughout the duration.

My humble gratitude goes to, Shri. S. L. Wankhade, Shri. H. S. Wadekar, Shri. S. N. Raut and Shri. M. R. Tumbde, Agriculture Assistant, for rendering every possible help during my field work and to all the non-teaching staffs of the Department and college of Horticulture, Dr. PDKV, Akola for their constant help, support and co-operation.

Words fall short in expressing my heartfelt gratitude and love to all my dear friends and colleagues, Vijaya, Rajanee, Sonali, Neeta, Kuntal, Sarika, Asani, Shrutika, Zingkhai, Anil and Pradeep for their pleasant company, constant support, immense co-operation, every possible help, and availing themselves whenever needed. Thank you all so much for sharing and making my stay and years memorable.

I am in dearth of words to convey my deepest sense of respect, love and gratitude to my parents, whose unconditional love, untiring effort, immense support, prayers and unceasing encouragement help me reach this feat and make me what I'm today for which I will remain indebted all my life. I also convey my heartfelt love and gratitude to all my brothers and sisters for their immense love and support throughout my life so far.

I am also thankful to M/s Shri Grafix, Akola for their neat type setting in preparing this dissertation.

Many more people helped me indeed in one or the other way, and even if I don't list them all, their help and kind gestures holds dear and truly grateful in my heart.

Lastly but not the least, my honour to all the researchers, authors, workers and scholars who had rendered their valuable time of life to research work and keeping records and journals of books, which have helped me in organising my research work in proper line and utilize proper tools for interpretation of the results of my dissertation.

Thanking each and every person for materializing this dream come true.

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(D) List of Abbreviations

%	-	Per cent
/	-	Per
@	-	At the rate
Anon.	-	Anonymous
BC ratio	-	Benefit cost ratio
°C	-	Degree Celsius
CD	-	Critical Difference
cm	-	Centimetre
cm^2	-	Centimetre square
DAS	-	Days after sowing
et al.	-	et alia (and others)
etc.	-	Etcetera
FYM	-	Farm yard manure
Fig.	-	Figure
g	-	Gram
/g or g^{-1}	-	Per gram
ha^{-1}	-	Per Hectare
i.e.	-	That is
K_2O	-	Potassium
kg	-	Kilogram
kg^{-1}	-	Per kilogram
LAI	-	Leaf area index
m	-	Meter
Max.	-	Maximum
Met.	-	Meteorological

mg	-	Milligram
Min.	-	Minimum
mm	-	Milimeter
MOP	-	Muriate of potash
MT	-	Metric tonnes
N	-	Nitrogen
No.	-	Number(s)
NS	-	Non-significant
P	-	Phosphorus
$Plant^{-1}$	-	Per Plant
$Plot^{-1}$	-	Per Plot
P_2O_5	-	Phosphate
q	-	quintal
RH	-	Relative Humidity
Rs	-	Rupees
SE(m)$\pm$	-	Standard error of mean
Sig.	-	Significant
SSP	-	Single super phosphate
Temp.	-	Temperature
t	-	tonne (s)
viz.	-	Namely (videlicet)
Wt.	-	Weight

(F) **Thesis Abstract**

1. Title of the thesis	**:**	**''RESPONSE OF BABY CORN (*Zea mays* L.) TO SOWING PERIODS AND CROP GEOMETRY''**
2. Name of the student	**:**	**THEMMEICHON CHAMROY**
3. Name and Address of the Major Advisor	**:**	**Dr. V. S. Kale** Associate Professor Department of Horticulture Dr. P.D.K.V., Akola
4. Degree to be awarded	**:**	Ph.D. (Horticulture)
5. Year of award of degree	**:**	
6. Major Subject	**:**	Vegetable Science
7. Total number of pages In the thesis	**:**	200
8. Total number of words In Thesis abstract	**:**	727
9. Signature of the student	**:**	
10. Signature, name and address of forwarding authority	**:**	

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ABSTRACT

An experiment entitled "Response of baby corn (*Zea mays* L.) to sowing periods and crop geometry" was carried out during 2013-14 and 2014-15 at Main Garden, Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (M.S.).

The experiment was laid out in factorial randomized block design with three replications and twenty treatment combinations with factor A i.e. four sowing periods; P_1 (35th met. week; last week Aug.), P_2 (39thmet. week; last week Sept.), P_3 (43rd met. week; last week Oct.) and P_4 (48th met. week; last week Nov.) and factor B i.e. five different crop geometry ; S_1 (30cm × 30cm), S_2 (45cm × 15cm), S_3 (45cm × 30cm), S_4 (60cm × 15cm) and S_5 (60cm × 30cm).

The different sowing periods were found to influence the growth, yield and quality of baby corn. Among all the sowing periods under study, P_2 (39th met. week; last week Sept.) exhibited significantly the highest values of almost all the plant growth characteristics such as plant height (198.73 cm), number of leaves plant^{-1} (12.96), leaf area (509.28 cm^2), LAI (3.49) and leaf chlorophyll content (1.95 mg g^{-1}). However significantly, the minimum number of days to 50% cob emergence, 50% tasseling, 50% silking and harvest i.e. 48.77, 48.57, 51.82 and 52.4 days respectively was observed in the sowing period P_1 (35th met. week last week Aug.). The yield and its attributing characters like cob length (10.96 cm), number of cobs plant^{-1} (2.96), cob weight with husk (49.76 g) and without husk (8.97), cob yield with husk(146.95 g) and without husk (26.43 g) plant^{-1}, yield with husk (10.47 kg) and without husk (1.89 kg) plot^{-1}, yield with husk (387.75 q) and without husk (70.13 q) hectare^{-1}, fodder yield hectare^{-1} (36.24 t). However the treatment P_3 (43rd met. week;last week Oct.) exhibited highest quality parameters; protein (17.37 %), fibre (5.57 %), total sugar (3.33 %) and reducing sugar (3.29 %) content as well as dry matter accumulation plant^{-1} (166.03 g).

The crop geometry was also found to influence significantly the growth, yield and quality of baby corn. Most of the growth parameters such as number of leaves plant^{-1} (13.04), leaf area (511.76 cm^2), leaf area index (3.56) and leaf chlorophyll content (2.34 mg g^{-1}) were found maximum in crop geometry S_3 (45 × 30 cm), which also shows the maximum cob length (11.04 cm), cob weight without husk (19.17 g) and all the quality parameters; protein (17.95 %), moisture (89.51 %), total sugar (3.36 %) and reducing sugar (3.32 %) content, while S_1 (30 × 30 cm) recorded the highest fibre content (5.59 %). The dry matter accumulation $plant^{-1}$ (172.89 g), No. of cobs $plant^{-1}$(3.04), cob weight with husk (50.87 g), yield $plant^{-1}$ with husk (155.13 g) and without husk (27.21 g) were obtained in the wider geometry S_5 (60 × 30 cm). However, the closer geometry S_2 (45 × 15 cm) gives highest plant height (199.44 cm), yield $plot^{-1}$i.e. with husk (11.41 kg) and without husk (2.06 kg), yield $hectare^{-1}$ i.e. with husk (422.74 q) and without husk (76.29 q) and fodder yield (40.44 t ha^{-1}).

Among the treatment combinations, it was observed that P_2S_3 (39^{th} met. week; last week Sept. + 45 × 30 cm) exhibited highest values for almost all the growth parameters; number of leaves $plant^{-1}$ (13.63), leaf area (512.62 cm^2), LAI (3.62) and chlorophyll content (2.40 mg g^{-1}). Whereas the treatment combination P_2S_2 (39^{th} met. week; last week Sept. + 45 × 15 cm) gives highest plant height (205.47 cm). The yield and yield attributing characters such as, number of cobs $plant^{-1}$(3.43), cob weight with husk (54.34 g) and cob yield $plant^{-1}$with husk (186.53 g) and without husk (31.64 g) were found highest in P_2S_5 (39^{th} met. week; last week Sept. + 60 × 30 cm). While the treatment combination P_2S_3 (39^{th} met. week; last week Sept. + 45 × 30 cm) recorded maximum cob weight without husk (9.87 g) and cob length (11.32 cm). However, P_2S_2 (39^{th} met. week; last week Sept. + 45 × 15 cm) exhibit highest fodder yield (40.85 t ha^{-1}), yield $plot^{-1}$; with husk (12.02 kg) and without husk (2.19 kg), yield $hectare^{-1}$; with husk (445.01 q) and without husk (81.10 q).

The treatment combination P_2S_2 (39^{th} met. week;last week Sept. + 45 × 15 cm) obtained the highest gross monetary returns (Rs. 324997.03 ha^{-1}), net returns (Rs.186640.51 ha^{-1}) and B:C ratio (2.35).

CHAPTER I

INTRODUCTION

1.1 Background Information

Vegetables are an integral part in the balanced diet of human being, regardless of age groups in any part of the world. They are consumed either cooked or raw as a main part of meal, side dish, salad or appetizer. Being rich in vitamins and minerals vegetables are known as protective food (Gopalakrishnan, 2007 According to recommendation given by Indian Council of Medical Research (ICMR) an average man with vegetarian or non-vegetarian food habit should consume 300g vegetables per day, which include 125g leafy vegetable, 100g of root vegetable and 75g of other vegetables (Fageria *et al*. 2012) while the availability in India is 145 grams only. Thus vegetables are getting increasingly higher importance in India as well as in the world due to their relevance in achieving nutritional security from emerging nutritional problems in human being today.

India is the second largest producer of fruits and vegetables in the world. The horticulture production of the country during the year 2015-16 is estimated to be around 286 million tonnes from an area of 24.5 million hectares, out of which vegetable production accounts 169 million tonnes from an area of 10.1 million hectares. While, as per the 1st Advance Estimate released by Agriculture ministry, the horticulture production of the country during 2.16-17 is estimated to be around 287 million tonnes from an area of 24.4 million hectare, out of which vegetable accounts 168.6 million tonnes production of vegetables from an area of 9.95 million hectare (Anon. 2017). An increase of 2.5 % per year in vegetable production is required to fulfill the requirement of Indian population (Anon. 1998).

India grows maximum number of vegetable crops due to diversity of agro climatic condition. Nearly 60 kinds of fruits, leafy, roots, bulbs, tubers and other types of vegetables are cultivated in our country.

Grain production in the country has touched the plateau and food security was sustained. Nevertheless the economic potential of Indian farmers needs to be enhanced at utmost priority because grain production alone is no more remunerative. Therefore, now it has become essential to ponder that, how the crop cultivation itself can excel the economic condition of the farming community. An interesting recent development in this context is cultivation of maize for vegetable purpose as baby corn.

Baby corn is not a separate type of corn like sweet corn or popcorn and any corn type can be used as baby corn. It is the dehusked maize ear, harvested young especially when the silk have either not emerged or just emerging and no fertilization takes place or the shank with unpollinated silk is baby corn. Baby corn ears are light yellow colour/off white with regular row arrangement, 10 to 12 cm long and a diameter of 1.0 to 1.5 cm arrangement are preferred in the market. It is a short duration crop (65-75 days) and enters into the reproductive phase at 55 days after sowing (DAS) i.e. economic product is harvested just after silk emergence (1 to 2 cm long) stage.

Baby corn *(Zea mays* L.) belongs to the family *poaceae and is a* monoecious plant. It produce large, narrow opposite leaves borne alternatively along the length of the stem. The diploid chromosome number is 2n=20. Mexico and Central America is considered to be the centre of origin of corn.

Baby corn is a warm season, photo insensitive crop that can be grown easily over a range of agro climatic zones. In fact, the suitability of corn to diverse environments is unmatched by any other crop. It is grown from 58° N to 40° S, from below sea level to altitudes higher than 3000 m, and in areas with 250 mm to more than 5000 mm of rainfall per year. However, baby corn being a C_4 plant requires sunny days for accelerated photosynthetic activities and fast growth.

Baby corn grows well in a wide range of soil types but it thrives best in loose soil with good drainage and soil pH range from 5.5 to 7.0. It can also grow in quite acidic soil, but cannot grow in wetland with low drainage. Consequently, successful growth requires a minimum average temperature of 22 or 23°C. The agronomic requirement of baby corn is similar to grain maize except for a suitable variety, plant density, higher doses of nitrogen and most importantly early harvesting. The crop can be sown round the year in southern India and from February to November in northern India.

Baby corn production being a recent development has proved enormously successful in countries like Thailand, Taiwan, Sri Lanka and Myanmar. Today, Thailand and Taiwan are the world leaders in baby corn production and have emerged as largest exporters. In India, this industry is still at the juvenile stage and increasing attention is being paid by the Indian Council of Agricultural Research to explore its potential. Recently, baby corn cultivation is now picking up in Meghalaya, Western Uttar Pradesh, Haryana, Maharashtra, Karnataka and Andhra Pradesh (Ramachandrappa *et al*., 2004). In India, it is grown on 9.43 m ha area with the production and productivity of 24.35 m t and 2583 kg ha-1, respectively (Anon. 2014). Rajasthan State was first in respect of area, where in this crop occupies 10.5 lakh ha area (12.9%) with production of 19.5 lakh tones and productivity of 18.6 q ha^{-1} (Anon.2010).

In late 1970s people in USA and western countries started to consume the young raw cobs. Baby corn can be consumed in fresh form or used as an ingredient in various preparations like chop-suey (Chinese dish), soups, deep fried with meat or rice, sautéed with other vegetables, pickles, corn pakoras, etc. Fresh baby corn ears used as decorative, crisp vegetable in salad. It is popular as canned or stir-fried with vegetables in Chinese-American restaurants.

The nutritive value of baby corn is comparable with several high-priced vegetables like cauliflower, cabbage, French bean, spinach, okra, brinjal, tomato, radish, etc. Baby corn contained 90.03, 17.96, 2.13, 5.30 and 5.89 percent moisture, protein, fat, ash and crude fiber, respectively. Total soluble sugar content is 23.43 g/100gm and reducing sugar is 1.96 g/100gm. It also contains 8.10 g/100gm of cellulose, 5.41

g/100gm of lignin, 5.43 mg/100g of ascorbic acid. Calcium, magnesium and phosphorus content of baby corn are 95.00, 345.00, 86 mg/100g, respectively. Thus, baby corn is good source of various nutrients and minerals and its nutritional quality is at par or even superior to many other commonly used vegetables (Hooda and Kawatra, 2013).Besides its nutritive advantage, it is also free from residual effect of pesticides (because it is harvested within a week of emergence and the young cob is wrapped up tightly with husk and well protected from natural enemies giving very little time to the disease and insect-pests to attack), whereas other vegetables cannot be grown without the protected umbrella of pesticides.

1.2 Importance and need of the study

Baby corn cultivation promises to have an important role in the future of crop production due to its fresh and safe product. The short growth duration offers an intensive rotation cultivation system which is an excellent solution for promotingeconomic and poverty alleviation in countries with high populations like India. Theother advantage of growing baby corn is its remaining biomass after harvesting which can be use as feed for animal and aquaculture raising (Nguyen Van Sua, 2003).

Cultivation of baby corn to diversify cropping patterns and to increase productivity of the cropping systems has been considered important for improving the livelihood of resource poor farmers in South Asia. This approach can fetch very high income within a quite short period i.e., 3-4 crops can be raised in year giving good profit per unit area per unit timeand at the same time can generate rural employment for the rural poor.

Information on the optimum crop geometry to explore the available resources and suitable sowing dates for better performance and utilization of available moisture on baby corn yield and quality is meagre.Sowing period is an important factor influencing the performances of the crop since it is important for better utilization of available moisture and nutrients supplied to the crop. Planting date was reported to affect the growth and yield of corn significantly. Either early planting or late planting can result in lower yield because the probability exists that unfavorable climatic conditions can occur after planting or during the growing season. Norwood (2001) suggested that farmers should plant on more than one planting date in order to safeguard against unpredicted seasons.

Space available to the individual plant is also important which decides the utilization of soil resources and also harvest of solar radiation**,** both together, in turn decides the yield of baby corn. A spatial arrangement of plant governs the shape and size of the leaf area per plant, which in turn influences efficient interception of radiant energy and proliferation and growth of shoots and their activity. It is of great importance to establish the optimum crop geometry for the region concern, because unlike the plants of tillering traits i.e.; rice or wheat baby corn cannot compensate for lost space. Maximum yield can be expected only when plant geometry allows individual plant to achieve their maximum inherent potential.

In recent year baby corn has been gaining popularity among growers in India because of its several uses and advantages. However the location specific technologies are not available. Therefore agro-techniques to achieve higher production are the need of the day.

1.3 Objectives of study

Informations on the optimum crop geometry to explore the available resources and suitable sowing periods for better performance and utilization of available moisture on baby corn yield and quality is meagre. Keeping this background in mind, the present study on “Response of baby corn (*Zea mays* L.) to sowing periods and crop geometry” was carried out at the Main Garden, Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth , Akola with the following objectives.

1. To study the effect of different sowing period on yield and quality of baby corn
2. To study the effect of crop geometry on yield and quality of baby corn

3. To find out the most suitable combination of sowing period and crop geometry on yield and quality of baby corn under Akola condition.

1.4 Hypothesis

Baby corn cultivation being a relatively new introduction in our country as vegetable requires the development of suitable production technology for realizing higher Baby corn yield coupled with higher monetary returns.Time of sowing and crop architecture management have greater influence on higher yield of baby corn.

Baby corn cultivation in Akola condition is new practice though ‘maize’ is grown here commercially in kharif season. This crop is cultivated mainly in western countries. The sowing periods and crop geometry recommended for those regions may not be suitable for Vidarbha condition. Therefore there is need to find out suitable sowing period and crop geometry suitable for the region considering its base of maize. Sowing periods and crop geometry were decided by climatic factors such as temperature, humidity, rainfall and light intensity and duration.

1.5 Scope and Limitations

Scope

There is a considerable scope in the region for promoting and developing baby corn production technology because of its several uses and importance. “Baby corn” is a highly versatile and profitable crop with high-yield and fast-growth habit that allows a diversification of production, aggregation of value with increased income (Pandy *et al.*, 2002).

Baby corn crop despite of being short duration is a drought resistant crop with low expenses on disease and pest management due to lower incidence.

Being a C_4 plant, crop has efficient photosynthetic pathway, low CO_2 compensation point and light saturation point resulting higher yield.These characteristics make it suitable for wider use and production in the developing world.

Change in food habit from non-vegetarian to vegetarian aggravated the consumption of vegetables especially baby corn (Thavaprakaash *et al*., 2006). Its delicate, tender, sweet flavour and crisp nature contribute to its increasing popularity making it an indispensable ingredient in many fancy dishes today. With the increasing concern for health, people have turned towards quality food in place of bulky items. Baby corn has prime place as a safe and quality vegetable. As a product, it is important in Thailand and a few other countries. However, because of globalization, other countries including India have increased interest in this crop.

Baby corn can be effectively used as both a nutritious vegetable and as an export crop to earn valuable foreign exchange. This novel use, known as baby corn (candle corn in Thai cook books), is becoming popular in domestic and foreign markets and has enormous processing and export potential.

Since only immature cobs are harvested as the economic produce, the crop meant as baby corn can be harvested within 50-55days of sowing. Thus in the areas adjoining to cities or other urban areas (peri-urban agriculture) multiple crop of baby corn can be raised which would fetch higher income to the farmers.

Limitations

Despite of all its benefits the lack of knowledge about the use, economic and nutritional importance of baby corn and non-availability of appropriate production technology are the major constraints for its popularization among Indian maize growers.

Some other limitations are less availability of quality seed, lack of processing facility, lack of proper storage facilities and lack of marketing facility.

CHAPTER II

REVIEW OF LITERATURE

The investigation on "Response of baby corn (*Zea mays* L.) to sowing periods and crop geometry" was conducted during the academic year 2013-14 and 2014-15 with an objective to study the effect of different sowing period and crop geometry on growth, yield and quality of baby corn. Several factors viz. soil, climate, nutrients and growing seasons influenced the performance of the plant. Amongst all these factors, optimum sowing period and crop geometry is of utmost importance for better performance and maximum utilization of available resources which in turn decides the yield and quality of baby corn.

The relevant literature regarding the study on effect of different sowing period and crop geometry on growth, yield contributing characters and yield of baby corn under different agro-climatic conditions by various scientists and researchers have been reviewed and the available literature presented in this chapter under the appropriate headings and sub headings.

2.1 Effect of Sowing periods

2.1.1 Growth parameters

2.1.2 Yield parameters and yield

2.1.3 Quality parameters

2.1.4 Economics and light interception

2.2 Effect of Crop geometry

2.2.1 Growth parameters

2.2.2 Yield parameters and yield

2.2.3 Quality parameters

2.2.4 Economics and light interception

2.1 Effect of Sowing dates

Sowing period is probably the most important subject of variation because of the differences in weather at sowing time between seasons and within the range of climates (Otegui *et al*. 1995). Under dryland conditions Oktem in 2000 conducted a trial to determine the sowing dates of corn (*Zea mays* L. saccharata) and stated that, the year to year variation in plant establishment, pest and diseases incidence makes it difficult to predict the optimum sowing dates for maize crop.

2.1.1 Growth parameters

Imholte and Carter (1987) studied the effect of planting date and tillage on corn and observed that delay of sowing caused declined in growth of the plant and cooler soil associated with reduced seedling emergence, delay in silking and also days to harvesting.

Caruso (1995) conducted field trials on sweet corn cv. Rival sown on six dates between 7 June and 6 August near Naples, Italy and reported that Leaf area index, crop growth rate and net assimilation rate were higher for the earlier sowing dates.

Sencar and Gokmen (1997) evaluated two sweet corn hybrid sown on three dates with conventional sowing method of sweet corn. The result revealed that, delay in sowing time causes decreased in tasseling.

Lee *et al.* (2007) conducted studies on optimum plant population of a super sweet corn hybrid at different sowing dates i. e. 1st April, 1st May, and 1st June and reported that the sowing date, 1st May was significantly superior in comparison to other sowing dates.

Williams and Lindquist (2007) carried out an experiment for two years at different dates i.e., 6 May (early) and 21 June (late) in the year 2004 and 2 May (early) and 20 June (late) in 2005. Results showed that early sowing date was more beneficial for sweet corn.

In North Central United States, Martin (2008) studied effect of planting dates on sweet corn. The results of the study revealed that, crop development was more rapid as planting was delayed from mid-April to early July as evidenced by fewer days needed to achieve silking. Maximum height generally increased through planting dates with as much as 23% taller plants in early July versus mid-April planted sweet corn. Delayed planting also resulted in plants with fewer leaves. Leaf area per plant, LAI, and chlorophyll content were also lowest in the early July planting date, but only in a single year.

Jat *et al*. (2009) conducted an experiment on the effect of fertilizer levels and dates of sowing on growth and yield of sweet corn in Pune during kharif 2005. The treatments consisted of 4 sowing dates (7th June, 21st June, 7th July and 21st July) and 3 fertilizer levels, i.e. 120:60:60 kg N:P:K/ha, 90:45:45 kg N:P:K/ha and 60:30:30 kg N:P:K/ha. The greatest plant height (127.10 cm) and leaf area (0.44 dm^2) were recorded at 21st July sowing.

Rahmani *et al*. (2010) in order to investigate standard ear yield and some agronomic characteristics of baby corn under influence of planting date and plant density an experiment was conducted at Mashhad, Iran in 2010. Three planting date (14th June, 3rd July and 24th July) were studied. The result of the study revealed that, there was a significant differences between different sowing dates on growth parameters of baby corn. The highest plant height (162.6 cm), maximum ear length (67.46 cm) and highest number of leaves above ear (6.3) were obtained on 24 July sowing.

At Peshawar, Pakistan during 2008 Khan *et al*. (2011) conducted a study to document some phenological stages and grain yield of landraces of sweet corn planted on different dates. Sweet corn landraces, MNG, MNS, SWB, PRC and cv. Azam were planted on 5 dates i.e. 17th March, 30th April, 17th May, 21st June, and 26th July. They reported that days to tasseling and silking enhanced as the planting was delayed and days to maturity decreased when sowing was delayed from March to June, however further delay in sowing has increased number of days to cob maturity.

Kolo *et al.* (2012) studied the effect of planting date and weed management on maize. The planting dates were, 2nd July, 16th July, 30th July and 13th August. From the result of the study, they concluded that planting date significantly affected the maize grain yield with delay in planting dates.

Moosavi *et al*. (2012) studied the effect of planting date and plant density of corn in Iran, the planting dates were July 4, July 21 and August 6. The results showed that delay in sowing from July 4 to August 6 decreased significantly the plant height, stem diameter, leaf area index by 15.7, 20.9, 42.1 % respectively.

Verma *et al*. 2012 conducted field experiment during *rabi* season of 2006-07 and 2007-08 to study the effect of sowing dates and INM on growth, yield and quality of winter maize. The three sowing dates were (15th Oct, 25th Oct and 5th Nov). Among the three sowing dates, the crop sown on 25th Oct significantly enhanced the growth characteristics viz. plant height, leaf area index, days to silking and maturity.

Talware (2013) studied the effect of three sowing dates i.e., 6th July, 20th July and 3rd August on sweet corn at Akola condition during 2011-2012. It was observed that, the plants sown on 6th July gave the highest plant height (230.17 cm), 50 % silking (44.51 days) and 50 % tasseling (43.45 days). While the number of leaves (11.91), leaf area (3713.41 cm^2) chlorophyll content (52.94 %) was significantly higher at 3rd Aug sowing time.

Maga *et al.* (2015) conducted a field study at the Teaching and Research Farm of the University of Agriculture, Makurdi, Southern Guinea, during 2012 cropping season to determine the effect of different sowing dates on the growth and yield of maize. They evaluated two maize varieties, TZESR-Y and QPM under three different sowing dates (4th May, 18th May and 1st June). The result showed that, early sowing had significant and positive effect on growth components of maize crop. The highest plant height (96.40 cm), number of leaves per plant (20.04) and leaf area (232.40 cm^2) were observed at 18th May sowing date.

Rahmani *et al*. (2015) in order to investigate standard ear yield and some agronomic characteristics of baby corn under influence of planting date and plant density conducted an experiment at Khorasan Razavi Agricultural and Natural Resources Research center, Mashhad, Iran in 2010. The planting date (14 June, 3 July and 24 July) were arranged in main plots. The results indicated that different planting dates had significant effects on agronomic traits. The maximum plant height (162.6 cm), number of leaves above ear (6.3) and yield (13240 kg/ha) was observed in 24 July planting date. The highest and lowest ear length was obtained in 14 June and 24 July which were about 9.3 and 7.5 cm respectively, while the 24 July planting date recorded highest value for ear diameter. However, concerning to marketability the 3 July planting obtained the best value of ear length and diameter. During the same year, Singh *et al*. studied three sowing dates (1st October, 30th October and 29th November) on baby corn (*Zea mays* L.) under Allahabad condition. The baby corn planted on 1st October recorded significantly higher plant height (79.36 cm), number of leaves/plant (9.17), leaf length (62.76 cm) and plant dry weight(5.33 q/ha) followed by 30th October sowing date. While, the maximum days to tasseling and silking was recorded on 29th November sowing.

2.1.2 Yield parameters and yield

Mckerlie *et al.* (1968) conducted a trial of sweet corn cultivar Golden Bantam on five sowing dates, from 4 October to 22 December and reported that Sowing on 14 November gave the highest yield which was statistically higher than the yield from the 1st but not from other dates.

At Corvallis Oregon, Sisson (1982) studied the effects of sowing date, nitrogen and boron application on mineral element concentration in cob yield, dry weight and fresh weight of sweet corn (Zea mays L. cv. Jubilee). The crop was planted on May 15, 30, and June 14 in 1979; and May 5, 20, and June 8 in 1980 to represent early, mid-season and late season commercial planting dates and reported that, planting date also affected the fresh and dry weight of whole plants; the later planting produced more dry weight than the earlier two plantings, while the early planted corn produced more fresh weight at harvest than the later two plantings.

Aldrich *et al*. (1986) stated that maize planted early develops better and has higher yield potential because the vegetative growth period of development occurs in the cooler part of the season when moisture stress is less likely to occur.

Caruso (1995) reported highest yield parameters of sweet corn with the 7^{th} June sowing date and decreased with delay in sowing, with the lowest yield with sowing on 6 August.

Sar and Abak (1997) conducted the experiment in Turkey on sweet corn by sowing at 12 or 22 February and 4 March, grown under tunnels and in the open condition and reported that sowing dates did not affect yield, but tunnels increased yield by 20 %. During the same year Sencar and Gokmen reported decreased number of ear per plant with delay in sowing, while the plant height, ear length and single ear weight of sweet corn was increased.

White (1997) studied the performance of sweet corn cultivar with three planting date (March 16, 30 and April 13) to evaluate their effect on yield and reported that, the average yield as measured by the number of ears was lowest for the March 16 planting date and highest for the April 13 planting date.

Sari *et al.* (2000) recorded the effect of sowing times on yield and some agronomical characteristics of sweet corn at Gapa area of turkey. Sowing were done at 15-day intervals i.e. (7April, 21 April, 4 May, and 18 May) and (9 April, 22 April, 5 May, 16 May). The April sowing was considered preferable for better ear yield.

Norwood (2001) conducted a research in Kansas from 1996 to 1999 to determine the effects of hybrid maturity, planting date and plant population on the yield of dryland corn. Five hybrids with maturities of 75, 92, 98, 106 and 110 days were planted in mid-April and early May of each year and thinned to plant population of 30,000, 45,000 and 60,000 plants per hectare. The result revealed that, the early May planting always produced higher yield (40.2 q ha^{-1}) than those of mid- April planting (22.1q ha^{-1}).

Najafinia (2002) examined maize sowing date in Orsoiieh tropical region and found no statistically significant difference in maize yield for sowing dates from 3rd February to 17th March.

Anil and Sezer (2003) conducted an experiment during 1996 and 1997 in Carsamba Plain, to determine the effects of different sowing dates, i.e. 10 May (transplanting) and 10, 20 and 30 May (direct sowing), on the fresh ear yield, yield characteristics and quality of sweet corn cultivars Fortune and Taste. Ear number per parcel, ear yield per parcel and single ear weight were highest with 10 May sowing, while dry matter was highest with 20 and 30 May sowing.

Danaie *et al.* (2004) conducted the field trial on planting date on winter planting of sweet corn. The planting dates were, Feb 9, Feb 21, Mar 4, Mar 16. The results of the study revealed that, 9 Feb sowing date is best for higher yield character. During the same year, Oktem *et al.* conducted a study to determine optimum sowing date for sweet corn. Sowing dates were, April 25, May 10, May 25, June 10, June 25, July 10, July 25 and August 10. Among all the dates, the 25 July sowing recorded highest fresh ear yield.

Kgasago (2006) investigated the effects of planting date, plant density and cultivar on yield and yield components of maize at each two selected areas (Bethlehem and Potchefstroom) in South Africa during 2004-05. The planting dates in Potchefstroom commenced from 26th October (early), 23rd November (optimum) and 4th January (late). While in Bethlehem planting dates were from 3rd November (early), 30th November (optimum) and 5th January (late). From the observations recorded, they concluded that, at both localities early and optimum planting dates as well as low and optimum plant densities promoted increases in yield components and yield.

Tamaddon and Amini (2007) carried out field trial to study the effect of planting time and density on yield and yield components of sweet corn. Planting dates were, 25th April, 15th and 25th May and 9 June. The highest yield was recorded at 25th April sowing.

Luchsinger and Camilo (2008) evaluated Sweet corn cultivar and their behavior with different sowing time (12 October, 5 November, 15 December and 8 January). The results revealed that, sowing time of 12 Oct. and 5 Nov. was superior over the others for yield.

Martin (2008) sweet corn yield components consistently decreased in the early July planting date. Number of ears and green mass were comparable among the first three planting dates, averaging 1290 boxes/ha and 19.6 mg ha^{-1}, respectively. In contrast, the early July planting date yielded on average 583 boxes/ha and 6.6 mg ha^{-1} of green ears. For instance, husked mass yield and kernel mass yield were 61% and 63% respectively, of yields of May-planted plots in 2007.

Mokhtarpour *et al.* (2008) determined the effect of sowing date and plant density on the yield quantity and quality of sweet corn. They observed significant differences in forage yield of sweet corn when sown on different dates like 9 April, 29 April,19 May, 8 June. The maximum dry forage yield was obtained on the second (29 April) planting date in Iran.

Jat *et al*. (2009) during kharif 2005 in Pune conducted an experiment on sweet corn, by sowing the seeds in four dates i. e., 7th June, 21st June, 7th July and 21st July reported highest cob yield (10.89 t/ha) and green fodder yields (20.21 t/ha) on 21st July sowing date.

Mohammadi *et al.* (2009) studied the effect of plant density and sowing time on economic yield and sugar content of sweet corn. The sowing dates were from May 22th, June 10th, July 1st and July 21st. The results of the study revealed that sweet corn sown on 10th June produced highest fresh ear yield in South Iran.

Panahi *et al*. (2010) in order to study the variations of sweet corn to sowing dates, conducted an experiment at Central Iran during

2007-2008. Crops were sown at two sowing dates (5th and 20th of May). The results indicated that the effect of sowing dates on yield and yield components had no significant differences. However the first sowing date provided suitable condition for growth and enough opportunity for harvesting fodder.

Rahmani *et al*. (2010) reported that planting date did not have a significant effect on number of ears per plant. The highest ear length (9.3 cm) was obtained on sowing date of 14th July, while the highest ear diameter (15.75 cm) and highest baby corn yield of 13240 kg ha^{-1} was obtained in 24th July sowing date.

Arash *et al.* (2011) observed that, among the four sowing dates i.e. 4th May, 24th May, 15 June and 3 July, early sowing on 4th May found to be best for yield of sweet corn.

Kara (2011) studied the response of fresh ear yield and growing degree days of sweet corn to sowing times, using different sowing date from 1st April, 15th April, 1st May, 15th May, and 1st June. The highest ear diameter, ear length, number of kernel per ear and ear weight of sweet corn were observed at 1st May sowing date.

Khan *et al*. (2011) reported that sweet corn planted on 26th July produced more yield (2960 kg ha-1) while 17th May planting gave lowest grain yield (1690 kg ha^{-1}). However, the highest biological yield (15778 kg ha^{-1}) was recorded in 17th March planting, while minimum (10611 kg ha^{-1}) was recorded in 17th May planting.

Izadi *et al.* (2012) evaluated the effect of planting dates (July 14 and 24 July) on sweet corn and reported that, sowing time had significant effect on ear length and cob yield. The highest husk yield was obtained with July 24 planting date and highest grain yield on July 14 planting date.

Moosavi et al. (2012) reported that the total fresh and dry yield of forage corn was significantly affected by sowing date and plant density, but their interaction was not significant on them. Means comparison revealed that delay in sowing from July 4 to August 6 decreased total fresh and dry yield by 25.9 and 24.7% respectively.

Shirkhani *et al.* (2012) evaluated the effect of cropping architect and sowing time on forage quantity and quality of corn at western Iran during 2008-09. The treatment consisted of three planting dates, 20th June, 30th June, and 10th July. The highest fresh and dry forage yield was produced by earliest sowing time (20 June).

Verma *et al*. (2012) recorded significantly higher yield attributes such as diameter of cob, weight of cobs per plant in 25th Oct sowing than early sowing 15th Oct and late sowing 5th Nov. in both the years. The yield was also significantly higher in 25th Oct. sowing. The same year, Zarei *et al.* observed that, the 5th August sowing date was best for forage yield and also increased protein, carbohydrate and ash content of plant.

Talware (2013) recorded significantly maximum cob length (25.90cm) and Cob girth (17.08 cm) at 3rd august sowing date. However highest cob yield/ha (16.25 t/ha) and fodder yield at 6th July sowing date.

Kavut *et al*. (2015) conducted a study in order to determine the effect of different previous crops and sowing dates on the grain yield and some other yield components of corn under typical Mediterranean climatic conditions during summer period of 2013 and 2014. The main plots were allocated to three sowing dates (Early Spring, Mid Spring and Late Spring). The results of their study revealed that, the late planting date had a significantly negative effect on the yield and yield components of corn.

Singh *et al*. (2015) concluded that sowing date significantly influenced the yield parameters and yield of baby corn. They recorded highest weight of corn with husk (52.84 g) and without husk (6.45 g) and cob diameter (1.17 cm) on 29th November sowing. However, the highest number of cobs/plant (4.42), corn yield (19.84 q/ha) and fodder yield (381.49 q/ha) were observed on 30th October sowing date.

2.1.3 Quality parameters

Wong (1979) studied the effect of harvest date on sweet corn maturity, sugar content and yield. Reducing sugar decreased rapidly as harvesting delayed and fructose decreased faster than glucose and also yield increased by delay in harvesting.

Kara *et al*. (2012) determined the effect of different sowing dates on protein content, total sugar and dry matter rate of sweet corn. The sowing dates were, 1^{st} April, 15^{th} April, 1^{st} May, 15^{th} May and 1^{st} June. It was found that, different sowing date had a significant effect on protein, total sugar, and dry matter content on fresh sweet corn. The total sugar was found more with sowing date at 1^{st} May than those early and late sowing time.

Verma *et al*. (2012) observed highest protein content (8.25 %) in 25^{th} Oct. sown crop than early sowing 15^{th} Oct and late sowing 5^{th} Nov.

Talware (2013) reported that among the three sowing dates; 6^{th} July, 20^{th} July and 3^{rd} August, 6 July sowing obtained highest protein (8.73 %) and fibre (4.56 %) content of sweet corn. While, reducing sugar (5.11 %) was significantly higher at 3 August and Non-reducing sugar (1.92%) at 20 July sowing date.

2.1.4 Economics and light interception

Singh *et al*. (2015) reported that, among the three dates of sowing, sowing on 30th October resulted in maximum gross return (Rs.1,18,288 ha^{-1}), net return (Rs. 95,642 ha^{-1}) and benefit cost ratio (4.21) under Allahabad condition.

2.2 Effect of Crop geometry

2.2.1 Growth parameters

Thakur *et al.* (1997) conducted an experiment in Himachal Pradesh on baby corn grown at spacing (40 × 10 and 20 cm and 60 × 10 and 20 cm) and they observed that in wider spacing of 60 cm × 20 cm, there was significant increase in almost all the growth parameters.

Sukanya *et al.* (1999) studied the effect of spacing on yield of baby corn, the different spacings were (60 × 15 cm, 45 × 30 cm and 45 ×15 cm) and reported that wide spacing of 45 × 30 cm increased all the growth parameters and the spacing at 45 × 15 cm gave the highest green fodder yield.

Cho *et al*. (2001) conducted an experiment at CARI, Yezin, by sowing baby corn with three row spacings of 45, 60 and 75 cm and five plant spacings of 10, 15, 20, 25 and 30 cm. The result revealed tallest plant height at 45 × 30 cm spacing and the shortest at 60 × 15 cm. There was no significant effect on leaves number, days to first harvest and harvest duration.

Pandey *et al*. (2002) carried out an experiment at Almora during rainy season of 1995-1997 to find out optimum plant density and suitable variety of baby corn production. Three populations, viz. 111,000 (50 cm × 18 cm); 133,000 (50 cm × 15 cm) and 166,000 (50 cm × 12 cm) were evaluated. Significantly more number of days to baby corn harvest initiation (48.7) was recorded in 50 cm × 12 cm spacing than 50 cm × 18 cm spacing. The highest plant height (223.6 cm) and harvest duration (19.6) was recorded in 50 cm × 18 cm.

Thavaprakaash *et al.* (2005) conducted field experiment of baby corn at TNAU, Coimbatore during late *rabi* 2002 (January to March) and late *rabi* 2002-03 (December to March) seasons. Two crop geometry levels (45 x 25 cm and 60 x 19 cm) were taken in main plot. The result revealed that baby corn raised at 60 x 19 cm produced taller plants (182.9 and 155.5 cm), higher LAI (3.41) and more DMP (7435 and 5310 kg ha) than (45 x 25 cm) during both seasons respectively.

Kunjir *et al*. (2009) conducted a trial at Dapoli (Maharashtra) during *rabi* season of 2003-04 to test the performance of sweet com cultivar 'Sumadhur' under the influence of different planting geometry, nitrogen levels and micronutrients. The values of growth attributes were significantly higher under broader spacing of 75 x 20 cm. During the same year Tajul *et al*. evaluated three levels of plant population i.e., 53000, 66000 and 80000 plants ha^{-1} corresponding to spacings 75 cm × 25 cm, 60 cm × 25 cm and 50 cm × 25 cm and N-fertilizer effects on maize and observed maximum LAI and chlorophyll value from sparsely populated plants of 53000 plants ha^{-1}.

Kole (2010) reported that growth parameters viz., plant height (190.67 cm at harvest), number of green leaves per plant (10.92) and leaf area index (20.58) were significantly higher in spacing of 45 cm × 10 cm compared to 45 cm × 20 cm spacing.

Futuless *et al*. (2010) examined the effect of spacing on extra early yellow maize variety TZESR-Y in Mubi Nigeria, with the objective of finding the most appropriate spacing for maize. The spacings viz; 75cm x 25cm, 75cm x 20cm, 75cm x 15cm and 75cm x 10cm respectively were evaluated. Result shows that the wider spacing, (75cm x 25cm) gave the highest number of days to 50% tasseling. However, the number of leaves was recorded more in closer spacing.

Rafiq *et al.* (2010) conducted field experiment on maize crop at Pakistan during autumn 2006 and 2007, to determine the effects of different fertilizer levels and plant densities. Three plant densities (57100, 71400 and 99900 plants ha $^{-1}$) realized by maintaining plant distance of 25, 20 and 15 cm respectively with row spacing of 70 cm. The results revealed that, 50 % tasseling and 50 % silking required more days in closer spacing. The maximum plant height (224.09 cm) was recorded where the crop was sown at 75 cm x 15 cm spacing against the minimum plant height (200.29 cm) at 75 cm x 25 cm.

Aravinth *et al*. (2011) studied the effect of varied population, vermicompost and intercropping on baby corn during kharif and summer 2007, the two planting geometries followed were; 60 cm × 15 cm and 45 cm × 25 cm. The result revealed that baby corn raised at 60 cm × 15 cm spacing produced taller plants (179 cm and 155 cm), higher LAI (3.32 and

2.66) and DMP (6804 and 6731 kg ha^{-1}) during kharif and summer seasons respectively.

Bharud *et al*. (2012) evaluated the effect of planting geometry and different fertilizer levels on growth and yield of sweet corn (*Zea mays* L. var. saccharata) during kharif season 2009 at Rahuri and reported that, among the three spacings of 45 cm × 20 cm, 60 cm × 15 cm and paired row planting of 45-75 cm × 20 cm, planting at 60 cm × 15 cm spacing produced significantly higher plant height (185.84 cm) which is however at bar with 45 cm × 20 cm. While paired row planting of 45-75 cm × 20 cm recorded more number of functional leaves per plant.

Sobhana *et al*. (2012) conducted a field experiment during kharif season of 2010 at IARI, New Delhi to find out the suitable plant population and nutrient requirement of baby corn. The seeds were sown at spacing of 60 cm × 25 cm and 60 cm × 20 cm. They reported higher plant height (110.8 cm) in 60 cm × 20 cm, while the leaf area and leaf area index (4.2) was higher in crop planted at 60 cm × 25 cm.

Sonkamble *et al*. (2012) recorded maximum number of days to 50 % tasseling and plant height (197.1 cm) at 60 x 15 cm^2 in field trials at Akola.

Chauhan and Opena (2013) evaluated the effect of plant geometry (row and plant to plant spacing: 50 × 20, 50 × 30, 75 × 20, and 75 × 30 cm) on growth and yield of corn. Plant height and leaf production per plant were not influenced by the plant geometry. However, highest leaf area and shoot biomass were produced by plants grown at 50 × 20 cm spacing.

Talware (2013) conducted field trial at main garden of Horticulture Department, Dr. P.D.K.V. Akola during 2011-2012 to study the effect of sowing time and spacing on yield and quality of sweet corn. The seeds were sown at four different spacing, i.e., 30 cm × 15 cm, 30 cm × 30 cm, 45 cm × 15 cm and 45 cm × 30 cm. The result of the study revealed that, the wider spacing (45 cm × 30 cm) superiorly increased in plant height

(214.63 cm). The highest number of leaves (12.22) and Chlorophyll content (54.43 %) was recorded at 30 × 30cm, while the maximum leaf area (3398.66 cm^2) was obtained at 45cm × 15cm spacing.

Dar *et al*. (2014)[a] reported maximum plant height (147 cm) and leaf area index (7.67) at 50 cm × 15 cm planting geometry from a trial during rainy season of 2012 at Karnal, Haryana with 6 planting geometry viz. 40 cm × 15 cm, 40 cm × 20 cm, 50 cm × 15 cm, 50 cm × 20 cm, 60 cm × 15 cm and 60 cm × 20 cm and 4 levels of nitrogen (0, 60, 120 and 180 kg/ha) on dual purpose baby corn (Zea mays L.).

Mathukia *et al*. (2014) conducted field experiment during *rabi* season of 2010 on clayey soil of Junagadh (Gujarat) to study the response of sweet corn (*Zea mays* L. var. *saccharata* Sturt) to plant geometry (60 cm x 15 cm, 45 cm x 20 cm and 30 cm x 30 cm) and fertilizer (control, 90-45, 120-60 and 150-75 kg N-P2O5 ha-1). Results of the study reveal plant geometry did exert significant influence on growth attributes of sweet corn. The highest plant height (173 cm) and LAI (3.65) was recorded at 30 cm x 30 cm spacing which was at par with 45 cm x 20 cm spacing. Whereas, the highest dry matter $plant^{-1}$ (141 g) was observed under 45 cm x 20 cm spacing.

Dutta *et al*. (2015) carried out field experiment during 2010 to 2012 (three years) at Gayeshpur, Nadia, West Bengal to investigate the effect of irrigation schedules and planting geometry viz. 30 × 30 cm, 45 × 20 cm and 60 × 15 cm on growth, yield and water-use efficiency (WUE) of summer baby corn (*Zea mays* L.). The results revealed significant influence of planting geometry on growth attributes of baby corn. Baby corn raised at 60 × 15 cm spacing produced taller plants (166.94 cm), higher LAI (3.59), maximum dry matter accumulation (488.37 g m-2) and higher CGR (9.89 g m-2 day-1) which was statistically at par with the spacing of 45 × 20 cm.

Gaikwad *et al*. (2015) conducted an experiment at Parbhani (Maharashtra) during 2008 to 09, to study the performance of sweet corn Cv. Nirmal-120 under the influence of different spacings, planting methods and nutrient management. They studied four spacings (45 x 15 cm, 45 x 20 cm, 60 x 15 cm, 60 x 20 cm), out of which they recorded higher values of plant height at closer spacing 45 x 15 and 45 x 20 cm. While more number of leaves was observed at wider spacing.

Singh *et al*. (2015) studied the performance of baby corn (*Zea mays* L.) under the influence of two spacings (45 × 25 cm and 60 × 25 cm) during the Rabi season of 2007-08 and 2008-09 on sandy loam soil at Allahabad (U.P.). The spacing 60 × 25 cm recorded maximum plant height (36.59 cm), number of leaves/plant (5.69) and leaf length (34.90 cm). While maximum dry weight of plant at maturity (1.76 q/ha), days to tasseling (59.67) and days to silking (65.42) were recorded at 45 × 25 cm.

2.2.2 Yield and yield parameters

Emil (1956) conducted two experiment at Belle Glade area during the late winter and spring to study the effect of plant spacing on yield and ear characteristics of sweet corn. In the first experiment, plants were planted on 26th January at 6, 9 and 12 inches apart in 34 inches row. While, in the second experiment plants were planted on 6th March at 6, 9 and 12 inches apart in 32 inches row. They observed that in both of the experiments, plant height increased and number of suckers decreased as the plants were spaced closer. Ears on plants grown at 6 inch spacing generally matured 1-2 days later. Highest yields produced in both experiment was by the 6 inch spacing.

Tsai and Chung (1984) studied the effect of plant density and N-fertilizer on the yield and ear quality of super sweet corn. The result revealed that the total ear yield increased with increasing plant density and was maximum at 80 × 20 cm spacing.

Thakur *et al.* (1997) reported that under Himachal Pradesh condition, among the plant spacing (40 × 10 cm, or 20 cm and 60 × 10 or 20 cm) studied on baby corn, the wider spacing of 60 cm × 20 cm, revealed significant increase in almost all the yield attributes but could not compensate baby corn yield obtained in narrow spacing. Plant spacing of 40 cm × 20 cm increased the baby corn yield by 28.2, 11.3 and 9.4 per cent over 60 cm × 20 cm, 60 cm × 10 cm and 40 cm × 10 cm spacing, respectively.

Sukanya *et al.* (1999) studied the response of three plant spacings (60 × 15, 45× 30and 45 ×15 cm) on baby corn and reported that, the spacing 45 × 15 cm gave the highest green fodder yield.

Cho *et al*. (2001) reported that among the crop geometry studied in baby corn i. e., three row spacings of 45, 60 and 75 cm and five plant spacings of 10, 15, 20, 25 and 30 cm, the maximum number and weight of marketable ears were at plant spacing of 10 cm and 15 cm with 45 cm and 60 cm row spacings. The maximum marketable ears, 1.9 and 2.0 per plant were obtained at the plant spacings of 25 cm and 30 cm respectively.

Dale (2001) studied the yield performance of corn at six locations across Lowa over three years to determine the response of row spacing, plant density and hybrid effects on corn. Averaged across the years, locations and plant densities, corn grown in 76 cm row spacing produced higher yields and moisture content than that grown in 38 cm rows.

Fernando *et al*. (2002) conducted a trial at Argentina, to study the effect of row spacing on grain yield and radiation interception (RI) during the critical period for grain set in three crop species. Ten experiments were conducted with maize, sunflower or soy-bean under irrigation or under dry land conditions without severe drought during flowering and grain filling. Grain yield responses to decrease distance between rows were inversely proportional to radiation interception achieved with wide row control treatment during critical period for grain number determination. Moreover, when row spacing was reduced, grain yield increases and RI increases during the critical periods for grain set were significantly and directly correlated in the three crop species.

Pandey *et al*. (2002) reported significant reduction in green cob weight and baby corn/plant with decrease in plant spacing. Highest yield parameters such as green cob : baby corn weight (4.6), cobs/plant (2.10), cob length (6.2 cm) and cob diameter (3.4 cm) was observed in 50 cm × 18 cm spacing. While the highest baby corn yield (11.48 q/ha) and green fodder yields (24.5 t/ha) was observed on 50 cm × 12 cm spacing.

Rangarajan *et al.* (2002) concluded from the four year study on sweet corn that, despite improvement in individual ear weight and length at wider row spacing, the marketable yield usually was higher at narrower spacing. The weight and the outer green husk increased in wider spacing.

Chowchong and Ngamprasitthi (2003) conducted a study on the optimum plant spacing for Insee 2 sweet corn hybrid in Thailand. Treatments comprised plant spacings of 25, 30 and 35 cm with one plant per hill and 50 cm with 2 plants per hill, while the row spacing was 75 cm. The results revealed that, the 25 cm plant spacing recorded the highest yield of fresh ear with husk (2229.8 kg/rai). The fresh weight of maize stalk after harvest of fresh ears was highest in the 25 cm plant spacing (4362 kg/rai).

Thavaprakaash *et al.* (2006) reported significantly higher yield and yield attributes of baby corn under wider row spacing (60 x 19 cm) due to better alteration crop geometry over narrow row (45 x 25 cm) spacing. At harvest, longer cob length (10.4 and 10.5 cm), cob diameter (1.75 and 1.69 cm), heavier cobs (47.6 and 43.9 g) and corns (10.86 and 10.60 g) were recorded during late *rabi* 2002 and late *rabi* 2003 seasons respectively with 60 x 19 cm spacing as compared with 45 x 25 cm spacing.

Kar *et al.* (2006) carried out field trial of Sweet corn with four spacings (45 cm × 30 cm, 45 cm × 20 cm, 60 cm × 30 cm and 60 cm × 20 cm) during rainy seasons of 2002 and 2003 at Bhubaneshwar, Orissa. They observed that the spacing of 60 × 20 cm significantly increased the number of prime cobs (54,108 ha^{-1}) and green cob yield (9.21 tones ha^{-1}) followed by 45 × 30 cm spacing. However, the fodder yield was obtained maximum at spacing of 45cm × 20cm and 45cm × 30cm.

Sahoo and Mahapatra (2007) conducted a field experiment at Jashipur, Orissa during Rabi (dry) season of 2002-03 and 2003-04 to study the effect of plant population and fertility levels on yield and economics of sweet corn (*Zea mays L*.). The plant populations, viz. 111.1, 83.3, 66.7 and 55.6 x 10^3 plants/ha, were maintained with spacing of 60 cm x 15 cm, 60 cm x 20 cm, 60 cm x 25 cm and 60 cm x 30 cm respectively. The green-cob yield was maximum (11.29 - 12.30 t/ha) at 60 cm x 20 cm, which was 32 and 23% more than that planted at 60 cm x 15 cm during 2002-03 and 2003-04, respectively. However, the highest number of plants/unit area (111.1 x 10^3 plants/ha) at 60 cm x 15 cm contributed significantly towards higher green-fodder yield.

Demetrius *et al.* (2008) studied the influence of row spacing and population density on yield component and grain yield in maize. The row spacing were (0.40, 0.60 and 0.80 m). They observed that the corn yield increased with narrow row spacing and concluded that the best arrangement for planting corn hybrid was 0.40 m row spacing.

Hussein *et al.* (2008) carried out an experiment with six plants spacing (two ridge width 60 and 70 cm with constant spaced hill (20, 25 and 30 cm apart) on one side of ridge. They reported that planting at wide spacing improved most yield parameter of ear and the highest grain yield of maize resulted at spacing of 60 × 25 cm.

Rathika *et al*. (2008) conducted field experiments during the *kharif* season of 2006 and 2007 at Tamil Nadu Agricultural University, Coimbatore. The main plot treatments comprised of two factors *viz.,* crop geometry (60 x 20 cm and 75 x 16 cm) and intercropping systems (baby corn alone, baby corn + fenugreek (greens), baby corn + fodder cowpea). Results of the study shows that baby corn raised at 75 x 16 cm produced higher yield parameters and yield. Raising baby corn at 75 x 16 cm crop geometry also registered higher green fodder yield than 60 x 20 cm during the course of investigation.

Thavaprakaash *et al*. (2008) conducted field experiment during late Rabi seasons of 2002 and 2003 in Tamil Nadu on response of

Crop Geometry, Intercropping Systems and INM Practices on Yield and Fodder Quality of Baby Corn. The results revealed that, baby corn yield and fodder yields were higher at 60 x 19 cm spacing as compared with 45 × 25 cm. The percentage increase in yield of 60 x 19 cm over 45 × 25 cm was 11.5 and 3.6 during 2002 and 2003 respectively.

Das *et al.* (2009) conducted a field experiment at SHIATS, Allahabad to study the effect of different levels of nitrogen and crop geometry on the growth, yield and quality of baby corn (*Zea mays* L.) cv. 'golden baby'. They observed that plant spacing of 50×15 cm and 120 kg N ha^{-1} give the highest baby corn yield (5.15 t ha^{-1}).

Gosavi and Bhagat (2009) conducted an experiment during 2005-06 on lateritic soil of Dapoli (Maharashtra), to study the effect of N levels and spacing (60×20 cm, 45 × 20 cm and 30 × 20 cm) on baby corn. They observed that the spacing of 60 × 20 cm was at par with 45 × 20 cm recorded significantly higher values of yield attributing characters over the spacing 30 × 20 cm. The spacing of 45 × 20 cm recorded significantly higher baby corn yield with and without husk than the remaining spacing.

Kunjir *et al*. (2009) conducted a field trial at Dapoli (Maharashtra) during *rabi* season of 2003-04 to test the performance of sweet corn cultivar 'Sumadhur' under the influence of different planting geometry, nitrogen levels and micronutrients. The crops were sown at 3 spacings (45 x 20, 60 x 20 and 75 x 20 cm).The values of yield attributes such as length of cob (cm), girth of cob (cm), weight of cob and dry matter/plant were significantly higher under broader spacing of 75 x 20 cm. However, green cob yield and green biomass yield were significantly higher under 45 x 20 cm spacing than the broader spacing.

Futuless *et al*. (2010) reported that the wider spacing, (75 cm x 25 cm) gave the highest length of cob (12.13), diameter of cob (13.27), stem girth (13.02) and yield (1900kg/ha) of maize.

Kole (2010) reported that higher cob yield (674 kg/ha) and total dry matter (351.03 g plant $^{-1}$) were significantly higher in spacing of 45 cm × 10 cm compared to 45 cm × 20 cm spacing. Whereas, spacing of 45 cm × 20 cm recorded significantly higher green fodder yield (57.33 t/ha) compared to 45 cm × 10 cm (53.83 t/ha).

Prodhan *et al*. (2010) carried out an experiment during kharif and rabi season of year 2002, 2003 and 2004 at West Bengal, to study the effect of spacing, seed placement and plant density on yield of baby corn. The row to row distance was 60 cm and plant spacing was as per specification of the respective treatment, viz. 25 cm, 12.5 cm, 8 cm, 6 cm or 5 cm. Seeds per hill were; 1, 2, 3 and 4 plants per hill. Considering all desirable characteristics under study, the plant spacing of 60 × 12.5 cm and seed placement of 1 seed per hill was found to be the best treatment for higher corn ear yield, fodder yield, barrenness and lodging.

Salam *et al*. (2010) at Dhaka, from their study on the effect of plant spacing (60x25 cm, 75x25 cm and 90x25 cm) on hybrid maize during April 2006 reported that there was no significant difference in the number of cobs per plant and cob length due to plant spacing. However they recorded the highest number of cobs/plant (1.07) and maximum cob length (16.9 cm) in the wider spacing of 75x25 cm.

Venkateswarlu and Reddy (2010) conducted two field trials on sweet corn and popcorn for three years (1997-99) at Telangana region, to identify suitable management practices consisting of three planting patterns (75x20 cm; 60x20 cm; 45x20 cm) and two fertility levels (F1=40 N + 20 P2O5 kg ha-1 and F2 = 60 N + 40 P2O5 kg ha-1). Higher yields in sweet corn (1782 kg ha-1) and popcorn (2692 kg ha-1) were obtained at higher dose (F2) at 60 x 20 cm row spacing.

Aravinth *et al*. (2011) studied the effect of spacing on baby corn during kharif and summer 2007 using two crop geometries; 60 cm × 15 cm and 45 cm × 25 cm at Annamalai. The baby corn raised at 60 cm × 15 cm spacing produced highest number of cobs/plant (2.48 and 2.27), maximum cob length (22.62 cm and 21.48 cm), cob width (2.56 cm and

2.44 cm), cob weight (32.42 g and 27.78 g) and baby corn yield (7,119 kg/ha and 5415 kg/ha) in kharif and summer respectively compared to 45 cm × 25 cm.

Mugalkhod *et al*. (2011) conducted an experiment at Dharwad, Karnataka during 2004 to study the effect of planting methods. The yield parameters were not affected significantly due to planting methods. However, it influenced the husked baby corn yield and green fodder yield. The husked baby corn yield (8.64 t ha^{-1}) and green fodder yield (56.45 Mg ha) were noticed in paired row planting (25-50-25 × 20cm).

Bharud *et al*. (2012) evaluated the effect of different plant geometry and fertilizer levels on sweet corn at Rahuri, during Kharif season 2009. The result revealed that paired row planting of 45-75 cm × 20 cm recorded the highest number of cobs per plant (1.32), cob length (18.66 cm), fresh cob yield (162.64 q ha^{-1}), green fodder yield (194.58 q ha^{-1}) and total biomass (357 q ha^{-1}).

Prakash (2012) carried out a field experiment during *Rabi* of 2011 at the central research farm of SHIATS, Allahabad, to study the effect of different levels of nitrogen and crop geometry on growth and yield of baby corn (*Zea mays* L.). The treatments comprised 3 levels of nitrogen (60, 80 and 100) and 4 crop geometry (45 × 25 cm^2, 45 × 20 cm^2, 60 × 25 cm^2 and 60 × 20 cm^2). The result revealed that crop geometry 45 × 25 cm gave significantly maximum baby corn diameter (1.61 cm), baby corn yield (11.18 q ha^{-1}) and green fodder yield (28.31 t ha^{-1}).

Shanti *et al*. (2012) studied the influence of plant spacing at four levels, viz. 45 x 15 cm^2, 45 x 20 cm^2, 60 x 15 cm^2 and 60 x 20 cm^2 and fertilizer doses at three levels, i.e. 90: 45: 45 NPK kg ha^{-1}, 120: 60: 45 NPK kg ha^{-1} and 150: 75: 45 NPK kg ha-1 on sweet corn during kharif 2008. They reported that, combinations, viz. 45 x 20 cm^2 and 120: 60: 45 NPK kg ha^{-1}, 60 x 15 cm^2 and 150: 75: 45 NPK kg ha^{-1}, 60 x 20 cm^2 and 120: 60: 45 NPK kg ha^{-1}, 60 x 20 cm^2 and 150: 75: 45 NPK kg ha^{-1}, excelled for all the yield components indicating their superiority in providing congenial field conditions for expression of sweet corn cv. Madhuri to its full potential.

From commercial view point 45 x 20 cm^2/ 120:60:45 NPK kg ha^{-1} performed exceedingly well for all the parameters and found to be promising due to its capacity to exploit inherent yield potential using moderate resources.

Singh *et al.* (2012) conducted a field experiment during a rainy season of 2007 and 2008 at Wadura, Jammu and Kashmir, to study the effect of crop geometry (60 cm × 15 cm, 60 cm × 20 cm, 60 cm × 25 cm and 60 cm × 30 cm) and nitrogen levels (0, 30, 60, 90, 90, 120 and 150 kg/ha) on sweet corn (*Zea mays* saccharata sturt). The results of their study reveals that, the weight of green cobs increased as the inter-plant spacing was increased from 15 to 30 cm, while the number of cobs/ha, plant dry weight and barrenness increased with the decreased in inter-plant spacing from 30 to 15 cm. The maximum cob yield was recorded at 60 cm × 20 cm spacing which was higher than 60 cm × 25 cm planting geometry.

Sobhana *et al*. (2012) conducted a field experiment during kharif season of 2010 at IARI, New Delhi on baby corn. The seeds were sown at spacing of 60 cm × 25 cm and 60 cm × 20 cm. They reported higher dry matter accumulation/plant (59.1 g/plant), cobs/plant (2) and cob weight (7.7 g) in crop planted at 60 cm × 25 cm. However, higher the spacing 60 cm × 20 cm recorded significant increase in baby corn yield with husk (5.9 t/ha), baby corn yield (1.2 t/ha) and fodder yield (22 t/ha).

Sonkamble *et al*. (2012) carried out field trials at seed technology research unit, Dr. PDKV, Akola during kharif 2008-09, 09-10 and 11-12 to find out the optimum spacing and fertilizer dose for seed production of sweet corn. The seeds were grown in ridge planting method with four different spacing i. e., 45 x 15 cm, 45 x 20 cm, 60 x 15 cm and 60 x 20 cm. The spacing 45 x 20 cm with fertilizer dose of 150:75:45 NPK Kg ha^{-1} was the best combination for yield and yield parameters.

Chauhan and Opena (2013) evaluated the effect of plant geometry (50 × 20 cm, 50 × 30 cm, 75 × 20 cm, and 75 × 30 cm) on corn. The result revealed that, yield of corn per unit area was significantly influenced by crop geometry. The highest yield (8.2 t·ha^{-1}) was produced by plants grown at 50 × 20 cm spacing.

Golada *et al*. (2013) reported that the crop spacing 60 × 15 cm significantly influenced the yield attributes. Maximum green cob yield, baby corn yield and green fodder yield was recorded at 60 × 15 cm spacing which was higher (14.0, 24.3 and 8.8%, respectively) over 90 × 10 cm.

Talware (2013) conducted field trial on sweet corn at Akola, by sowing the seeds at four different spacing, i.e., 30 cm × 15 cm, 30 cm × 30 cm, 45 cm × 15 cm and 45 cm × 30 cm. The maximum Cob length, cob diameter, cob yield/ha (21.33 t/ha) and fodder yield was recorded at the wider spacing (45 cm × 30 cm).

Tajul *et al*. (2013) evaluated the effect of plant population and N- Fertilizer effects on yield and yield components of maize. The treatment variables were, three levels of plant populations (53000, 66000 and 800000 plants ha^{-1} corresponding to spacing of 75 cm × 25 cm, 60 cm × 25 cm and 50 cm × 25 cm) and 4 doses of N (100, 140, 180 and 220 kg ha^{-1}). Results revealed maximum yield and harvest index in plant population of 800000 plants ha^{-1} (50 cm × 25 cm) with N 220 kg ha^{-1}.

Verma *et al*. (2013) conducted field experiment at Karnal, Haryana (India) during post monsoon season (2011-2012), the seeds were sown with six crop geometries (50 cm × 15 cm, 50 cm × 20 cm, 60 cm × 15 cm, 60 cm × 20 cm, 70 cm × 15 cm and 70 cm × 20 cm). They reported significantly higher cob as well as fodder yield in 50cm × 15cm crop geometry than all other crop geometry treatments except, 50 × 20cm and 60cm × 15cm crop, which were at par with 50 × 15cm.

Dar *et al*. (2014)[b] studied the effect of 6 planting geometry viz. 40 cm × 15 cm, 40 cm × 20 cm, 50 cm × 15 cm, 50 cm × 20 cm, 60 cm × 15 cm and 60 cm × 20 cm and 4 levels of nitrogen (0, 60, 120 and 180 kg/ha) on dual purpose baby corn (*Zea mays* L.) and reported highest baby corn yield (1.88 t/ha), total green fodder yield (30.8 t/ha) as well as dry fodder yield (6.52 t/ha) in 50 cm × 15 cm planting geometry than all other planting geometry, however the fresh weight per plant were significantly higher in 60 cm × 20 cm planting geometry.

Mathukia *et al*. (2014) reported the influence of different spacing on yield attributes of sweet corn. The plant geometry of 45 cm x 20 cm, being at par with 30 cm x 30 cm, which recorded significantly the highest cobs plant^{-1} (1.43), cob length (16.9 cm), cob girth (15.5 cm), fresh weight of cob (129 g), kernels cob^{-1} (279) and fresh weight of 100-kernels (24.3). The highest green cob yield (7.98 t ha-1) was recorded under spacing of 45 cm x 20 cm. While, different spacing did not exert significant influence on green fodder yield.

Dutta *et al*. (2015) observed that wider row planting (60 × 15 cm) had stimulatory effect on the yield attributes of baby corn over close row (45 × 20 cm and 30 × 30 cm) spacing. At harvest heavier cobs (6.28 g), longer cobs (6.38 cm) and thicker cobs (1.29 cm) were recorded with 60 cm × 15 cm spacing and these results were statistically at par with 45 × 20 cm spacing. While, the crop spacing of 45 × 20 cm significantly produced higher cob and fodder yields (1302 kg and 22.62 t ha^{-1} respectively) over 30 × 30 cm spacing, however, it was at par with 60 × 15 cm spacing.

Gaikwad *et al*. (2015) reported higher yield attributes under broader spacings (60 x 15 and 60 x 20 cm). However, green cob yield were significantly higher under the spacing of 45 x 15 and 45 x 20 cm.

Singh *et al*. (2015) studied the effect of spacings (45×25 cm and 60×25 cm) on performance of baby corn (*Zea mays* L.). The result revealed maximum cob diameter (1.14 cm), weight of corn with husk (46.33 g) and without husk (6.17 g) at 60 × 25 cm spacing. While, the crop geometry 45 × 25 cm recorded maximum cob length (8.25 cm), corn yield (18.77 q/ha) and fodder yield (381.82 q/ha).

Vishuddha (2015) conducted field experiment at Kanpur (U.P), during rabi season in 2010-11 and 2011-12 to evaluate the effect of spacing (45cm x 20 cm, 60cm x 20 cm and 60cm x 25 cm) and fertility levels on protein content and yield of hybrid and composite maize (Zea mays L.). The result revealed that the spacing of 60cm x 20cm significantly increased the cob length (16.87 and 17.09 cm), cob girth (11.23 and 11.80 cm), cob weight (205.90 and 205.90 g), grains weight/cob (170.52 and 173.94 g) and grain yield (6.62 and 6.75 t/ha).

2.2.3 Quality parameters

Chowchong and Ngamprasitthi (2003) reported that in terms of sweetness (range: 14.2-14.5 degree brix) of sweet corn, there was no significant difference among all plant spacings. Plant analysis revealed that the stalk contained 10 % crude protein and 33.94% crude fibre.

Das *et al.* (2009) recorded 89 .1% moisture, 0.20 g fat, 1.9 g protein, 8.2 mg carbohydrate, 0.06 g ash, 28.0 mg calcium, 86.0 mg phosphorus and 11.0 mg of ascorbic acid in baby corn planted at spacing of 50×15 cm.

Kar *et al.* (2006) conducted field trial of Sweet corn with four spacings (45 cm × 30 cm, 45 cm × 20 cm, 60 cm × 30 cm and 60 cm × 20 cm) and five nitrogen levels (0, 20, 40, 60 and 80 kg/ha) during rainy seasons of 2002 and 2003 at Bhubaneshwar, Orissa. The result revealed that the spacing of 60 × 20 cm recorded significantly higher protein yield (174.35 kg ha^{-1}) as compared with other spacings.

Gosavi and Bhagat (2009) reported that the wider spacing of 60 × 20 cm recorded significantly higher protein and sugar content of baby corn than the narrower spacing.

Kole (2010) noted that the baby corn quality parameters such as protein content (12.24 %), non-reducing sugar (0.306 %), reducing sugar (0.071 %) and total sugars (0.394%) was significantly superior with 45 cm × 20 cm spacing.

Rafiq *et al.* (2010) conducted field experiment on maize crop at Pakistan during autumn 2006 and 2007, maintaining plant distance of 25, 20 and 15 cm respectively with row spacing of 70 cm. The results revealed that maximum protein content (9.66 %) was recorded in wider spacing of 75cm x 25 cm against the minimum (9.16 %) in 75cm x 15 cm.

Talware (2013) recorded higher non-reducing sugar (1.96 %) at wider spacing (45 cm × 30 cm), while the highest protein (10 %) and fibre (4.61 %) was observed at 30 cm × 15 cm plant spacing.

Dar *et al*. (2014)[b] conducted a field experiment to observe quality of baby corn with six treatments of crop geometry viz. 40 cm × 15 cm, 40 cm × 20 cm, 50 cm × 15 cm, 50 cm × 20 cm, 60 cm × 15 cm and 60 cm × 20cm in main plots and four levels of nitrogen (0, 60, 120 and 180 kg ha-1) in sub plots with four replications. Crop geometry of 60 cm × 20 cm recorded higher crude protein (CP) content of baby corn (9.84 %), fodder (11.69 %), cob husk (12.56 %) and tassel (14.77 %) to all other crop geometry treatments. However, dry matter content (7.89 %) was highest in 50 cm × 15 cm crop geometry.

Vishuddha (2015) reported significantly higher protein content (8.78 and 8.87 %) and protein yield (58.20 and 60.00 kg/ha) at 60cm x 20cm spacing than the spacing of 60cm x 25 cm and 45cm x 20cm, respectively.

2.2.4 Economics and light interception

Pandey *et al*. (2002) reported highest net returns (Rs.19,165 ha^{-1}) and benefit : cost ratio (2.14) in 50 cm × 12 cm spacing.

Das *et al.* (2009) reported the maximum net profit of Rs 144,900 with a B: C ratio of 11.32 from baby corn planted at spacing of 50×15 cm.

Kar *et al.* (2006) obtained highest net return (Rs 48,571 ha^{-1}) and benefit: cost ratio (3.55) from sweet corn planted at spacing 60 cm × 20 cm which is followed by 45 × 30 cm spacing.

Thavaprakaash and Velayudham (2008) conducted a field experiment on baby corn sown at two crop geometry viz. 45 × 25 cm and 60 × 19 cm during kharif (June-September) 2002 and summer (march-may) 2003 seasons at TNAU, Coimbatore. They reported that, the two crop geometry levels did exhibit a perceptible difference on light interception over seasons. During kharif season, 60 x 19 cm intercepted more light (29.7, 47.9, 66.0 and 45.7%) at 25, 45 and 60 DAS and at harvest respectively than 45 x 25 cm. Similar results were reported during summer 2003 season also.

Das *et al*. (2009) reported maximum net profit of Rs 144,900 ha^{-1} with a B:C ratio of 11.32 at crop geometry 50 x 15 cm and 120 kg N/ha.

Liu *et al*. (2012) studied the light interception and RUE response to narrow-wide planting patterns in maize, under three planting patterns i.e., 30 cm + 170 cm (P1, narrow row is 30 cm and wide row is 170 cm), 40 cm + 90 cm (P2) and uniform row of 60 cm (CK). The fraction of light interception value (F) in P1 was significantly lower than that in P2 and CK.

Prakash (2012) recorded minimum cost of cultivation (Rs. ha^{-1}) of baby corn in 60 kg N ha^{-1} with 45 × 25 cm crop geometry. The maximum gross return (Rs. ha^{-1}) was recorded in 100 kg N ha^{-1} with 45 × 25 cm crop geometry while the maximum net return (Rs. ha^{-1}) and benefit cost ratio (3.70) was recorded in 100 kg N ha^{-1} with 60 × 20 cm crop geometry.

Sahoo and Mahapatra (2007) noted that the population of 83.3 x 10^3 plants ha^{-1} (60 cm x 15 cm) gave the highest net profit of Rs 33,241 to 37,345 /ha and maximum benefit : cost ratio (3.42) which was significantly higher than other plant population.

Sobhana *et al*. (2012) conducted a field experiment during kharif season of 2010 at IARI, New Delhi on baby corn. The seeds were sown at spacing of 60 cm × 25 cm and 60 cm × 20 cm. They reported higher net returns and benefit:cost ratio (2.4) at 60 cm × 20 cm spacing.

Sonkamble *et al*. (2012) conducted field trials at Akola during kharif 2008-09, 09-10 and 11-12 on sweet corn by sowing the seeds with four different spacing i. e., 45 x 15 cm^2, 45 x 20 cm^2, 60 x 15 cm^2 and 60 x 20 cm^2. The results revealed that the highest benefit : cost ratio (2.29) was found in the treatment; 45 x 20 cm^2 spacing with fertilizer dose of 150:75:45 NPK Kg ha^{-1}.

Dar *et al*. (2014)[a] reported that among the 6 planting geometry viz. 40 cm × 15 cm, 40 cm × 20 cm, 50 cm × 15 cm, 50 cm × 20 cm, 60 cm × 15 cm and 60 cm × 20 cm under study, the highest net returns Rs. 162400 ha^{-1} and benefit: cost ratio (2.31) was recorded in 50 cm × 15 cm geometry.

Mathukia *et al*. (2014) reported that, sowing of the crop at 45 cm x 20 cm gave maximum net returns of Rs. 77840 ha^{-1} with B:C ratio of 3.11, followed by spacing of 30 cm x 30 cm, which recorded net returns of Rs. 74920 ha^{-1} and B:C ratio of 3.03.

Dutta *et al*. (2015) reported that among the planting geometry viz. 30 × 30 cm, 45 × 20 cm and 60 × 15 cm, the highest gross return of Rs. 59500 ha^{-1}, net return Rs. 36300 ha^{-1} and benefit-cost ratio (2.56) were found with baby corn raised at 45 × 20 cm spacing, whereas the lowest values were obtained for 30 cm × 30 cm spacing.

Singh et al. (2015) reported that among the two crop geometry (45×25 cm and 60×25 cm), sowing the crop at 45×25 cm spacing resulted in maximum gross return (Rs. 1, 12,963/ha), net return (Rs. 90, 148/ha) and benefit cost ratio (3.95).

CHAPTER III

MATERIAL AND METHODS

The details of the materials used and techniques adopted for conducting the present field investigation entitled, “Response of baby corn (*Zea mays* L.) to sowing periods and crop geometry” are described in this chapter under the appropriate headings and sub-headings.

3.1 Experimental site

The experiment entitled, “Response of baby corn (*Zea mays* L.) to sowing periods and crop geometry” was carried out at Main Garden, Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, during the year 2013-14 and 2014-15. The experiment was conducted at the same field and same randomization during both the years.

3.2 Climate and weather condition

Akola is situated in subtropical region between 22.42°N latitude and 77.02° E longitude at an altitude of 307.42 m above the mean sea level. The climate of Akola is semi-arid and characterized by three distinct seasons i.e. hot and dry summer from March to May, warm humid and rainy monsoon from June to October and mild cold winter from November to February. The meteorological data in respect of rainfall, humidity, maximum and minimum temperature recorded at Department of Agronomy, Dr. Panjabrao Krishi Vidyapeeth, Akola, during the experimental period been furnished in Appendices I and II respectively.

3.3 Soil

Fairly leveled land was selected for conducting the experiment. The experimental plot was having medium black soil with uniform texture and structure with good drainage.

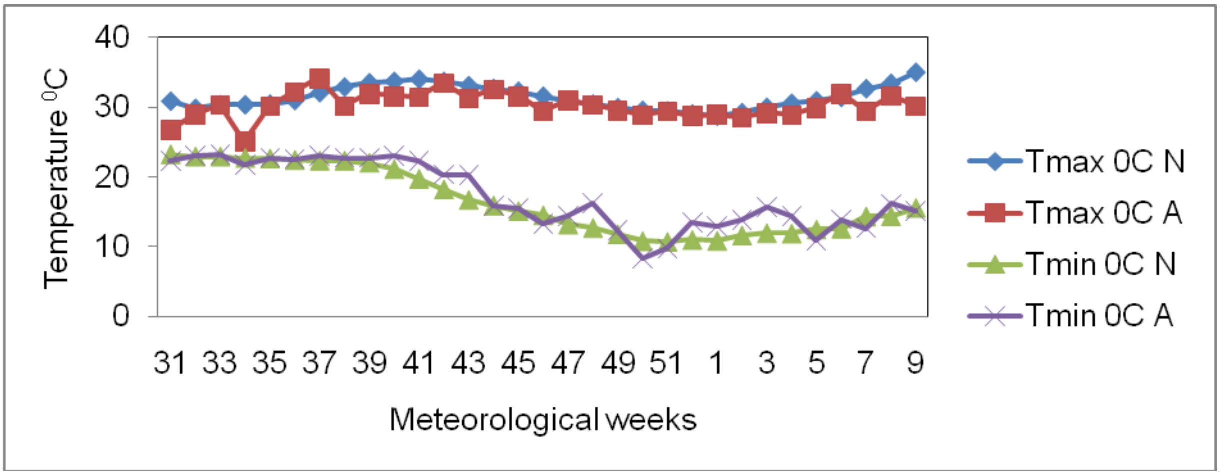


Fig. 1(a).Maximum and minimum Temperature (°C) from Aug –Feb for the year 2013-14

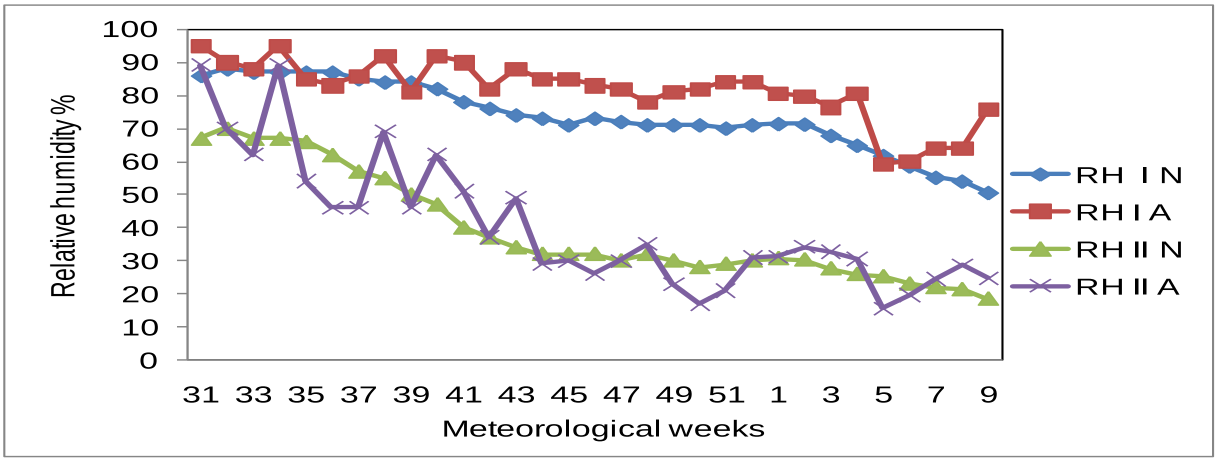


Fig. 1(b). Relative Humidity (%) from Aug –Feb for the year 2013-14

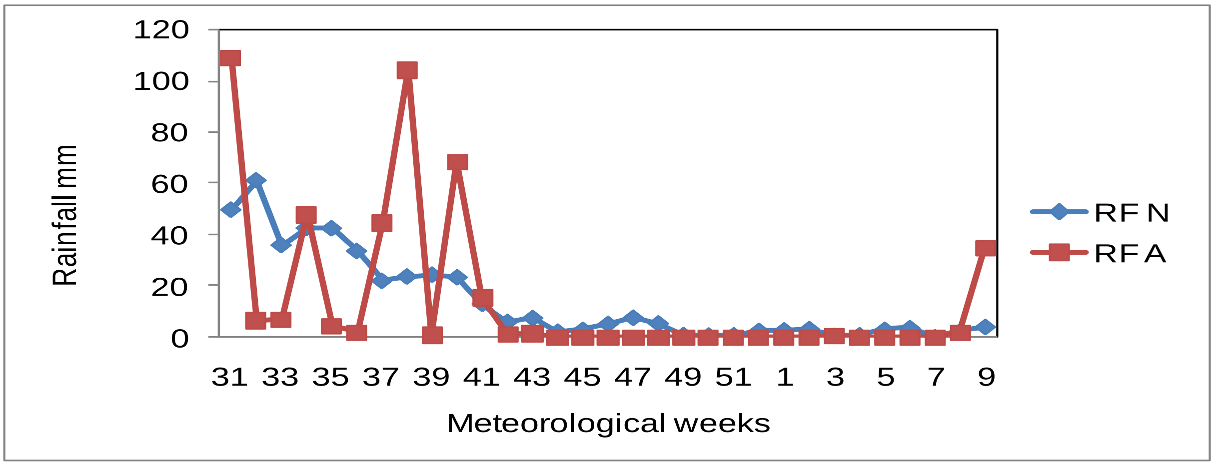


Fig.1(c). Rainfall (mm) from Aug – Feb for the year 2013-14

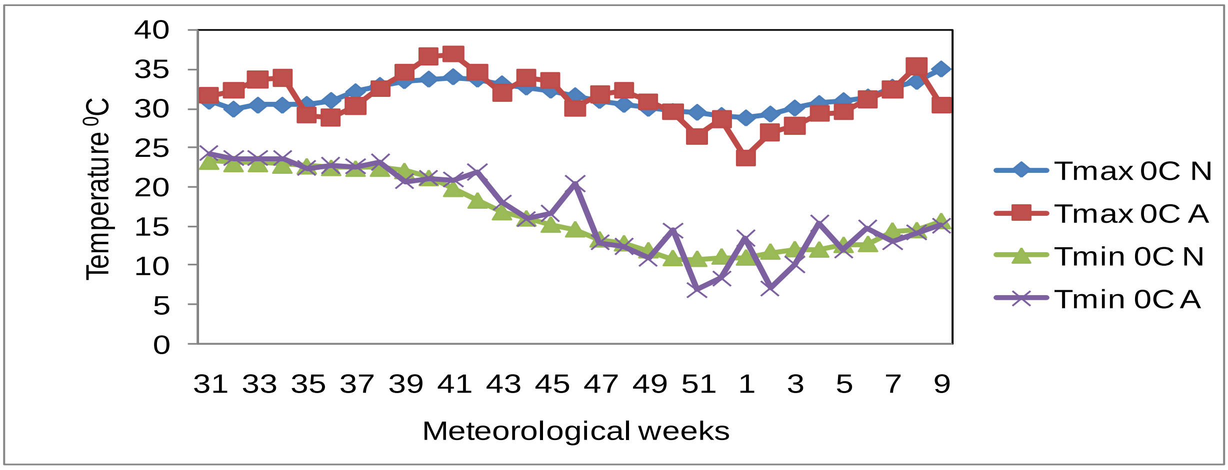


Fig. 2(a).Maximum and minimum Temperature (°C) from Aug –Feb for the year2014-15

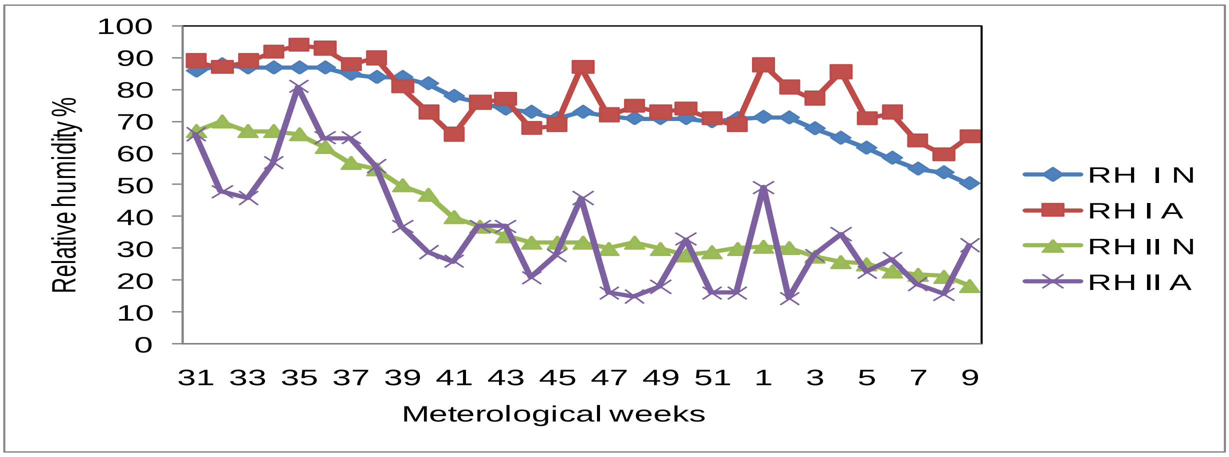


Fig. 2(b). Relative Humidity (%) from Aug –Feb for the year 2014-15

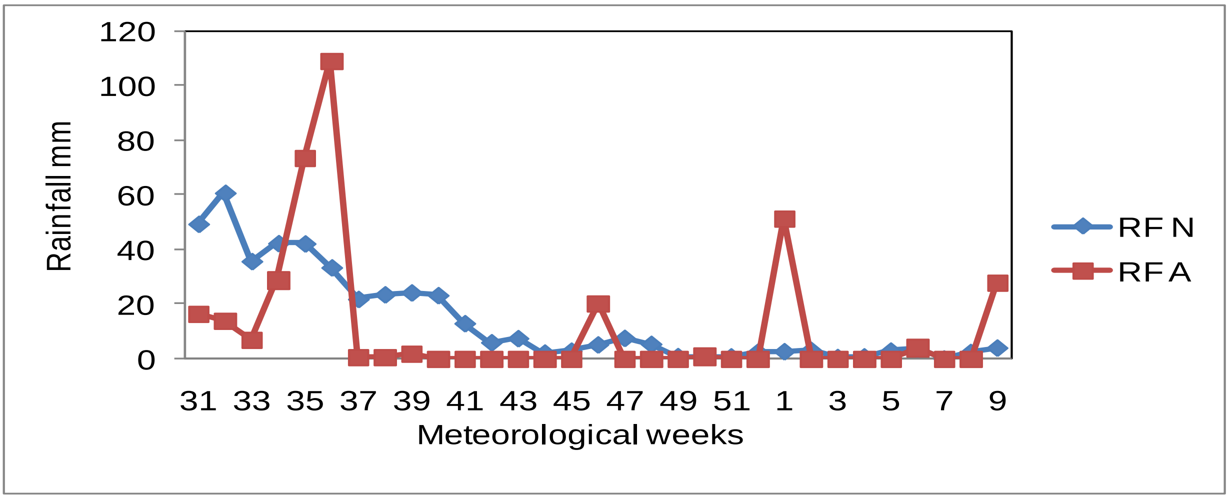


Fig. 2(c). Rainfall (mm) from Aug –Feb for the year 2014-15

3.4 Experimental Details

1	Name of crop	:	Baby corn
2)	Variety	:	G – 5414 Source : Syngenta India
3)	Experimental design	:	FRBD (Factorial Randomized Block Design)
4)	Number of replication	:	3 (Three)
5)	Number of treatment combination	:	20 (Twenty)
6)	Total number of plots		60 (Sixty)
7)	Planting Method		Flat bed
8)	Plot size	:	Gross plot – 1.8 m × 2.1 m. Net plot – 1.5 m × 1.8 m.

Table 3.1 Treatment details

Factor A - Sowing Period		**Factor B - Spacing**	
P_1	35th met. week (last week Aug.)	S_1	30 × 30 Cm
P_2	39th met. week (last week Sept.)	S_2	45 × 15 Cm
P_3	43rd met. week (last week Oct.)	S_3	45 × 30 Cm
P_4	48th met. week (last week Nov.)	S_4	60 × 15 Cm
		S_5	60 × 30 Cm

Table 3.2 Treatment combinations

$P_1 S_1$	35th met. week (last week Aug.) + 30 × 30 Cm
$P_1 S_2$	35th met. week (last week Aug.) + 45 × 15 Cm
$P_1 S_3$	35th met. week (last week Aug.) + 45 × 30 Cm
$P_1 S_4$	35th met. week (last week Aug.) + 60 × 15 Cm
$P_1 S_5$	35th met. week (last week Aug.) + 60 × 30 Cm
$P_2 S_1$	39th met. week (last week Sept.) + 30 × 30 Cm
$P_2 S_2$	39th met. week (last week Sept.) + 45 × 15 Cm
$P_2 S_3$	39th met. week (last week Sept.) + 45 × 30 Cm

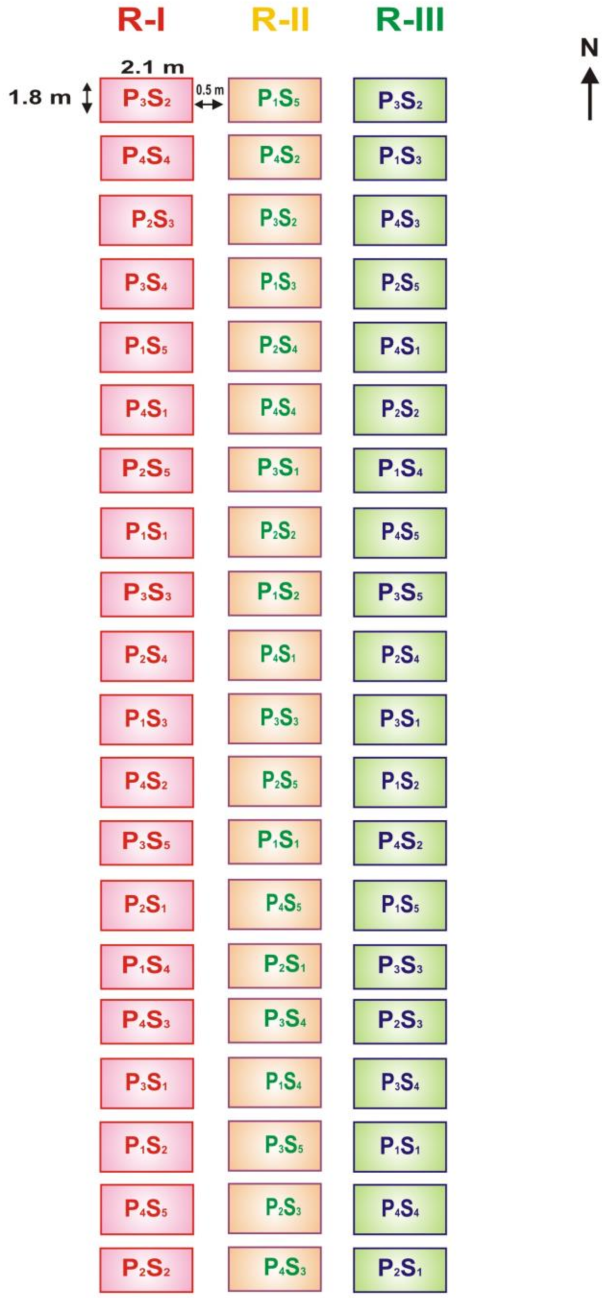


Fig. 3. Plan of layout

Plate 1. General view of experimental plot (2013-14)

Plate 2. General view of experimental plot (2014-15)

P_2 S_4	39th met. week (last week Sept.) + 60 × 15 Cm
P_2 S_5	39th met. week (last week Sept.) + 60 × 30 Cm
P_3 S_1	43rd met. week (last week Oct.) + 30 × 30 Cm
P_3 S_2	43rd met. week (last week Oct.) + 45 × 15 Cm
P_3 S_3	43rd met. week (last week Oct.) + 45 × 30 Cm
P_3 S_4	43rd met. week (last week Oct.) + 60 × 15 Cm
P_3 S_5	43rd met. week (last week Oct.) s+ 60 × 30 Cm
P_4 S_1	48th met. week (last week Nov.) + 30 × 30 Cm
P_4 S_2	48th met. week (last week Nov.) + 45 × 15 Cm
P_4 S_3	48th met. week (last week Nov.) + 45 × 30 Cm
P_4 S_4	48th met. week (last week Nov.) + 60 × 15 Cm
P_4 S_5	48th met. week (last week Nov.) + 60 × 30 Cm

3.5 Cultivation Details

3.5.1 Seed

Seeds of Baby corn variety G -5414 developed by Syngenta Seed Company were sown.

3.6. Cultural Operations

The details of various cultural operations carried out during the course of investigation are furnished here under;

3.6.1 Land preparation

The land was prepared one month prior to sowing by ploughing once with mould board plough followed by two harrowing. FYM @ 10 t/ha was incorporated in the soil at the time of last harrowing. Stubbles and weeds were collected and disposed off from the experimental area. Plots were laid out as per the plan, one week before sowing.

3.6.2 Seeds sowing

Seeds were dibbled at 3-5 cm depth @ two to three seeds per hill at four different sowing periods (35, 39, 43 and 48 meteorological week) with five different crop geometry (i.e. 30 × 30 Cm, 45 × 15 Cm, 45 × 30 Cm, 60 × 15 Cm and 60 × 30 Cm). Uniform plant population was maintained by thinning at week days after germination.

3.6.3 Gap filling and thinning

Gap filling was done at 10 DAS to maintain uniform plant population. Similarly thinning was done in all the treatments at 7 days after gap filling, retaining two healthy seedlings per hill.

3.6.4 Application of manures and fertilizers

The recommended dose of fertilizer NPK @ 150:60:60 Kg ha^{-1} were applied in the form of urea, SSP, and MOP. The full dose of P_2O_5 and K_2O and 10% of N were given at the time of sowing, while the remaining dose of N was applied in 4 split doses.

3.6.5 Irrigation

The crop was lightly irrigated immediately after sowing for obtaining better and uniform germination. Subsequent irrigations were given as and when required depending upon moisture condition of experimental plot and crops critical stages. Soil moisture was maintained uniformly throughout the crop growth period.

3.6.6 Weeding and earthing up

To check the weed growth, intercultural operations were done starting from 3rd week after sowing, hand weeding was done as per requirement, which was followed by earthing up to support the initial crop stand.

3.6.7 Plant protection

To control stem borer, Phorate 10 G was applied @1 to 2 g/plant at 30 DAS and 40 DAS.

3.6.8 Detasseling

Detasseling is an essential operation for maintaining the quality of baby corn. However, the variety G-5414 having cytoplasmic male sterility does not require detasseling practice.

3.6.9 Harvesting

Harvesting of ear was done at 3rd day of silking, before physiological maturity stage when they attained the proper size suitable for vegetable purpose. After removing the green cobs from the plants, the plants were cut off close to the ground and used as fodder for animals.

3.7 Biometric observations

Due to large plant population size, it was very difficult to record the observation of every plant, hence the technique of random sampling was adopted for recording the observation of various growth parameters of the plant during the course of the study. Five plants were selected and tagged at random in each treatment plot for recording the observations on growth, yield and quality parameters and their means were worked out.

3.7.1 Growth parameters

3.7.1.1 Plant height (cm)

The plant height of five randomly selected plants in each plot was measured from ground level to the base of flag leaf at 30 days after sowing and at harvest. The average value at each treatment was computed and expressed in centimeters (cm).

3.7.1.2 Number of leaves

Total number of leaves in five randomly selected plants in each plot was counted at 30 days after sowing and at harvest and their mean values were expressed as number of leaves plant^{-1}.

3.7.1.3 Leaf area at harvest

Total number of leaves on the same five tagged plants in each treatment was selected and the leaf area was recorded with the help of leaf area meter in cm^2.

3.7.1.4 Leaf area index (LAI)

Leaf area index was calculated by using following formula (Sestak *et al*., 1971)

$$LAI = \frac{\text{Leaf area plant}^{-1}\ (cm^2)}{\text{Ground area occupied plant}^{-1}\ (cm^2)}$$

3.7.1.5 Days to 50% tasseling

Days to 50% tasseling was recorded on the basis of number of days taken from the date of sowing to tasseling of half of plant population in each plot.

3.7.1.6 Days to 50% Cob emergence

The number of days from sowing to the days when 50 percent of plant population in each plot showed cob emergence was recorded.

3.7.1.7 Days to 50% silking

Days to 50% silking was recorded on the basis of number of days taken from the date of sowing to silking of half of plant population from overall plot.

3.7.1.8 Days to cob harvest

Days to cob harvest was recorded on the basis of number of days taken from the date of sowing to harvesting of half of plant populations cobs from overall plot.

3.7.1.9 Chlorophyll content of leaves (mg g^{-1})

The chlorophyll content of the leaves was estimated by measuring the chlorophyll in the middle portion of the leaf on five leaves per plant from the five randomly selected plants. The average chlorophyll content was calculated first by considering average of the five leaves then from five observation plants. Chlorophyll content of baby corn leaves was measured at harvest. The chlorophyll content in leaf was estimated by adopting the procedure given by Hiscox and Israelstam (1979) and extraction of Chlorophyll was done with DMSO (Dimethyl sulphoxide) methods. The leaf samples weighing 0.375 g were added in test tubes containing 10 ml DMSO solution and kept in BOD incubator for 2 hours at 60˚C for extraction of chlorophyll. The supernatant was used for estimation of pigments. The optical density of the aliquot was measured on spectrophotometer at the wavelength of 663 nm for chlorophyll a, 645 nm for chlorophyll b and 652 nm for total chlorophyll with red filter.

The chlorophyll from leaves was calculated from the equations given below and was expressed in mg g^{-1}.

$$\text{Total chlorophyll} = \frac{\text{OD at 652 nm x 100}}{34.5} \times \frac{V}{100 \times W}$$

Where,

OD = Optical density

V = Final volume i.e. 10 ml of DMSO

W = weight of fresh leaves (g)

$$\underset{(\text{mg } g^{-1})}{\text{Chlorphyll a}} = 12.7 \text{ (OD at 663nm)} – 269 \text{ (OD at 663 nm)} – 2.69 \text{ OD at 645 nm)} \times \frac{V}{1000x\ W}$$

$$\underset{(\text{mg } g^{-1})}{\text{Chlorophyll b}} = 22.9 \text{ (OD at 645 nm)} – 4.68 \text{ (OD at 663 nm)} \times \frac{V}{1000 \times W}$$

3.7.2 Yield parameters

3.7.2.1 Number of cobs plant^{-1}

The number of cobs from the five tagged plants were recorded individually and the average number of cobs per plant was worked out.

3.7.2.2 Cob length (cm)

The length of dehusked cobs from five tagged plants were measured from the tip to bottom of ear and the mean length was expressed in centimeter.

3.7.2.3 Cob diameter (cm)

The width of dehusked cobs from the selected five plants in each treatment was measured at middle portion of corn with the help of Vernier caliper and expressed in centimeter.

3.7.2.4 Cob weight with husk (g)

The total weight of baby corn cobs from five tagged plants was taken along with the husk and the average weight of an individual cob was recorded.

3.7.2.5 Cob weight without husk (g)

The total weight of baby corn cobs from five selected plants was taken without the husk and the average weight of an individual cob was worked out.

3.7.2.6 Cob yield per plant (g)

The cob yield per plant (g) was obtained by multiplying the average weight of an individual cob of both i.e. cob with husk and dehusked cob from each plant of the five tagged plants to the average number of cobs per plant.

3.7.2.7 Cob yield per plot (kg)

Cob yield per plot (Kg) was calculated by multiplying average cob yield per plant to the total plant population per plot in each treatment.

3.7.2.8 Cob yield per hectare (q ha^{-1})

Weight of both i.e. cob with husk and dehusked baby corn from each net plot was recorded in kg and it was converted on hectare basis as q ha^{-1}.

3.7.2.9 Green fodder yield (t ha^{-1})

After complete harvesting of the cobs, total plant in each plot was cut very close to the ground for fodder and weight was recorded in kg and it was converted on hectare basis as t ha^{-1}.

3.7.2.10 Total dry matter accumulation (g)

Five plants were selected randomly in the sampling row. They were cut very close to the ground levels for the determination of dry matter production and its portioning in different parts of the plant. The sample plants were separated into leaves, stem, cob sheath and cobs without husk. These samples were sundried for 4 to 5 days and then oven dried at 70˚C temperature for 24 to 48 hrs. Then dry weight was recorded in grams.

3.7.3 Quality parameter

3.7.3.1 Protein content (%)

Total N content was determined from the baby corn of each treatment by Kjeldahl's method as suggested by Jackson (1967) and this was multiplied by factor 6.25 as suggested by Piper (1966). The protein percentage from the baby corn was calculated by the following formula,

Percent protein = N% X 6.25 (Factor)

3.7.3.2 Reducing sugar (%)

Reducing sugar percent was estimated by DNS method, suggested by Milleo, (1992).

3.7.3.3 Total sugar (%)

Total sugar was estimated by Anthron method, suggested by Satasivam and Manickan (1992)

3.7.3.4 Non reducing sugar (%)

The non-reducing sugar percent was observed by substracting the reducing sugar from total sugar percent.

Non-reducing sugar = Total Sugar – Reducing sugar x 0.95

3.7.3.5 Moisture (%)

Moisture percent was determined by using electronic moisture meter.

3.7.3.6 Fibre content (%)

Fibre content of each treatment combination was determined from cob with the help of Fibra-plus operational system. 2 gm leaf sample was boiled on 500 ºC in acid (H_2SO_4) and washed with distilled water. After acid wash, samples were boiled in alkali (NaOH) and again washed with distilled water. Placed crucibles in hot air oven until the crucibles are free from moisture, then, placed all the crucibles in muffle furnace at 550 ºC for ashing. Then weight of the crucibles was taken and reading was recorded.

Crude fibre content of corn was calculated by using procedure and formula suggested by Ranganna (1986).

$$\% \text{ Crude fibre} = \frac{(W_1 - W_2)}{W} \times 100$$

Where,

W_1 – Initial weight of crucibles

W_2 – Final weight of crucibles

W – Weight of crucibles

3.7.4 Others

3.7.4.1 Light interception

3.7.4.1.1 Absorbed Photosynthetically active radiation (%)

The measurement of light was done between 1200 and 1300 h of the day using a quantum meter (LI-COR model LI-185 A) with 1.0 m line quantum sensor. In each plot, the light incident above the canopy was measured by holding the sensor above the crop canopy. Light transmitted through the crop canopy was measured by holding the sensor below the crop canopy. For transmitted light, two observations were taken, one holding the sensor along the row and other across the rows and the mean was taken. The percentage of light intercepted by the crop canopies of the cropping systems was calculated as under.

$$PLI = \frac{(LI-LT)}{LI} \times 100$$

Where:

PLI-Percentage of light intercepted,

LI- Light incident above the crop canopies and

LT-Light transmitted below the crop canopies.

Light interception pattern was studied at harvest of baby corn.

3.7.5 Economics

3.7.5.1 Cost of cultivation (Rs. ha^{-1})

The total cost of cultivation was calculated considering the inputs used in each treatment with prevailing market rates.

3.7.5.2 Gross monetary returns (Rs. ha^{-1})

The total value of produce i.e. cobs and fodders were estimated treatment wise as per the prevailing market rates and gross monetary returns was calculated.

3.7.5.3 Net monetary returns (Rs. ha^{-1})

Net monetary returns was calculated by substracting the cost of cultivation from gross monetary returns treatment wise, since this represent the actual income o the farmer.

Net return (Rs. ha^{-1}) = Gross return (Rs. ha^{-1}) – Cost of cultivation (Rs. ha^{-1})

3.7.5.4 Benefit cost ratio

The benefit cost ratio was worked out by dividing the gross returns with total cost of cultivation. This was calculated with the following formula;

$$\text{Benefit cost ratio} = \frac{\text{Gross monetary returns (Rs. ha}^{-1}\text{)}}{\text{Total Cost of cultivation (Rs. ha}^{-1}\text{)}}$$

CHAPTER IV

RESULTS AND DISCUSSION

The present investigation of field experiment entitled ““Response of baby corn (*Zea mays* L.) to sowing periods and crop geometry” was conducted at Main garden, Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, during the year 2013-14 and 2014-15.

The results of data collected on various aspects during the investigation are presented and discussed in this chapter under appropriate headings. In order to have a clear understanding of the findings the tables and figures are also presented.

1. Growth parameters
2. Yield parameters and yield
3. Quality parameters
4. Light interceptions (%)
5. Economics

1. Growth parameters

Growth is an irreversible increase in size of the plants and it is influenced by growing season and arrangement of plants. The different sowing periods with different crop geometry exerted a significant increase on growth parameters, such as plant height, number of leaves, leaf area, leaf area index and leaf chlorophyll content.

4.1 Influence of sowing periods and crop geometry on plant height (cm) of baby corn

Plant height is an important component which helps in the determination of growth attained during the growing period. The data regarding the plant height of baby corn as influenced by sowing periods and crop geometry at 30 days after sowing and harvest is presented in Table 1, figure 4 (a) and (b).

4.1.1 Influence of sowing periods

The data presented in Table 1 and represented graphically in the figure 4 (a) and (b) revealed that the plant height of baby corn was significantly influenced by different sowing period subsequently at 30 days after sowing and harvest during both the years of experimentation.

During the year 2013-14 the sowing period P_2 (39thmet. week) had recorded the maximum plant height (51.91 and 197.67 cm) respectively at both the stages of observation i. e. 30 DAS and at harvest respectively. However, the minimum plant height (45.28 and 191.89 cm) was recorded in the sowing period P_4 (48th met. week) at all the stages of observation i. e. 30 DAS and at harvest.

Similarly during the year 2014-15, significantly the maximum plant height of baby corn (53.49 and 199.80 cm) was recorded with the sowing period P_2 (39thmet. week) at all the stages of observation such as 30 DAS and at harvest. However, the minimum value (47.72 and 192.92 cm) was recorded in the sowing period P_4 (48th met. week) at 30 DAS and at harvest.

The data regarding the pooled mean of both the years clearly indicated that significantly maximum plant height (52.70 and 198.73 cm) was recorded with treatment P_2 (39th met. week) at all the stages of observation such as 30 DAS and at harvest. However, significantly minimum plant height was recorded in the treatment P_4 (48th met. week) at all the stages of observation i. e. 30 DAS (46.50 cm) and at harvest (192.40 cm).

Sowing period significantly influenced the plant height. Progressive increase in plant height with the age of the crop i.e. from 30 DAS to harvest and the highest values recorded at harvest irrespective of the treatments imposed. At earliest sowing period i.e. 35th meteorological week (last week Aug.) the decreased in plant height at both 30 DAS as well as harvest may be associated with higher temperatures that the plants experienced which limited their growing period and assimilate-building because of the early maturity of plants. Thus, the plants did not have adequate opportunity for photosynthesis and their height decreased.However, the plant height was found highest at sowing periods of 39th meteorological week (last week of Sept.) due to optimum sowing time, suitable growth period and favourable climatic conditions especially temperature. On the other hand the plant height was decreased in with further delay in sowing period i.e. 48th meteorological week (last week Nov.). Colder soil results in slow germination and growth of the plants. Imholte and Carter (1987) reported that delay of sowing caused decline in plant height which are in agreement to this result.

4.1.2 Influence of crop geometry

The data presented in Table 1 and represented graphically in the figure 4 (a) and (b) revealed that the plant height of baby corn was significantly influenced by different crop geometry subsequently at 30 days after sowing and harvest during both the years of experimentation.

During the year 2013-14 the crop geometry S_2 (45×15 cm) had recorded the maximum plant height (53.20 and 198.27 cm) at both the stages of observation i. e. 30 DAS and at harvest. However, the minimum plant height (45.73 and 191.98 cm) was recorded in the treatment S_5 (60×30 cm) at all the stages of observation i. e. 30 DAS and at harvest respectively and also found statistically at par with the plant height (46.47 and 192.80 cm)at 30 DAS as well as harvest respectively in S_3(45×30 cm).

Similarly during the year 2014-15, significantly the maximum plant height of baby corn was recorded with the treatment S_2 (45×15 cm) at all the stages of observation such as 30 DAS (54.68 cm) and at harvest (200.61 cm). However, the minimum value (47.39 and 192.83 cm) was recorded in the treatment S_5 (60×30 cm) i. e. 30 DAS and at harvest respectively. At 30 DAS it was also found statistically at par with the plant height (48.21 cm) in the crop geometry S_3 (45×30 cm).

The data regarding the pooled mean of both the years clearly indicated that significantly maximum plant height (53.94 and 199.44 cm) was recorded with the crop geometry S_2 (45×15 cm) at 30 DAS as well as at harvest respectively. However, significantly minimum plant height (46.56 and 192.41 cm) was recorded in the crop geometry S_5 (60×30 cm) at all the stages of observation i. e. 30 DAS and at harvest. At 30 DAS it was also found statistically at par with the plant height (47.34 cm) in the crop geometry S_3 (45×30 cm).

An increasing trend in plant height with decreasing crop geometry was observed during both the years of experimentation. The greater closeness in crop geometry encourages greater etiolation which resulted in taller plants, while, the wider spacing enjoyed a temporal difference which helped in reducing competition for the growth factor such as light. Similar result was reported by Gaikwad *et al*. (2015) and Kunjir *et al.* (2009) which were also in close agreement with findings of various researchers as Futuless *et al*. (2010), Mathukia *et al*. (2014) who reported tallest plant at closer spacing.

4.1.3 Interaction effect

The data presented in Table 2 indicated that the interaction of sowing periods and crop geometry on plant height of baby corn at 30 DAS and harvest was significant during both the years of experimentation (2013-14 and 2014-15).

In the year 2013-14, significantly maximum plant height (57.07 and 203.40 cm) was recorded with treatment combination P_2S_2 (39^{th} met. week + 45×15 cm) at 30 DAS and harvest respectively. At 30 DAS these value was also found to be statistically at par with the plant height (56.07 cm) in P_3S_2 (43^{rd} met. week + 45×15 cm). However, at 30 DAS the minimum plant height (43.60 cm)was recorded in the treatment combination P_4S_5 (48^{th} met. week + 60×30 cm) which was also found at par with the plant height (45.40, 43.8, 45.27, 43.67 and 45.20 cm) in the treatment combinations P_1S_3 (35^{th} met. week + 45×30 cm), P_1S_5 (35^{th} met. week + 60×30 cm), P_4S_1 (48^{th}met. week + 30×30 cm), P_4S_3 (48^{th} met. week

+ 45×30 cm) and P_4S_4 (48th met. week + 60×15 cm) respectively. At harvest the minimum plant height (189.70 cm) was observed with the treatment combination P_4S_5 (48th met. week + 60×30 cm) was also found at par with plant height (192.13, 191.93, 189.73 and 191.87 cm) in the treatment combinations P_1S_3 (35th met. week + 45×30 cm), P_3S_5 (43rd met. week + 60×30 cm), P_4S_3 (48th met. week + 45×30 cm) and P_4S_4 (43rd met. week + 60×15 cm) respectively.

During the year 2014-15, significantly maximum plant height (58.93 and 207.53 cm) was recorded in the treatment combination P_2S_2 (39th met. week + 45×15 cm) at 30 DAS and harvest respectively. However, at 30 DAS significantly minimum plant height (45.00 cm) was recorded in the treatment combination P_1S_5 (35th met. week + 60×30 cm), which was also found at par with the plant height (46.40 and 45.83 cm) in the treatment combinations P_4S_3 (48th met. week + 45×30 cm) and P_4S_5 (48th met. week + 60×30 cm) respectively. At harvest the minimum plant height (190.00 cm) was obtained in the treatment combination P_4S_5 (48th met. week + 60×30 cm), which was at found to be at par with the plant height (192.00 and 191.30 cm) in the treatment combinations P_3S_5 (43rd met. week + 60×30 cm) and P_4S_3 (48th met. week + 45×30 cm) respectively.

Regarding the pooled mean of both years, significantly maximum plant height (58.00 and 205.47 cm) was recorded with treatment combination P_2S_2 (39th met. week + 45×15 cm) respectively at 30 DAS and harvest. However, significantly minimum plant height (44.43 cm) was recorded in the treatment combination P_1S_5 (35th met. week + 60×30 cm) at 30 DAS which was also at par with the plant height (45.03 and 44.72 cm) in the treatment combinations P_4S_3 (48th met. week + 45×30 cm) and P_4S_5 (48th met. week + 60×30 cm) respectively. While, at harvest the minimum plant height (189.85 cm) was found in the combination P_4S_5 (48th met. week + 60×30 cm) and found at par with the plant height (191.97 and 190.52 cm) in the treatment combinations P_3S_5 (43rd met. week + 60×30 cm) and P_4S_3 (48th met. week + 45×30 cm) respectively.

Table 1: Influence of sowing period and crop geometry on plant height of baby corn (*Zea mays* L.)

Treatments	Plant height (cm)					
	30 DAS			At harvest		
Sowing Period (P)	**2013-2014**	**2014-2015**	**Pooled mean**	**2013-2014**	**2014-2015**	**Pooled mean**
P_1	47.45	48.94	48.20	194.55	196.05	195.33
P_2	51.91	53.49	52.70	197.67	199.80	198.73
P_3	50.65	51.34	51.00	194.80	196.18	195.49
P_4	45.28	47.72	46.50	191.89	192.92	192.40
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)±	0.374	0.296	0.280	0.449	0.407	0.363
CD at 5%	1.070	0.848	0.803	1.286	1.165	1.039
Crop geometry (S)						
S_1	49.88	51.47	50.68	195.82	196.98	196.40
S_2	53.20	54.68	53.94	198.27	200.61	199.44
S_3	46.47	48.21	47.34	192.80	194.51	193.65
S_4	48.83	50.13	49.48	194.85	196.26	195.55
S_5	45.73	47.39	46.56	191.98	192.83	192.41
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)±	0.418	0.331	0.314	0.502	0.455	0.406
CD at 5%	1.196	0.948	0.898	1.438	1.303	1.162
Interaction effect (P × S)						
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)±	0.836	0.662	0.627	1.004	0.910	0.812
CD at 5%	2.393	1.896	1.796	2.875	2.605	2.324

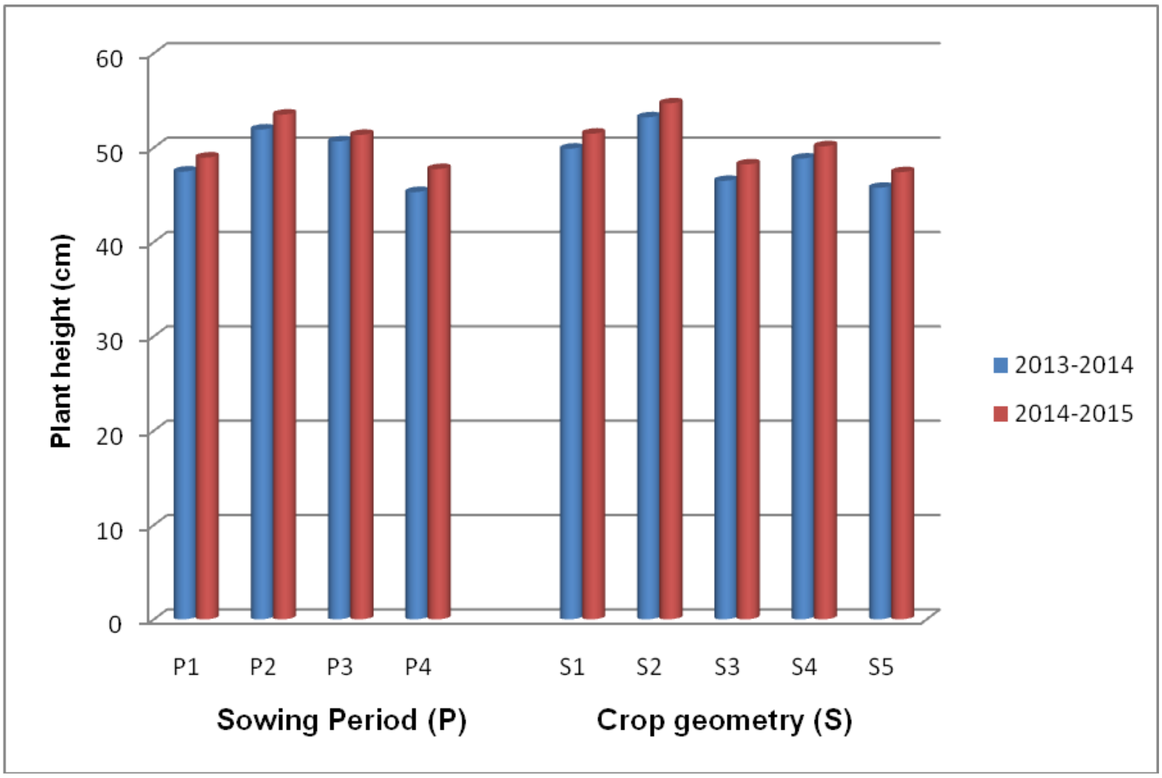


Fig. 4 (a) Influence of sowing period and crop geometry on plant height of baby corn (*Zea mays* L.) at 30 DAS

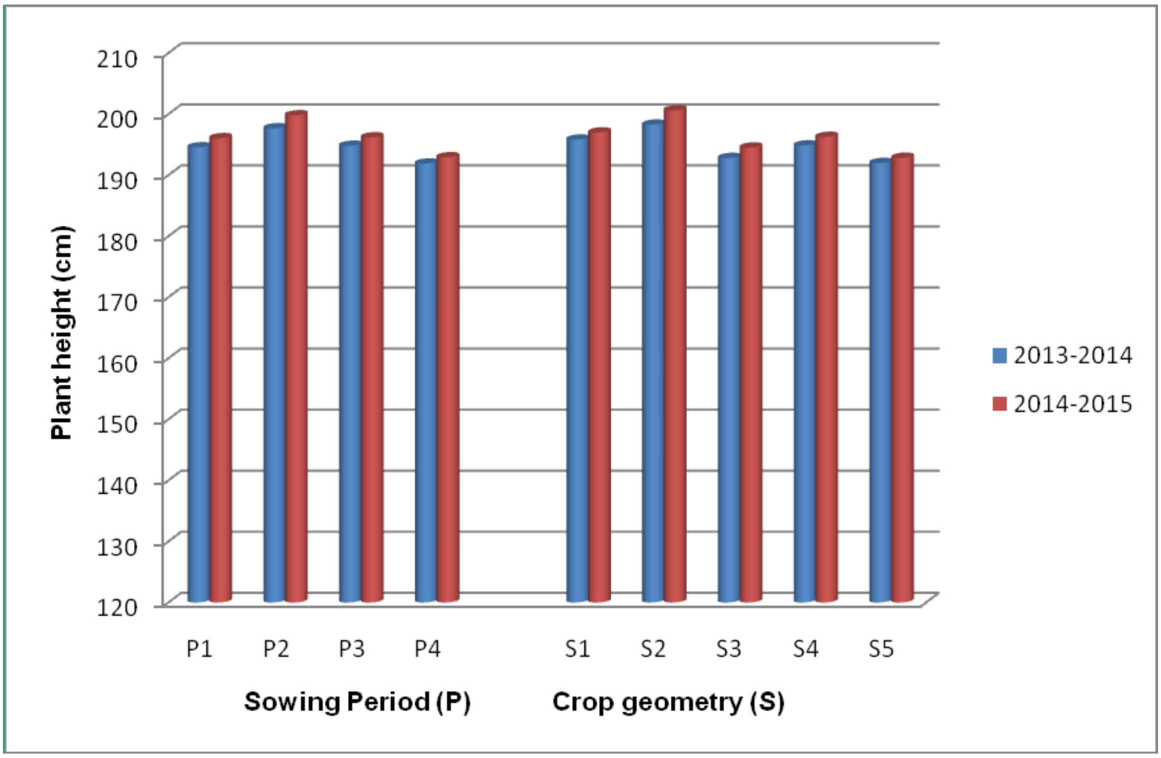


Fig. 4 (b) Influence of sowing period and crop geometry on plant height of baby corn (*Zea mays* L.) at harvest

Table 2: Interaction effect of sowing period and crop geometry on plant height of baby corn (*Zea mays* L.)

Treatment combinations	Plant height (cm)					
	30 DAS			At harvest		
	2013-2014	2014-2015	Pooled mean	2013-2014	2014-2015	Pooled mean
P_1 S_1	47.07	49.17	48.12	195.00	196.90	195.95
P_1 S_2	51.00	53.83	52.42	197.33	198.33	197.83
P_1 S_3	45.40	47.37	46.38	192.13	194.73	193.43
P_1 S_4	49.93	49.33	49.63	195.27	196.50	195.88
P_1 S_5	43.87	45.00	44.43	193.37	193.77	193.57
P_2 S_1	54.13	54.67	54.40	197.00	200.23	198.62
P_2 S_2	57.07	58.93	58.00	203.40	207.53	205.47
P_2 S_3	49.13	50.17	49.65	196.60	196.50	196.55
P_2 S_4	51.07	53.10	52.08	198.40	199.17	198.78
P_2 S_5	48.13	50.60	49.37	192.93	195.57	194.25
P_3 S_1	53.07	54.07	53.57	198.20	196.80	197.50
P_3 S_2	56.07	55.50	55.78	197.27	200.43	198.85
P_3 S_3	47.67	48.90	48.28	192.73	195.50	194.12
P_3 S_4	49.13	50.10	49.62	193.87	196.17	195.02
P_3 S_5	47.33	48.13	47.73	191.93	192.00	191.97
P_4 S_1	45.27	47.97	46.62	193.07	193.97	193.52
P_4 S_2	48.67	50.43	49.55	195.07	196.13	195.60
P_4 S_3	43.67	46.40	45.03	189.73	191.30	190.52
P_4 S_4	45.20	47.97	46.58	191.87	193.20	192.53
P_4 S_5	43.60	45.83	44.72	189.70	190.00	189.85
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)$\pm$	0.836	0.662	0.627	1.004	0.910	0.812
CD at 5%	2.393	1.896	1.796	2.875	2.605	2.324

At closer crop geometry, more severe competition for light and higher intra and inter-row competition for nutrients and water due to overcrowding of plants might be responsible for increasing the plant height. The higher plant density at closer crop geometry coupled the optimum sowing time, suitable growth period and favourable climatic conditions especially temperature resulted in higher growth of the plant.

4.2 Influence of sowing periods and crop geometry on number of leaves plant^{-1} of baby corn

The data regarding the number of leaves plant^{-1} of baby corn recorded at 30 days after sowing and harvest during both the years of experimentation is presented in Table 3 and depicted in figure 5 (a) and (b).

4.2.1 Influence of sowing periods

The data presented in Table 3 and represented graphically in the figure 5 (a) and (b) revealed that the plant height of baby corn was significantly influenced by different sowing period subsequently at 30 days after sowing and harvest during both the years of experimentation.

During the year 2013-14 the sowing period P_2 (39th met. week) had recorded the maximum number of leaves plant^{-1}(9.43 and 12.93) at 30 DAS and harvest respectively. However, the minimum leaves plant^{-1} (8.65 and 12.43) was recorded in P_4 (48th met. week) at all the stages of observation i. e. 30 DAS and at harvest respectively.

Similarly during the year 2014-15, significantly the maximum number of leaves plant^{-1}(9.51 and 12.99) was recorded with the sowing period P_2 (39th met. week) at all the stages of observation such as 30 DAS and at harvest. However, the minimum value (8.76 and 12.43) was recorded in the sowing period P_4 (48th met. week) at 30 DAS and at harvest respectively.

The data regarding the pooled mean of both the years clearly indicated that significantly maximum number of leaves plant^{-1}(9.47 and

12.96) was recorded with treatment P_2 (39thmet. week) at all the stages of observation such as 30 DAS and at harvest. However, the minimum leaves plant^{-1} (8.71 and 12.39) was recorded in the treatment P_4 (48thmet. week) at all the stages of observation i. e. 30 DAS and at harvest respectively.

Sowing period significantly influenced the number of leaves plant^{-1}. There was a progressive increase in number of leaves plant^{-1}from 30 DAS to harvest and the highest values recorded at harvest irrespective of all the treatments studied. Irrespective of the year the highest number of leaves plant^{-1}was observed in the sowing period P_2 (39th met. Week), which may be due to optimum sowing time, suitable growth period and favourable climatic conditions especially temperature. This is in close conformity with the finding of Singh *et al*. (2015), who reported highest number of leaves at 1st October sowing. However, the further delayed in sowing resulted in fewer leaves and slower rate of leaf appearance.

4.2.2 Influence of crop geometry

The data presented in Table 3 and represented graphically in the figure 5 (a) and (b) revealed that the number of leaves plant^{-1} of baby corn was significantly influenced by different crop geometry subsequently at 30 days after sowing and harvest during both the years of experimentation.

During the year 2013-14 the crop geometry, S_3 (45×30 cm)had recorded the maximum leaves plant^{-1}(9.42 and 13.02) at both the stages of observation i. e. 30 DAS and at harvest respectively and was also found at par with the number of leaves plant^{-1} (9.30 and 12.90)in crop geometry S_5 (60×30 cm) at 30 DAS and at harvest respectively. However, the minimum number of leaves plant^{-1}(8.68 and 12.22) was recorded in the treatment S_2 (45×15 cm) at all the stages of observation i. e. 30 DAS and at harvest respectively.

Similarly during the year 2014-15 the crop geometry, S_3 (45×30 cm)had recorded the maximum leaves plant^{-1}(9.55 and 13.07) at 30 DAS and harvest which was also found at par with the number of leaves plant^{-1} (9.42 and 12.97) in crop geometry S_5 (60×30 cm) at 30 DAS and harvest respectively. However, the minimum number of leaves plant^{-1}(8.73 and 12.33) was recorded in the treatment S_2 (45×15 cm) at all the stages of observation i. e. 30 DAS and harvest respectively.

The data regarding the pooled mean of both the years clearly indicated that, significantly maximum number of leaves plant^{-1}(9.48 and 13.04) was recorded with crop geometry S_3 (45×30 cm) at 30 DAS as well as at harvest which was also found at par with the number of leaves plant^{-1} (9.36 and 12.93) in the crop geometry S_5 (60×30 cm) at 30 DAS and at harvest respectively. However, the minimum value (8.71 and 12.28) was recorded in the treatment S_2 (45×15 cm) at 30 DAS as well as at harvest.

An increasing trend in the number of leaves plant^{-1} from 30 DAS to harvest was observed with the wider crop geometry irrespective of the year of experimentation. The highest number of leaves plant^{-1} was found in the crop geometry S_3 (45×30 cm) as compared with other geometry, which might have been due to better utilization of available resources by the plants. The higher number of leaves plant^{-1} at wider spacing was also reported by various researchers as Kunjir *et al*. (2009), Aravinth *et al*. (2011) and Gaikwad *et al*. (2015).

4.2.3 Interaction effect

The data presented in Table 4 indicated that the interaction of sowing periods and crop geometry on number of leaves plant^{-1} of baby corn at 30 DAS and harvest was significant during both the years of experimentation (2013-14 and 2014-15).

In the year 2013-14, significantly the maximum number of leaves plant^{-1}(9.93 and 13.60) was recorded with treatment combination P_2S_3 (39th met. week + 45×30 cm) at 30 DAS and at harvest respectively. At 30 DAS the number of leaves plant^{-1} in treatment combination P_2S_3 was also found at par with the number of leaves plant^{-1} (9.87) in the treatment combination P_2S_5 (39th met. week + 60×30 cm). Whereas, the minimum number of leaves plant^{-1}(8.40) was obtained in the combination P_4S_2

(43rdmet. week + 45×15 cm) at 30 DAS which was also found at par with P_1S_2 (35thmet. week + 45×15 cm) and P_4S_4 (43rd met. week + 60×15 cm) i.e. 8.53 leaves plant^{-1} each in both the cases. Whereas, at harvest the minimum number of leaves plant^{-1} (12.00) was obtained in the treatment combination P_4S_2 (43rd met. week + 45×15 cm) which was also found at par with the number of leaves plant^{-1} (12.13, 12.33 and 12.27) in the treatment combinations P_1S_2 (35th met. week + 45×15 cm), P_1S_4 (35th met. week + 60×15 cm) and P_4S_4 (48th met. week + 60×15 cm) respectively.

Similarly during the year 2014-15, significantly maximum number of leaves plant^{-1}(10.00 and 13.67) was recorded with treatment combination P_2S_3 (39th met. week + 45×30 cm) at 30 DAS and at harvest respectively. The number of leaves at 30 DAS in the treatment P_2S_3 was also found at par with the number of leaves plant^{-1} (9.87) in the treatment combination P_2S_5 (39th met. week + 45×30 cm). The minimum number of leaves plant^{-1}i.e. 8.40 and 12.00 at 30 DAS and harvest respectively was obtained in the combination P_4S_2 (39th met. week + 60×15 cm). However at harvest, it was found at par with the number of leaves plant^{-1} i.e. 12.27 each in the treatment combinations P_1S_2 (35th met. week + 45×15 cm) and P_4S_4 (48th met. week + 60×15 cm).

The pooled mean indicated significantly maximum number of leaves plant^{-1} (9.97 and 13.63) with treatment combination P_2S_3 (39th met. week + 45×30 cm) at 30 DAS and at harvest. The number of leaves plant^{-1}at 30 DAS in the treatment P_2S_3 was also found at par with the treatment combination P_2S_5 (39th met. week + 60×30 cm) i.e. 9.87 leaves. The minimum number of leaves plant^{-1} i.e. 8.40 and 12.00 leaves was obtained in the combination P_4S_2 (48th met. week + 45×15 cm) at both 30 DAS and harvest respectively. However, at harvest this value was at par with 12.20 leaves plant^{-1} in the treatment combination P_1S_2 (35th met. week + 45×15 cm).

Table 3: Influence of sowing period and crop geometry on number of leaves plant^{-1} of baby corn (*Zea mays* L.)

Treatments	**Number of leaves plant^{-1}**					
	30 DAS			**At harvest**		
Sowing Period (P)	**2013-2014**	**2014-2015**	**Pooled mean**	**2013-2014**	**2014-2015**	**Pooled mean**
P_1	8.93	9.08	9.01	12.55	12.61	12.58
P_2	9.43	9.51	9.47	12.93	12.99	12.96
P_3	9.09	9.21	9.15	12.60	12.71	12.65
P_4	8.65	8.76	8.71	12.35	12.43	12.39
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)±	0.040	0.036	0.031	0.056	0.055	0.041
CD at 5%	0.113	0.103	0.089	0.159	0.159	0.118
Crop geometry (S)						
S_1	8.90	9.03	8.97	12.47	12.55	12.51
S_2	8.68	8.73	8.71	12.22	12.33	12.28
S_3	9.42	9.55	9.48	13.02	13.07	13.04
S_4	8.83	8.97	8.90	12.43	12.50	12.47
S_5	9.30	9.42	9.36	12.90	12.97	12.93
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)±	0.044	0.040	0.035	0.062	0.062	0.046
CD at 5%	0.126	0.115	0.100	0.178	0.177	0.132
Interaction effect (P × S)						
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)±	0.088	0.080	0.070	0.124	0.124	0.092
CD at 5%	0.253	0.230	0.200	0.355	0.355	0.263

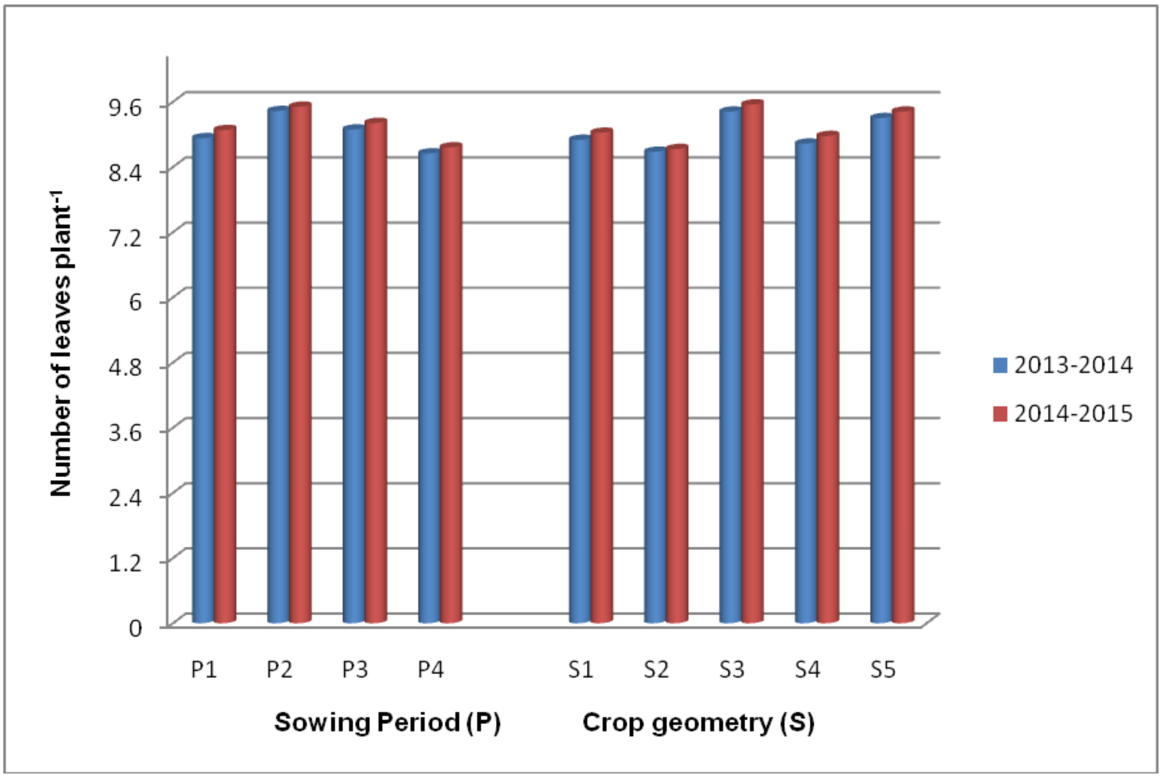


Fig. 5 (a) Influence of sowing period and crop geometry on number of leaves plant^{-1} of baby corn (*Zea mays* L.) at 30 DAS

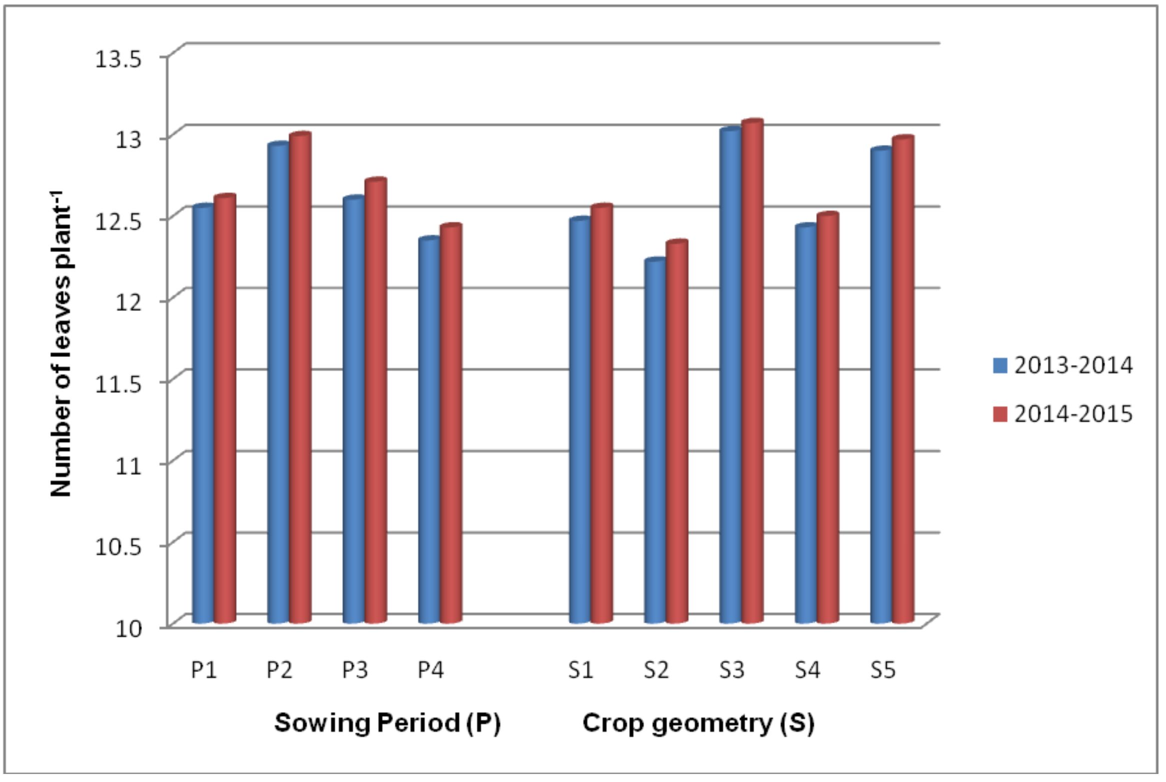


Fig. 5 (b) Influence of sowing period and crop geometry on number of leaves plant^{-1} of baby corn (*Zea mays* L.) at harvest

Table 4: Interaction effect of sowing period and crop geometry on number of leaves plant $^{-1}$ of baby corn (*Zea mays* L.)

Treatment combinations	Number of leaves plant^{-1}					
	30 DAS			At harvest		
	2013-2014	2014-2015	Pooled mean	2013-2014	2014-2015	Pooled mean
P_1 S_1	8.73	8.93	8.83	12.40	12.53	12.47
P_1 S_2	8.53	8.73	8.63	12.13	12.27	12.20
P_1 S_3	9.40	9.47	9.43	12.87	12.87	12.87
P_1 S_4	8.67	8.87	8.77	12.33	12.47	12.40
P_1 S_5	9.33	9.40	9.37	13.00	12.93	12.97
P_2 S_1	9.13	9.33	9.23	12.67	12.73	12.70
P_2 S_2	9.00	9.00	9.00	12.53	12.60	12.57
P_2 S_3	9.93	10.00	9.97	13.60	13.67	13.63
P_2 S_4	9.20	9.33	9.27	12.67	12.73	12.70
P_2 S_5	9.87	9.87	9.87	13.20	13.20	13.20
P_3 S_1	9.07	9.07	9.07	12.53	12.60	12.57
P_3 S_2	8.80	8.80	8.80	12.20	12.47	12.33
P_3 S_3	9.47	9.73	9.60	12.93	13.00	12.97
P_3 S_4	8.93	8.93	8.93	12.47	12.53	12.50
P_3 S_5	9.20	9.53	9.37	12.87	12.93	12.90
P_4 S_1	8.67	8.80	8.73	12.27	12.33	12.30
P_4 S_2	8.40	8.40	8.40	12.00	12.00	12.00
P_4 S_3	8.87	9.00	8.93	12.67	12.73	12.70
P_4 S_4	8.53	8.73	8.63	12.27	12.27	12.27
P_4 S_5	8.80	8.87	8.83	12.53	12.80	12.67
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)$\pm$	0.088	0.080	0.070	0.124	0.124	0.092
CD at 5%	0.253	0.230	0.200	0.355	0.355	0.263

The interaction between sowing period and crop geometry was found to influenced significantly on the number of leaves plant^{-1} irrespective of the year of experimentation. The highest value at 30 DAS and harvest was observed in the treatment combination P_2S_3 (39th met. week + 45×30 cm), which may be due to optimum growing period (last week September), better availability and utilization of resources by the plants under the wider spacing.

4.3 Influence of sowing periods and crop geometry on leaf area (cm^2) and leaf area index (LAI) of baby corn (*Zea mays* L.)

The data pertaining to leaf area (cm^2) and leaf area index (LAI) of baby corn (*Zea mays* L.) as influenced due to sowing periods and crop geometry, recorded during the years 2013-14 and 2014-15 is represented in Table 5 and illustrated in figure 6 (a) and (b).

4.3.1 Influence of sowing periods

The data presented in Table 5, clearly indicates that the leaf area as well as the leaf area index of baby corn plant was influenced significantly due to sowing periods during both the years of experimentation.

During the year 2013-14, significantly the maximum leaf area (509.27 cm^2) and leaf area index (3.49) was recorded with the treatment P_2 (39th met. week). While the minimum leaf area (508.76 cm^2) and leaf area index (3.39) was recorded in the sowing period P_1(35th met. week) and which was also found statistically at par with P_4 (48th met. week) i.e. 508.98 cm^2 and 3.40 respectively.

Similarly, in the year 2014-15, the maximum leaf area (509.29 cm^2) and leaf area index (3.50) was recorded significantly at sowing period P_2 (39th met. week). While the minimum leaf area (508.83 cm^2) and leaf area index (3.40) was recorded in the sowing period P_1 (35th met. week) which was also found statistically at par with P_4 (48th met. week) i.e. 508.96 cm^2 and 3.41 respectively.

Regarding the pooled mean, significantly the maximum leaf area (509.28 cm^2) and leaf area index (3.49) was recorded at sowing period P_2 (39th met. week). While the minimum leaf area (508.79 cm^2) and leaf area index (3.39) was recorded in the sowing period P_1 (35th met. week) which was also found statistically at par with P_4 (48th met. week) i.e. 508.94 and 3.40 respectively.

The results showed that sowing period had significantly affected the leaf area and LAI during both the years of experimentation. The highest leaf area and leaf area index was found in the sowing period P_2 (39th met. week) compared to rest of the sowing periods, which might have been attributed by better growing conditions and performance of plants under optimum period of growth. The further delay in sowing caused reduction in the leaf area as well as LAI.

4.3.2 Influence of crop geometry

The data presented in Table 5 revealed that, crop geometry influenced significantly the leaf area and leaf area index of baby corn during both the years of experimentation.

During the year 2013-14, significantly the maximum leaf area (511.74 cm^2) and leaf area index (3.56) was recorded with the treatment S_3 (45×30 cm) and was found statistically at par with S_5 (60×30 cm)i.e. 511.64 cm^2 and 3.55 respectively. The minimum leaf area (505.46 cm^2) and leaf area index (3.29) was recorded in the treatment S_2 (45×15 cm).

Similarly, in the year 2014-15, the maximum leaf area (511.78 cm^2) and leaf area index (3.56) was recorded significantly at S_3 (45×30 cm) and which also was found at par with the treatment S_5 (60×30 cm)i.e. 511.68 cm^2 and 3.55 respectively. The minimum leaf area (505.51 cm^2) and leaf area index (3.31) was recorded in the treatment S_2 (45×15 cm).

Regarding the pooled mean of both years, significantly the maximum leaf area (511.76 cm^2) and leaf area index (3.56) was recorded in the treatment S_3 (45×30 cm) and which was also found statistically at par with S_5 (60×30 cm) i.e. 511.66 cm^2 and 3.55 respectively. The minimum leaf area (505.48 cm^2) and leaf area index (3.30) was recorded in S_2 (45×15 cm).

It was found that irrespective of the years of experimentation, the leaf area and LAI was recorded higher in the wider crop geometry, the highest being observed in S_3 (45×30 cm) which however was found at bar with S_5 (60×30 cm). This might be due to the fact that, the baby corn grown at wider row crop geometry had helped the individual plants to make better spatial utilization of moisture, nutrients and light which in turn increased the leaf area and LAI as compared to narrow row crop geometry where the leaf area and LAI was reduced due to an interplant competition within the community. Similar increased in leaf area as well as LAI under wider spacing was also reported by Aravinth *et al*. (2011), Sobhana *et al*. (2012) and Tajul *et al*. (2013).

4.3.3 Interaction effect

The data presented in Table 6 indicated that the interaction effect of sowing period and crop geometry on leaf area and leaf area index was found to be significant during both the years of experimentation (2013-14 and 2014-15).

During the year 2013-14, significantly the maximum leaf area (512.60 cm^2) and leaf area index (3.62) was recorded with the treatment combination P_2S_3 (39^{th} met. week + 45×30 cm) over the rest of treatments. However, the leaf area index was found at par with the treatment combination P_2S_5 (39^{th} met. week + 60×30 cm) i.e. 3.60.The minimum value for leaf area (505.30 cm^2) was observed in the treatment combination P_1S_2 (35^{th} met. week + 45×15 cm) and also at par with the leaf area (505.53 cm^2) each in the treatment combinations P_2S_2 (39^{th} met. week + 45×15 cm) and P_4S_2 (48^{th} met. week + 45×15 cm). The minimum leaf area index (3.27) was observed in the treatment combination P_1S_2 (35^{th} met. week + 45×15 cm) which was also found at par with P_3S_2 (43^{rd} met. week + 45×15 cm) and P_4S_2 (48^{th} met. week + 45×15 cm) i.e. 3.29 and 3.28 respectively.

Similarly during the year 2014-15, significantly the maximum leaf area (512.63 cm^2) and leaf area index (3.62) was recorded with the treatment combination P_2S_3 (39th met. week + 45×30 cm) over the rest of treatments. However, the leaf area index was found at par with the treatment combination P_2S_5 (39th met. week + 60×30 cm) i.e. 3.61.The minimum value for leaf area (505.37 cm^2) was observed in the treatment combination P_1S_2 (35th met. week + 45×15 cm) and also at par with the leaf area (505.60 cm^2) each in the treatment combinations P_2S_2 (39th met. week + 45×15 cm) and P_4S_2 (48th met. week + 45×15 cm). The minimum leaf area index (3.28) was observed in the treatment combination P_1S_2 (35th met. week + 45×15 cm) which was also found at par with P_4S_2 (48th met. week + 45×15 cm) i.e. 3.29.

Regarding the pooled mean of both year, the maximum leaf area (512.62 cm^2) and leaf area index (3.62) was recorded with the treatment combination P_2S_3 (39th met. week + 45×30 cm) over the rest of treatments. However, the leaf area index was found at par with the treatment combination P_2S_5 (39th met. week + 60×30 cm) i.e. 3.61. The minimum value for leaf area (505.33 cm^2) was observed in the treatment combination P_1S_2 (35th met. week + 45×15 cm) and also at par with the leaf area (505.57cm^2) each in the treatment combinations P_2S_2 (39th met. week + 45×15 cm) and P_4S_2 (48th met. week + 45×15 cm). The minimum leaf area index (3.27) was observed in the treatment combination P_1S_2 (35th met. week + 45×15 cm) which was also found at par with P_4S_2 (48th met. week + 45×15 cm) i.e. 3.29.

The higher leaf area and LAI in the treatment combination P_2S_3 (39th met. week + 45×30 cm) might be due to optimum growing period which results in the better growth performances of the plants accompanied with the optimum crop geometry allowing better utilization of available resources (nutrient and space) which might have increased the leaf area and in turn LAI.

Table 5: Influence of sowing period and crop geometry on leaf area (cm^2) and leaf area index (LAI) of baby corn (*Zea mays* L.)

Treatments	Leaf area (cm^2)			Leaf area index (LAI)		
Sowing Period (P)	**2013-2014**	**2014-2015**	**Pooled mean**	**2013-2014**	**2014-2015**	**Pooled mean**
P_1	508.76	508.83	508.79	3.39	3.40	3.39
P_2	509.27	509.29	509.28	3.49	3.50	3.49
P_3	508.98	509.01	509.00	3.45	3.46	3.46
P_4	508.91	508.96	508.94	3.40	3.41	3.40
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)±	0.082	0.048	0.056	0.004	0.004	0.003
CD at 5%	0.235	0.138	0.160	0.012	0.011	0.010
Crop geometry (S)						
S_1	507.42	507.51	507.46	3.40	3.41	3.40
S_2	505.46	505.51	505.48	3.29	3.31	3.30
S_3	511.74	511.78	511.76	3.56	3.56	3.56
S_4	508.64	508.63	508.63	3.36	3.37	3.37
S_5	511.64	511.68	511.66	3.55	3.55	3.55
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)±	0.092	0.054	0.062	0.005	0.004	0.004
CD at 5%	0.262	0.155	0.179	0.014	0.012	0.011
Interaction effect (P × S)						
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)±	0.183	0.108	0.125	0.010	0.009	0.007
CD at 5%	0.525	0.310	0.358	0.028	0.025	0.021

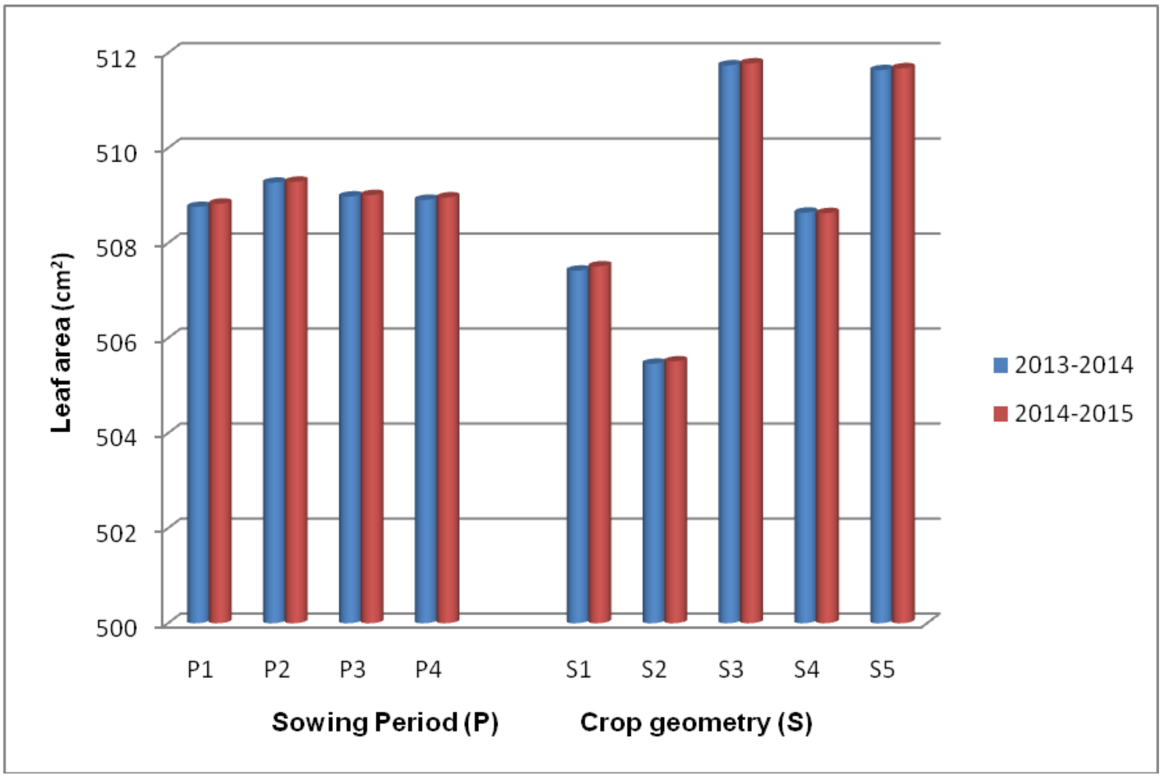


Fig. 6 (a) Influence of sowing period and crop geometry on leaf area (cm^2) of baby corn (*Zea mays* L.)

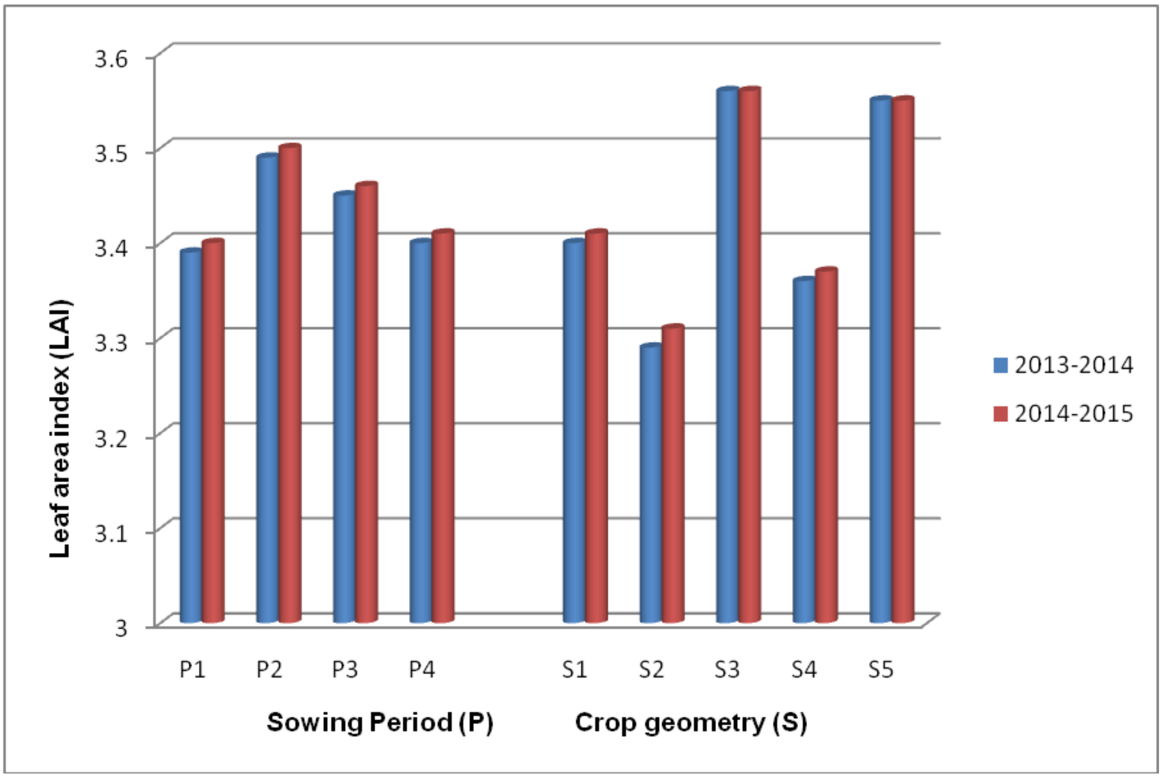


Fig. 6 (b) Influence of sowing period and crop geometry on leaf area index (LAI) of baby corn (*Zea mays* L.)

Table 6: Interaction effect of sowing period and crop geometry on leaf area (cm^2) and leaf area index (LAI) of baby corn (*Zea mays* L.)

Treatment combinations	Leaf area (cm^2)			Leaf area index (LAI)		
	2013-2014	2014-2015	Pooled mean	2013-2014	2014-2015	Pooled mean
P_1 S_1	507.20	507.33	507.27	3.35	3.35	3.35
P_1 S_2	505.30	505.37	505.33	3.27	3.28	3.27
P_1 S_3	510.97	511.13	511.05	3.53	3.53	3.53
P_1 S_4	508.70	508.63	508.67	3.30	3.31	3.31
P_1 S_5	511.63	511.67	511.65	3.51	3.51	3.51
P_2 S_1	507.67	507.70	507.68	3.46	3.47	3.47
P_2 S_2	505.53	505.60	505.57	3.34	3.34	3.34
P_2 S_3	512.60	512.63	512.62	3.62	3.62	3.62
P_2 S_4	508.80	508.70	508.75	3.44	3.44	3.44
P_2 S_5	511.73	511.80	511.77	3.60	3.61	3.61
P_3 S_1	507.47	507.53	507.50	3.43	3.44	3.43
P_3 S_2	505.47	505.47	505.47	3.29	3.31	3.30
P_3 S_3	511.80	511.80	511.80	3.57	3.58	3.58
P_3 S_4	508.47	508.53	508.50	3.40	3.42	3.41
P_3 S_5	511.70	511.73	511.72	3.56	3.56	3.56
P_4 S_1	507.33	507.47	507.40	3.37	3.36	3.37
P_4 S_2	505.53	505.60	505.57	3.28	3.29	3.29
P_4 S_3	511.60	511.57	511.58	3.52	3.53	3.53
P_4 S_4	508.60	508.63	508.62	3.32	3.32	3.32
P_4 S_5	511.50	511.53	511.52	3.52	3.52	3.52
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)$\pm$	0.183	0.108	0.125	0.010	0.009	0.007
CD at 5%	0.525	0.310	0.358	0.028	0.025	0.021

4.4 Influence of sowing periods and crop geometry on number of days to 50% tasseling and 50% cob emergence of baby corn (*Zea mays* L.)

The data regarding the number of days to 50% tasseling and 50% cob emergence of baby corn (*Zea mays* L.) as influenced by sowing periods and crop geometry during both the years of experimentation is presented in Table 7 and depicted in figure 7 (a) and (b).

4.4.1 Influence of sowing periods

The data presented in table 7 indicated that an effect of different sowing periods on number of days to 50% tasseling and 50% cob emergence of baby corn (*Zea mays* L.) during both the years of experimentation was found to be significant.

During 2013-14, significantly minimum number of days to 50% tasseling (48.67 days) and 50% cob emergence (48.33 days) was observed in the sowing period P_1 (35^{th} met. week) whereas the sowing period P_4 (48^{th} met. week) took the maximum number of days to 50% tasseling (57.40 days) and 50% cob emergence (55.07 days) over the rest of the sowing periods.

Similarly in the year 2014-15, significantly minimum number of days to 50% tasseling (48.87 days) and 50% cob emergence (48.80 days) was observed in the sowing period P_1 (35^{th} met. week) whereas, the sowing period P_4 (48^{th} met. week) took the maximum number of days to 50% tasseling (58.80 days) and 50% cob emergence (56.00 days) over the rest of the sowing periods.

In case of pooled data, minimum number of days to 50% tasseling (48.77 days) and 50% cob emergence (48.57 days) was observed in the sowing period P_1 (35^{th} met. week). However, the sowing period P_4 (48^{th} met. week) took the maximum number of days to 50% tasseling (58.10 days) and 50% cob emergence (55.53 days) over the rest of the sowing periods.

It was found that the number of days to 50% cob emergence and 50% tasseling was significantly affected by sowing period during both the years. The earlier sowing P_1 (35th met. week) took minimum time for both the years while with further delay the number of days required for 50% cob emergence and 50% tasseling significantly was more, the maximum days being observed in sowing period P_4 (48th met. week), which might be due to colder soils in the later periods which results in slower germination and slower growth early in the growing period (Norwood, 2001). This is also supported by Imholte and carter (1987) who reported that colder soil under no- till conditions were associated with reduced corn emergence. The results were closely related to those findings of Verma *et al*. (2012).

4.4.2 Influence of crop geometry

The data presented in Table 7 indicated that different crop geometry influence significantly on the number of days to 50% tasseling and 50% cob emergence of baby corn (*Zea mays* L.) during both the years of experimentation.

During 2013-14, significantly minimum number of days to 50% tasseling (51.92 days) and 50% cob emergence (50.00 days) was observed in the crop geometry S_2 (45×15 cm) whereas the crop geometry S_5 (60×30 cm) took the maximum number of days to 50% tasseling (56.33 days) and 50% cob emergence (54.58 days) over the rest of the sowing periods.

Similarly in the year 2014-15, minimum number of days to 50% tasseling (52.75 days) and 50% cob emergence (50.50 days) was observed in the crop geometry S_2 (45×15 cm) whereas the crop geometry S_5 (60×30 cm) took the maximum number of days to 50% tasseling (56.75 days) and 50% cob emergence (55.17 days) over the rest of the sowing periods.

Table 7: Influence of sowing period and crop geometry on number of days to 50% tasseling and 50% cob emergence of baby corn (*Zea mays* L.)

Treatments	Days to 50% tasseling			Days to 50% cob emergence		
Sowing Period (P)	**2013-2014**	**2014-2015**	**Pooled mean**	**2013-2014**	**2014-2015**	**Pooled mean**
P_1	48.67	48.87	48.77	48.33	48.80	48.57
P_2	54.80	55.13	54.97	52.47	53.07	52.77
P_3	54.33	54.93	54.63	52.07	52.73	52.40
P_4	57.40	58.80	58.10	55.07	56.00	55.53
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)$\pm$	0.534	0.439	0.449	0.457	0.314	0.320
CD at 5%	1.529	1.257	1.286	1.308	0.898	0.915
Crop geometry (S)						
S_1	53.33	54.00	53.67	51.58	52.08	51.83
S_2	51.92	52.75	52.33	50.00	50.50	50.25
S_3	54.17	54.83	54.50	52.00	53.33	52.67
S_4	53.25	53.83	53.54	51.75	52.17	51.96
S_5	56.33	56.75	56.54	54.58	55.17	54.87
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)$\pm$	0.597	0.491	0.502	0.511	0.351	0.357
CD at 5%	1.710	1.405	1.438	1.462	1.004	1.023
Interaction effect (P × S)						
F test	NS	NS	NS	NS	NS	NS
SE(m)$\pm$	1.194	0.982	1.005	1.022	0.701	0.715
CD at 5%	-	-	-	-	-	-

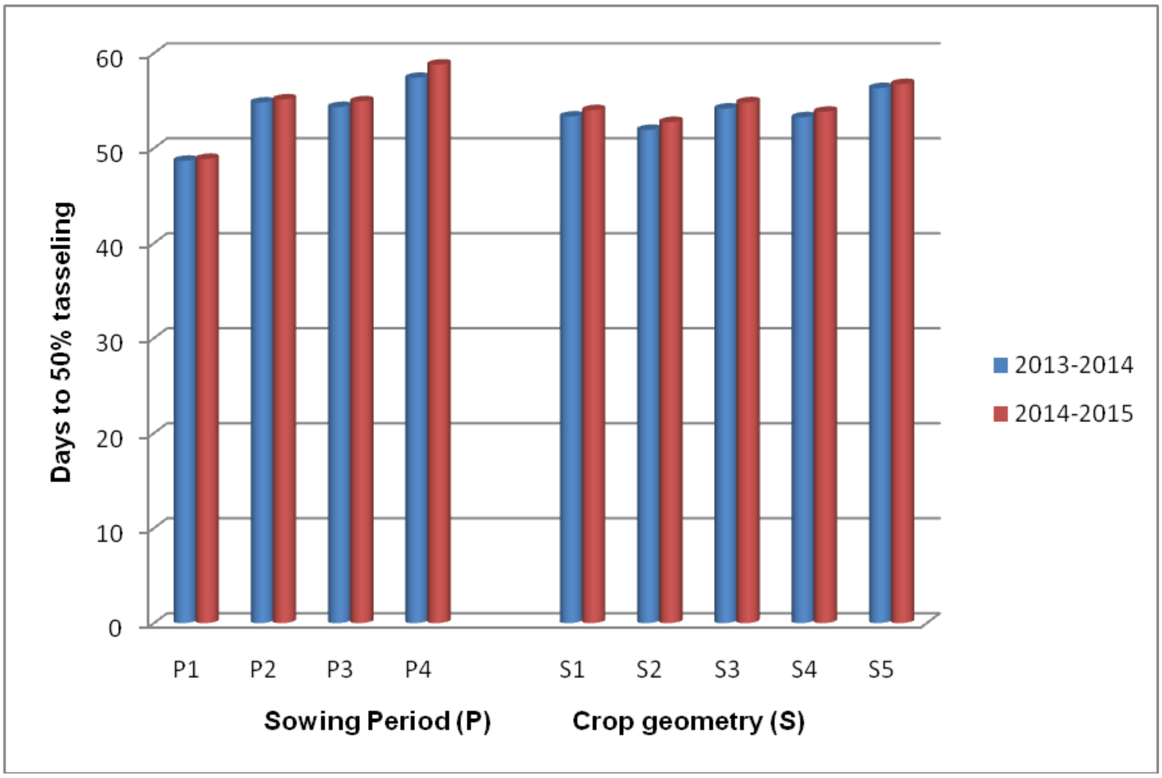


Fig. 7 (a) Influence of sowing period and crop geometry on number of days to 50% tasseling of baby corn (*Zea mays* L.)

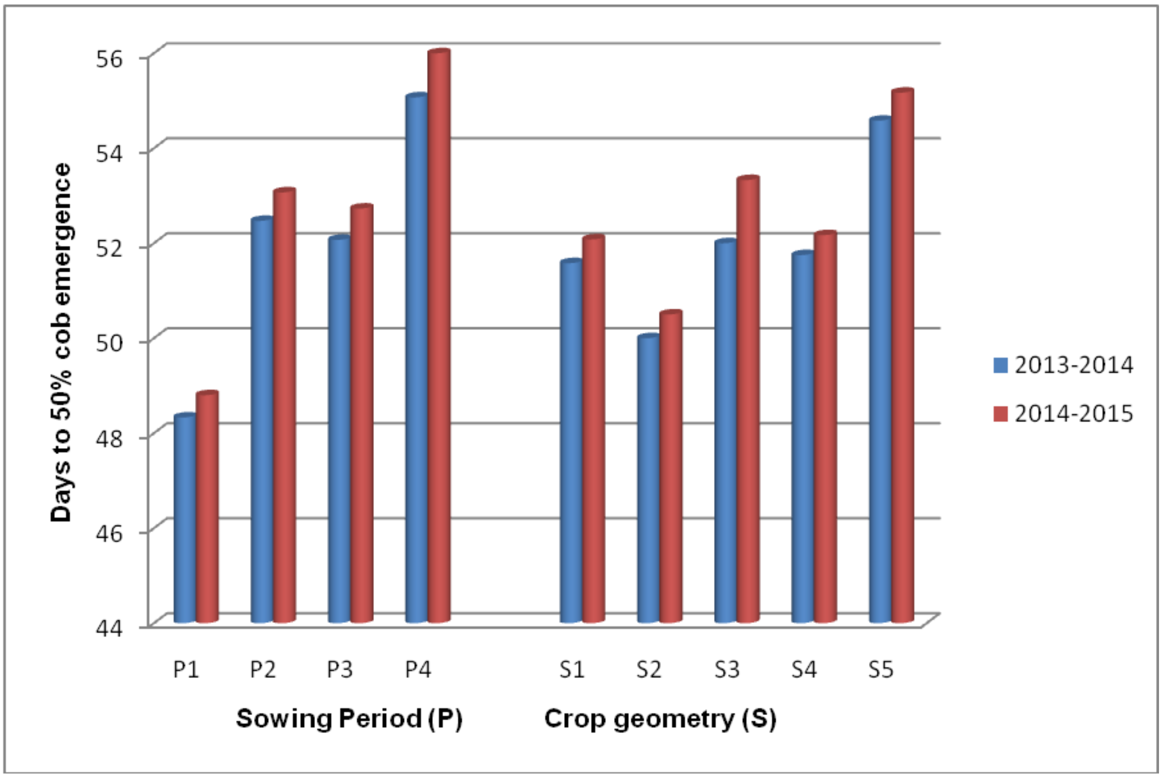


Fig. 7 (b) Influence of sowing period and crop geometry on number of days to 50% cob emergence of baby corn (*Zea mays* L.)

The data pertaining to the pooled result revealed that the crop geometryS_2 (45×15 cm) recorded the minimum number of days to 50% tasseling (52.33 days) and 50% cob emergence (50.25 days). Whereas the crop geometry S_5 (60×30 cm) took the maximum number of days to 50% tasseling (56.54 days) and 50% cob emergence (54.87 days) over the rest of the sowing periods.

It was clearly recorded that the minimum number of days to 50% tasseling and cob emergence was found at the closer crop geometry S_2 (45×15 cm) during both the years, which may be due to the fact that, there was enhanced competition for growth resources among the community at closer spacing and thereby advanced in the phenological development that ultimately enhanced earlier cob emergence and tasseling.

1.4.3 Interaction effect

An interaction effect of sowing period and crop geometry on number of days to 50% tasseling and 50% cob emergence was found to be non–significant during both the years of experimentation (Appendix V).

4.5 Influence of sowing periods and crop geometry on number of days to 50% silking and harvest of baby corn (*Zea mays* L.)

The data regarding the Influence of sowing periods and crop geometry on number of days to 50% silking and days to cob harvest of baby corn (*Zea mays* L.) is presented in Table 8 and illustrated in figure 8 (a) and (b).

4.5.1 Influence of sowing period

The data presented in Table 8 indicated that an effect of different sowing periods on number of days to 50% silking and harvest of baby corn (*Zea mays* L.) during both the years of experimentation was found to be significant.

During 2013-14, significantly minimum number of days to 50% silking (51.67 days) and days to cob harvest (52.27 days) was observed in the sowing period P_1 (35th met. week) whereas the sowing period P_4 (48th met. week) took the maximum number of days to 50% silking (60.27 days) and harvest (62.33 days) over the rest of the sowing periods.

Similarly in the year 2014-15, significantly minimum number of days to 50% silking (52.00 days) and days to harvest (52.53 days) was observed in the sowing period P_1 (35thmet. week) whereas, the sowing period P_4 (48th met. week) took the maximum number of days to 50% silking (61.07 days) and harvest (63.27 days) over the rest of the sowing periods.

In case of pooled data, significantly minimum number of days to 50% silking (51.83 days) and days to harvest (52.40 days) was observed in the sowing period P_1 (35th met. week) whereas, the sowing period P_4 (48th met. week) took the maximum number of days to 50% silking (60.67 days) and harvest (62.80 days) over the rest of the sowing periods.

As it was recorded for the number of days to 50% emergence and 50% tasseling, similarly the number of days to 50% silking and harvest was significantly affected by sowing period during both the years. The earlier sowing P_1 (35th met. week) takes minimum time for both while with further delay the number of days required for 50% silking and harvest significantly was more, the maximum days being observed in sowing period P_4 (48th met. week), which might be due to colder soils in the later periods which results in slower germination and slower growth early in the growing period (Norwood, 2001). This is also supported by Imholte and carter (1987) who reported that colder soil under no-till conditions were associated with reduced corn emergence, delay in silking and thereby harvesting.

4.5.2 Influence of crop geometry

The data presented in Table 8 indicated that different crop geometry influence significantly on the number of days to 50% silking and harvest of baby corn (*Zea mays* L.) during both the years of experimentation.

During 2013-14, significantly minimum number of days to 50% silking (54.25 days) and harvest (56.42 days) was observed in the crop geometry S_2 (45×15 cm) whereas the crop geometry S_5 (60×30 cm) took the maximum number of days to 50% silking (58.33 days) and harvest (60.42 days) over the rest of the sowing periods.

Similarly in the year 2014-15, minimum number of days to 50% silking (54.92 days) and harvest (56.67 days) was observed in the crop geometry S_2 (45×15 cm) whereas the crop geometry S_5 (60×30 cm) took the maximum number of days to 50% silking (58.67 days) and days to harvest (60.92 days) over the rest of the sowing periods.

The data pertaining to the pooled result revealed that the crop geometry S_2 (45×15 cm) recorded the minimum number of days to 50% silking (54.58 days) and days to harvest (56.54 days) was observed in the crop geometry S_2 (45×15 cm) whereas the crop geometry S_5 (60×30 cm) took the maximum number of days to 50% silking (58.50 days) and days to harvest (60.67 days) over the rest of the crop geometry.

The significant effect in the number of days to 50% silking and harvest among different crop geometry may be due to the fact that, in the closer crop geometry there was enhanced competition for growth resources among the community and thereby advanced in the phenological development that ultimately enhanced earlier cob emergence, tasseling, silking and thereby harvesting. Whereas, in the wider geometry the plant community have lesser competition which leads the individual plant pace for better vegetative growth and delayed in the phonological development. The result was in close conformity with the findings of Cho *et al*. (2001).

4.5.3 Interaction effect

An interaction effect of sowing period and crop geometry on number of days to 50% silking and days to harvest was found to be non–significant during both the years of experimentation (Appendix VI).

Table 8: Influence of sowing period and crop geometry on number of days to 50% silking and days to cob harvest of baby corn (*Zea mays* L.)

Treatments	**Days to 50% silking**			**Days to cob harvest**		
Sowing Period (P)	**2013-2014**	**2014-2015**	**Pooled mean**	**2013-2014**	**2014-2015**	**Pooled mean**
P_1	51.67	52.00	51.83	52.27	52.53	52.40
P_2	56.07	56.87	56.47	59.00	59.33	59.17
P_3	55.53	55.87	55.70	58.07	58.60	58.33
P_4	60.27	61.07	60.67	62.33	63.27	62.80
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)±	0.391	0.339	0.291	0.419	0.234	0.281
CD at 5%	1.120	0.969	0.832	1.200	0.671	0.806
Crop geometry (S)						
S_1	55.17	55.42	55.29	57.08	57.50	57.29
S_2	54.25	54.92	54.58	56.42	56.67	56.54
S_3	56.25	57.17	56.71	58.67	59.58	59.13
S_4	55.42	56.08	55.75	57.00	57.50	57.25
S_5	58.33	58.67	58.50	60.42	60.92	60.67
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)±	0.437	0.379	0.325	0.469	0.262	0.315
CD at 5%	1.252	1.084	0.930	1.342	0.750	0.901
Interaction effect (P × S)						
F test	NS	NS	NS	NS	NS	NS
SE(m)±	0.875	0.757	0.650	0.937	0.524	0.629
CD at 5%	-	-	-	-	-	-

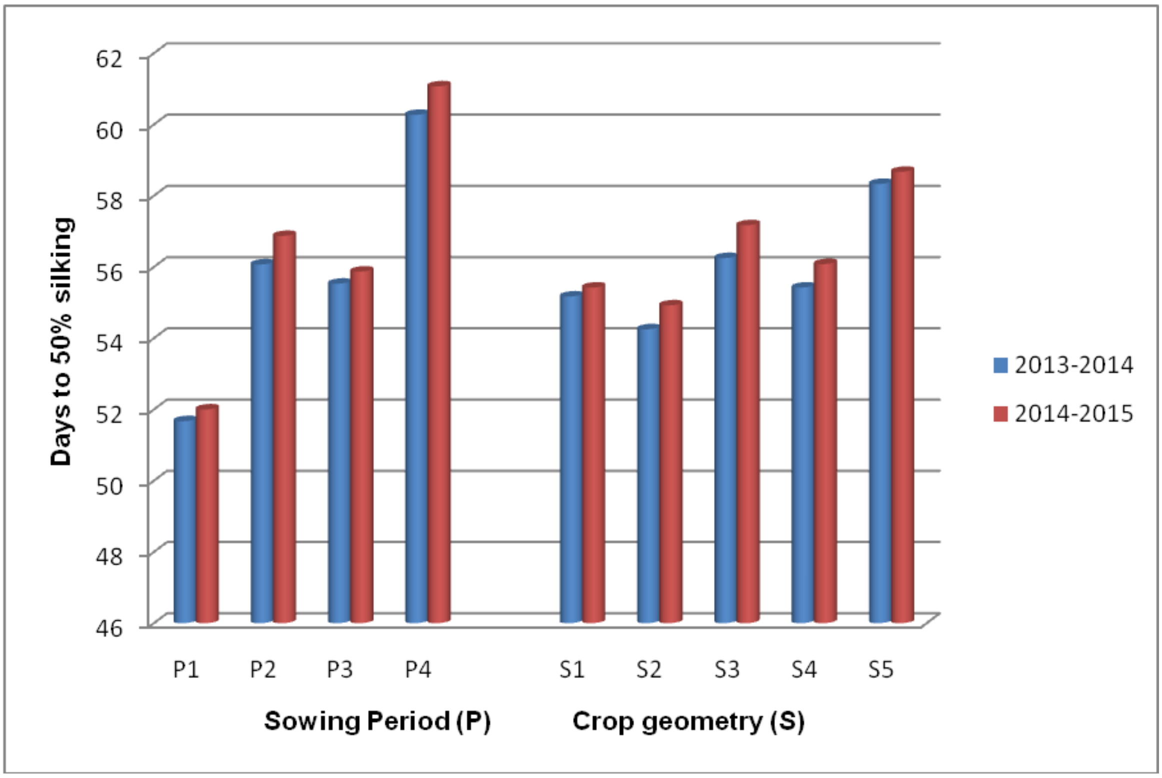


Fig. 8 (a) Influence of sowing period and crop geometry on number of days to 50%silking of baby corn (*Zea mays* L.)

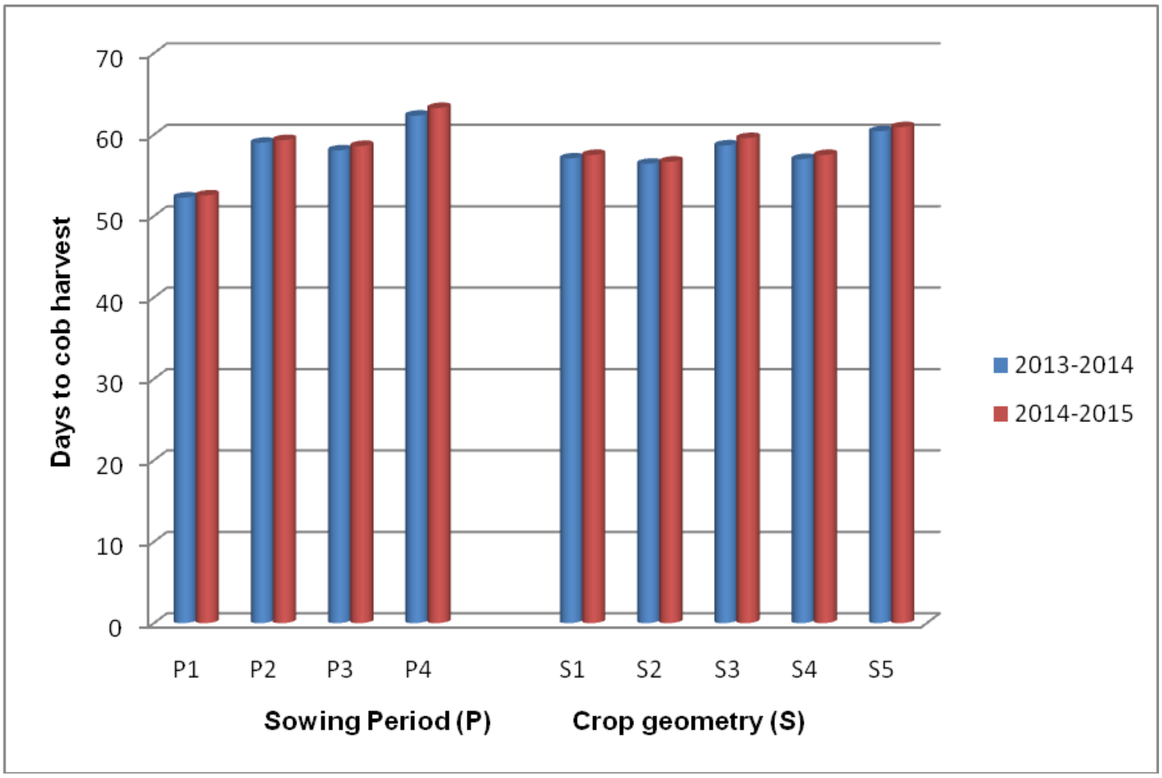


Fig. 8 (b) Influence of sowing period and crop geometry on number of days to cob harvest of baby corn (*Zea mays* L.)

4.6 Influence of sowing periods and crop geometry on leaf chlorophyll content (mg g^{-1}) of baby corn (*Zea mays* L.)

The data pertaining to leaf chlorophyll content (mg g^{-1}) of baby corn (*Zea mays* L.) as influenced due to sowing periods and crop geometry, recorded during the years 2013-14 and 2014-15 is represented in Table 9 and illustrated in figure 9.

4.6.1 Influence of sowing periods

The data presented in Table 9, clearly indicates that the leaf chlorophyll content (mg g^{-1}) of baby corn plant was influenced significantly due to sowing periods during both the years of experimentation.

During the year 2013-14, significantly the maximum leaf chlorophyll content (1.95 mg g^{-1}) was recorded with the treatment P_2 (39^{th} met. week). The minimum value (1.90 mg g^{-1}) was recorded in the sowing period P_1 (35^{th} met. week) which was also found at par with sowing period P_4 (48^{th} met. week) i.e. 1.91 mg g^{-1}.

In the same manner during the year 2014-15, the maximum leaf chlorophyll content (1.96 mg g^{-1}) was recorded with the treatment P_2 (39^{th} met. week). The minimum value (1.92 mg g^{-1}) was recorded in the sowing period P_1 (35^{th} met. week) which was also at par with the chlorophyll content (1.91 mg g^{-1}) in P_4 (48^{th} met. week).

The pooled mean also recorded significantly the maximum leaf chlorophyll content (1.95 mg g^{-1}) with the sowing period P_2 (39^{th} met. week). Whereas the minimum value (1.91 mg g^{-1}) was recorded in the sowing period P_1 (35^{th} met. week) and also found at par with the chlorophyll content (1.92 mg g^{-1}) in P_4 (48^{th} met. week).

The chlorophyll content in the leaves found higher at the sowing period P_2 (39^{th} met. week) compared to the rest sowing period might be due to prevailing optimum growing conditions during the period.

4.6.2 Influence of crop geometry

The data presented in Table 9 revealed that, crop geometry influenced significantly the leaf chlorophyll content (mg g^{-1}) of baby corn during both the years of experimentation.

During the year 2013-14, significantly the maximum chlorophyll content (2.31mg g^{-1}) was recorded with the treatment S_3 (45×30 cm). The minimum chlorophyll content (1.64 mg g^{-1}) was recorded in the treatment S_2 (45×15 cm).

Similarly, in the year 2014-15, significantly the maximum chlorophyll content (2.34 mg g^{-1}) was recorded with the treatment S_3 (45×30 cm) and the minimum (1.65 mg g^{-1}) was recorded in the treatment S_2 (45×15 cm).

Regarding the pooled mean of both years, the maximum chlorophyll content (2.33 mg g^{-1}) was recorded with the treatment S_3 (45×30 cm) and the minimum (1.64 mg g^{-1}) was recorded in the treatment S_2 (45×15 cm).

The higher values of chlorophyll content was obtained in the crop geometry S_3 (45×30 cm) which was higher than the widest geometry S_5 (60×30 cm) and the remaining closer geometry S_1 (30×30 cm) and S_4 (60×15 cm), while the lowest being observed at S_2 (45×15 cm). This may be due to better availability of resources and its utilization by the plants under optimum plant arrangement. The higher chlorophyll value at wider spacing was also reported by Tajul *et al*. (2013).

4.6.3 Interaction effect

The data presented in Table 10 indicated that the interaction effect of sowing period and crop geometry on leaf chlorophyll content (mg g^{-1}) was found to be significant during both the years of experimentation (2013-14 and 2014-15).

During the year 2013-14, significantly the maximum chlorophyll content (2.36 mg g^{-1})was recorded with the treatment combination P_2S_3 (39th met. week + 45×30 cm) over the rest of treatments, while the minimum (1.63 mg g^{-1}) was found in the combination P_4S_2 (48th met. week + 45×15 cm) and this was also at par with the treatment combination P_1S_1 (35th met. week + 30×30 cm) and P_1S_2 (35th met. week + 45×15 cm) i.e. 1.65 and 1.64 mg g^{-1} respectively.

Similarly during the year 2014-15, significantly the maximum chlorophyll content (2.40 mg g^{-1})was recorded with the treatment combination P_2S_3 (39th met. week + 45×30 cm) over the rest of treatments, whereas the minimum (1.64 mg g^{-1}) was found in the combination P_4S_2 (48th met. week + 45×15 cm) and was at par with the treatment combination P_1S_1 (35th met. week + 30×30 cm), P_1S_2 (35th met. week + 45×15 cm)and P_2S_2(39thmeteo. week + 45×15 cm) i.e. 1.67, 1.65, and 1.65mg g^{-1} respectively.

Regarding the pooled mean of both years the maximum chlorophyll content (2.38 mg g^{-1}) was recorded with the treatment combination P_2S_3 (39th met. week + 45×30 cm) over the rest of treatments, whereas the minimum (1.64 mg g^{-1}) was found in the combination P_4S_2 (48th met. week + 45×15 cm) and was at par with the treatment combination P_1S_1 (35th met. week + 30×30 cm), P_1S_2 (35th met. week + 45×15 cm) and P_2S_2 (39th met. week + 45×15 cm) i.e. 1.66, 1.65, and 1.66 mg g^{-1} respectively.

The optimum growing conditions accompanied with the optimum plant arrangement favouring better available resources by the plant community might have resulted in higher chlorophyll content in the leaves of baby corn in the treatment combination P_2S_3 (39th met. week + 45×30 cm).

Table 9: Influence of sowing period and crop geometry on leaf chlorophyll content (mg g^{-1}) of baby corn (*Zea mays* L.)

Treatments	**Leaf chlorophyll content (mg g^{-1})**		
Sowing Period (P)	**2013-2014**	**2014-2015**	**Pooled mean**
P_1	1.90	1.92	1.91
P_2	1.95	1.96	1.95
P_3	1.93	1.94	1.93
P_4	1.91	1.93	1.92
F test	Sig.	Sig.	Sig.
SE(m)$\pm$	0.004	0.005	0.004
CD at 5%	0.013	0.015	0.011
Crop geometry (S)			
S_1	1.67	1.68	1.68
S_2	1.64	1.65	1.64
S_3	2.31	2.34	2.33
S_4	1.69	1.70	1.69
S_5	2.30	2.32	2.31
F test	Sig.	Sig.	Sig.
SE(m)$\pm$	0.005	0.006	0.004
CD at 5%	0.014	0.017	0.012
Interaction effect (P × S)			
F test	Sig.	Sig.	Sig.
SE(m)$\pm$	0.009	0.012	0.008
CD at 5%	0.029	0.033	0.024

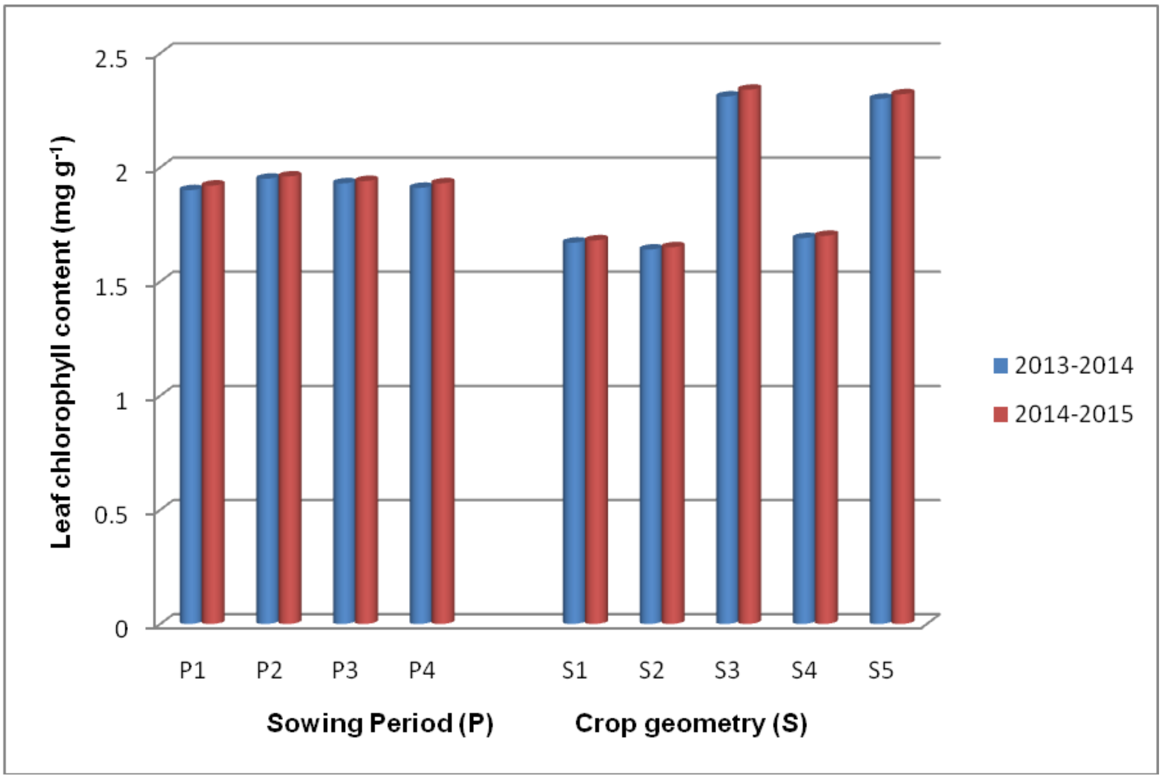


Fig. 9 Influence of sowing period and crop geometry on leaf chlorophyll content (mg g^{-1}) of baby corn (*Zea mays* L.)

Table 10: Interaction effect of sowing period and crop geometry on leaf chlorophyll content (mg g^{-1}) of baby corn (*Zea mays* L.)

Treatment combinations	Leaf chlorophyll content (mg g^{-1})		
	2013-2014	2014-2015	Pooled mean
P_1 S_1	1.65	1.67	1.66
P_1 S_2	1.64	1.65	1.65
P_1 S_3	2.26	2.30	2.28
P_1 S_4	1.68	1.69	1.69
P_1 S_5	2.28	2.29	2.29
P_2 S_1	1.68	1.69	1.69
P_2 S_2	1.66	1.65	1.66
P_2 S_3	2.36	2.40	2.38
P_2 S_4	1.70	1.72	1.71
P_2 S_5	2.33	2.35	2.34
P_3 S_1	1.69	1.68	1.69
P_3 S_2	1.64	1.64	1.64
P_3 S_3	2.32	2.34	2.33
P_3 S_4	1.69	1.70	1.69
P_3 S_5	2.31	2.33	2.32
P_4 S_1	1.67	1.67	1.67
P_4 S_2	1.63	1.64	1.64
P_4 S_3	2.31	2.32	2.32
P_4 S_4	1.67	1.70	1.69
P_4 S_5	2.28	2.31	2.30
F test	Sig.	Sig.	Sig.
SE(m)$\pm$	0.009	0.012	0.008
CD at 5%	0.029	0.033	0.024

2. Yield Parameters and yield

Characters that determine the overall performance of the crop were used to evaluate the yield. This is necessary because yield is a quantitative character and therefore influenced by a number of traits acting singly or interacting with each other. Yield is the most important parameter which decides the acceptance of a particular practice, yield attributing characters (number of cobs plant^{-1}, cob length, cob diameter and cob weight) mainly contributes for yield per unit area. The sowing periods and crop geometry influenced yield parameters significantly.

4.7 Influence of sowing periods and crop geometry on number of cobs plant^{-1} of baby corn (*Zea mays* L.)

The data pertaining to number of cobs plant^{-1}of baby corn (*Zea mays* L.) as influenced due to sowing periods and crop geometry, recorded during the years 2013-14 and 2014-15 is represented in Table 11 and illustrated in figure 10.

4.7.1 Influence of sowing periods

The data presented in Table 11, clearly indicates that the number of cobs plant^{-1}of baby corn was influenced significantly due to sowing periods during both the years of experimentation.

During the year 2013-14, significantly the maximum number of cobs plant^{-1} (2.91) was recorded with the treatment P_2 (39th met. week). The minimum value (2.57) was recorded in the sowing period P_1 (35th met. week).

In the same manner during the year 2014-15, the maximum number of cobs plant^{-1} (2.96) was recorded with the treatment P_2 (39th met. week). The minimum value (2.64) was recorded in the sowing period P_1 (35th met. week).

The pooled mean of both years also recorded significantly the maximum number of cobs plant^{-1} (2.93) with the treatment P_2 (39th met.

week) and the minimum value (2.61) in the sowing period P_1 (35^{th} met. week).

The higher number of cobs $plant^{-1}$ was observed as the sowing period advanced, however the maximum was recorded in the sowing period P_2 (39^{th} met. week) followed by P_3 (43^{rd} met. week) during both the years, which might be due to overall better growth and development of the crop. This result is in close conformity with the result obtained by Verma *et al*. (2012) and Singh *et al*. (2015).

4.6.2 Influence of crop geometry

The data presented in Table 11 revealed that, crop geometry influenced significantly the number of cobs $plant^{-1}$of baby corn during both the years of experimentation.

During the year 2013-14, significantly the maximum number of cobs $plant^{-1}$(3.00) was recorded with the crop geometry S_5 (60×30 cm). The minimum number of cobs $plant^{-1}$(2.47) was recorded in the closer crop geometry S_2 (45×15 cm).

Similarly, in the year 2014-15, significantly the maximum number of cobs $plant^{-1}$(3.08) was recorded with the crop geometry S_5 (60×30 cm). The minimum number of cobs $plant^{-1}$(2.52) was recorded in the closer crop geometry S_2 (45×15 cm).

Regarding the pooled mean of both years, the maximum number of cobs $plant^{-1}$(3.04) was recorded with the crop geometry S_5 (60×30 cm), while the minimum (2.49) was recorded in the closer crop geometry S_2 (45×15 cm).

It was observed that with increase in crop geometry, the number of cobs $plant^{-1}$ also increased. The significant reduction in the number of cobs $plant^{-1}$ at closer spacing might possibly be due to more competition for light, aeration and nutrients and consequently enabling the plants in these treatments to undergo less reproductive growth. These finding is in close agreement with the results obtained by various researchers as Mathukia *et al*. (2014), Dutta *et al*. (2015) and Singh *et al*. (2015).

4.7.3 Interaction effect

The data presented in Table 12 indicated that the interaction effect of sowing period and crop geometry on number of cobs plant^{-1} was found to be significant during both the years of experimentation (2013-14 and 2014-15).

During the year 2013-14, significantly the maximum number of cobs plant^{-1} (3.40) was recorded with the treatment combination P_2S_5 (39th met. week + 60×30 cm) over the rest of treatments, while the minimum (2.40) was found in the combination P_1S_2 (35th met. week + 45×15 cm) and this was also at par with the treatment combinationsP_1S_4 (35th met. week + 60×15 cm) i.e. 2.53 cobs and 2.47 cobs each in P_1S_1 (35th met. week + 30×30 cm), P_2S_2 (39th met. week + 45×15 cm), P_3S_2 (43rd met. week + 45×15 cm) and P_3S_2 (48th met. week + 45×15 cm).

Similarly during the year 2014-15, significantly the maximum number of cobs plant^{-1}(3.47) was recorded with the treatment combination P_2S_5 (39th met. week + 60×30 cm) over the rest of treatments, while the minimum (2.47) was found in the combination P_1S_2 (35th met. week + 45×15 cm) and P_4S_2 (48th met. week + 45×15 cm) and which was also at par with 2.53 cobs each in the treatment combinations P_1S_1 (35th met. week + 30×30 cm) and P_3S_2 (43rd met. week + 45×15 cm), 2.60 cobs each in P_1S_4 (35th met. week + 60×15 cm) and P_2S_2 (39th met. week + 45×15 cm).

Regarding the pooled mean of both years, the maximum number of cobs plant^{-1}(3.43) was recorded with the treatment combination P_2S_5 (39th met. week + 60×30 cm) over the rest of treatments, while the minimum (2.43) was found in the combination P_1S_2 (35th met. week + 45×15 cm) which was also at par with P_1S_1 (35th met. week + 30×30 cm), P_3S_2 (43rd met. week + 45×15 cm), P_1S_4 (35th met. week + 60×15 cm), P_2S_2 (39th met. week + 45×15 cm) and P_4S_2 (48th met. week + 45×15 cm).

Table 11: Influence of sowing period and crop geometry on number of cobs plant^{-1} of baby corn (*Zea mays* L.)

Treatments	Number of cobs plant^{-1}		
Sowing Period (P)	**2013-2014**	**2014-2015**	**Pooled mean**
P_1	2.57	2.64	2.61
P_2	2.91	2.96	2.93
P_3	2.72	2.80	2.76
P_4	2.68	2.73	2.71
F test	Sig.	Sig.	Sig.
SE(m)±	0.029	0.029	0.021
CD at 5%	0.083	0.083	0.059
Crop geometry (S)			
S_1	2.62	2.65	2.63
S_2	2.47	2.52	2.49
S_3	2.87	2.93	2.90
S_4	2.65	2.73	2.69
S_5	3.00	3.08	3.04
F test	Sig.	Sig.	Sig.
SE(m)±	0.032	0.032	0.023
CD at 5%	0.093	0.093	0.066
Interaction effect (P × S)			
F test	Sig.	Sig.	Sig.
SE(m)±	0.065	0.065	0.046
CD at 5%	0.185	0.186	0.133

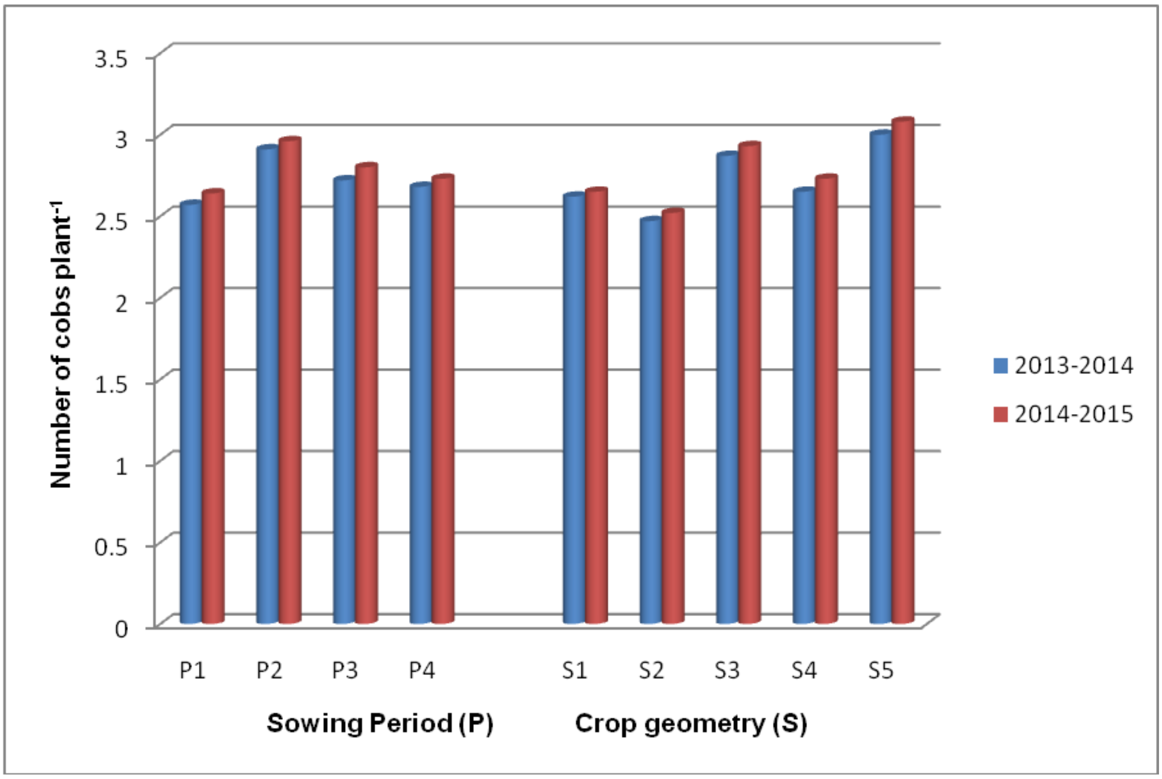


Fig. 10 Influence of sowing period and crop geometry on number of cobs plant^{-1} of baby corn (*Zea mays* L.)

Table 12: Interaction effect of sowing period and crop geometry on number of cobs plant^{-1} of baby corn (*Zea mays* L.)

Treatment combinations	Number of cobs plant^{-1}		
	2013-2014	2014-2015	Pooled mean
P_1 S_1	2.47	2.53	2.50
P_1 S_2	2.40	2.47	2.43
P_1 S_3	2.67	2.73	2.70
P_1 S_4	2.53	2.60	2.57
P_1 S_5	2.80	2.87	2.83
P_2 S_1	2.73	2.73	2.73
P_2 S_2	2.53	2.60	2.57
P_2 S_3	3.13	3.20	3.17
P_2 S_4	2.73	2.80	2.77
P_2 S_5	3.40	3.47	3.43
P_3 S_1	2.67	2.67	2.67
P_3 S_2	2.47	2.53	2.50
P_3 S_3	2.87	2.93	2.90
P_3 S_4	2.67	2.80	2.73
P_3 S_5	2.93	3.07	3.00
P_4 S_1	2.60	2.67	2.63
P_4 S_2	2.47	2.47	2.47
P_4 S_3	2.80	2.87	2.83
P_4 S_4	2.67	2.73	2.70
P_4 S_5	2.87	2.93	2.90
F test	Sig.	Sig.	Sig.
SE(m)$\pm$	0.065	0.065	0.046
CD at 5%	0.185	0.186	0.133

The higher number of cobs plant^{-1} recorded in the treatment combination P_2S_5 (39th met. week + 60×30 cm) over the rest of treatments might be due to overall superior performance of the crop resulting from optimum growing period along with the optimum plant arrangement for better utilization of available resources by the crops.

4.8 Influence of sowing periods and crop geometry on cob length (cm) and cob diameter (cm) of baby corn (*Zea mays* L.)

The cob length and cob diameter are important traits being considered in selecting the high quality products in processing industry. The data pertaining to cob length (cm) and cob diameter (cm) of baby corn (*Zea mays* L.) as influenced due to sowing periods and crop geometry, recorded during the years 2013-14 and 2014-15 is represented in Table 13, figure 11 (a) and (b).

4.8.1 Influence of sowing periods

The data presented in Table 13, clearly indicates that the cob length (cm) and cob diameter (cm) of baby corn was influenced significantly due to sowing periods during both the years of experimentation.

During the year 2013-14, significantly the maximum cob length (10.96 cm) was recorded with the sowing period P_2 (39th met. week) which also found at par with P_1 (35th met. week) i.e. 10.86 cm. The minimum value (10.64 cm) was recorded in the sowing period P_4 (48th met. week) and at par with P_3 (43rd met. week) i.e. 10.70 cm. The significantly maximum cob diameter (1.49 cm) was observed in the sowing period P_4 (48th met. week) which also was found at par with 1.47 cm each in P_2 (39th met. week) and P_3 (43rd met. week). The minimum cob diameter (1.44 cm) was observed at P_1 (35th met. week).

In the same manner during the year 2014-15, the maximum cob length (10.97 cm) was recorded with the sowing period P_2 (39th met. week) which also found at par with P_1 (35th met. week) i.e. 10.88 cm. The minimum value (10.66 cm) was recorded in the sowing period P_4 (48thmet. week) and at par with P_3 (43rdmet. week) i.e. 10.72 cm. However, the significantly maximum cob diameter (1.50 cm) was observed in the sowing period P_4 (48^{th} met. week). The minimum cob diameter (1.46 cm) was observed at P_1 (35^{th} met. week).

The pooled mean of both years, also recorded significantly the maximum cob length (10.96 cm) was recorded with the sowing period P_2 (39^{th} met. week) which also found at par with P_1 (35^{th} met. week) i.e. 10.87 cm. The minimum value (10.65 cm) was recorded in the sowing period P_4 (48^{th} met. week) and at par with P_3 (43^{rd} met. week) i.e. 10.71 cm. On the other hand, significantly maximum cob diameter (1.49 cm) was observed in the sowing period P_4 (48^{th} met. week) and the minimum cob diameter (1.45 cm) was observed at P_1 (35^{th} met. week).

It was observed that the cob length was maximum with optimum growth period when optimum temperature was found during the sowing period P_2 (39^{th} met. week) and P_1 (35^{th} met. week) and the further delay in sowing with cooler temperature reduce the cob length. However with the delay in sowing period, the cob diameter increases and the maximum obtained in the sowing period P_4 (48^{th} met. week). These results are in line with those findings of Singh *et al*. (2015).

4.8.2 Influence of crop geometry

The data presented in Table 13 revealed that, crop geometry influenced significantly the cob length (cm) and cob diameter (cm) of baby corn during both the years of experimentation.

During the year 2013-14, significantly the maximum cob length (11.03 cm) was recorded with the crop geometry S_3 (45×30 cm) which was also at par with S_5 (60×30 cm) i.e. 10.93 cm. The minimum cob length (10.61 cm) was recorded in the closer crop geometry S_4 (60×15 cm) found at par with S_2 (45×15 cm) i.e. 10.63 cm. However, the maximum cob diameter (1.49 cm) was found in wider crop geometry S_3 (45×30 cm) and S_5 (60×30 cm) and minimum (1.43 cm) at S_2 (45×15 cm).

Similarly, in the year 2014-15, significantly the maximum cob length (11.05 cm) was recorded with the crop geometry S_3 (45×30 cm) which was also at par with S_5 (60×30 cm) i.e. 10.94 cm. The minimum cob length (10.65 cm) was recorded in the closer crop geometry S_4 (60×15 cm) and S_2 (45×15 cm). However, the maximum cob diameter (1.50 cm) was found in wider crop geometry S_5 (60×30 cm) which was at par with S_3 (45×30 cm) i.e. 1.49 cm and the minimum value (1.45 cm) was observed at closer geometry S_2 (45×15 cm).

Regarding the pooled mean of both years, the maximum cob length (11.04 cm) was recorded with the crop geometry S_3 (45×30 cm) which was also at par with S_5 (60×30 cm) i.e. 10.94 cm. The minimum cob length (10.63 cm) was recorded in the closer crop geometry S_4 (60×15 cm) found at par with S_2 (45×15 cm) i.e. 10.64 cm. On the other hand, the maximum cob diameter (1.50 cm) was found in wider crop geometry S_5 (60×30 cm) which was at par with S_3 (45×30 cm) i.e. 1.49 cm and the minimum value (1.44 cm) was observed at closer geometry S_2 (45×15 cm).

The higher values of cob length and cob diameter was observed at the wider spacing of S_3 (45×30 cm) and S_5 (60×30 cm), which may be due to higher availability and better utilization of resources at wider spacing, while the minimum observed at the closer geometry S_5 (60×30 cm). Pandey *et al*. (2002) reported decreased in the cob length and diameter with increase in plant population. These results are in line with that reported by Kar *et al*. (2006) and in close conformity with the findings of other researchers as Kunjir *et al*. (2009), Futuless *et al*. (2010), Mathukia *et al*. (2014) and Singh *et al*. (2015) who had also reported higher cob length and diameter at wider crop geometry.

4.8.3 Interaction effect

The interaction effect of sowing period and crop geometry on cob length (cm) and cob diameter (cm) was found to be non-significant during both the years of experimentation (Appendix VII).

Table 13: Influence of sowing period and crop geometry on cob length (cm) and cob diameter (cm) of baby corn (*Zea mays* L.)

Treatments	Cob length (cm)			Cob diameter (cm)		
Sowing Period (P)	**2013-2014**	**2014-2015**	**Pooled mean**	**2013-2014**	**2014-2015**	**Pooled mean**
P_1	10.86	10.88	10.87	1.44	1.46	1.45
P_2	10.96	10.97	10.96	1.47	1.47	1.47
P_3	10.70	10.72	10.71	1.47	1.47	1.47
P_4	10.64	10.66	10.65	1.49	1.50	1.49
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)±	0.059	0.037	0.043	0.012	0.009	0.007
CD at 5%	0.169	0.107	0.122	0.033	0.025	0.019
Crop geometry (S)						
S_1	10.74	10.75	10.74	1.46	1.47	1.46
S_2	10.63	10.65	10.64	1.43	1.45	1.44
S_3	11.03	11.05	11.04	1.49	1.49	1.49
S_4	10.61	10.65	10.63	1.46	1.47	1.47
S_5	10.93	10.94	10.94	1.49	1.50	1.50
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)±	0.066	0.042	0.048	0.013	0.010	0.008
CD at 5%	0.189	0.120	0.137	0.037	0.028	0.022
Interaction effect (P × S)						
F test	NS	NS	NS	NS	NS	NS
SE(m)±	0.132	0.082	0.096	0.026	0.020	0.015
CD at 5%	-	-	-	-	-	-

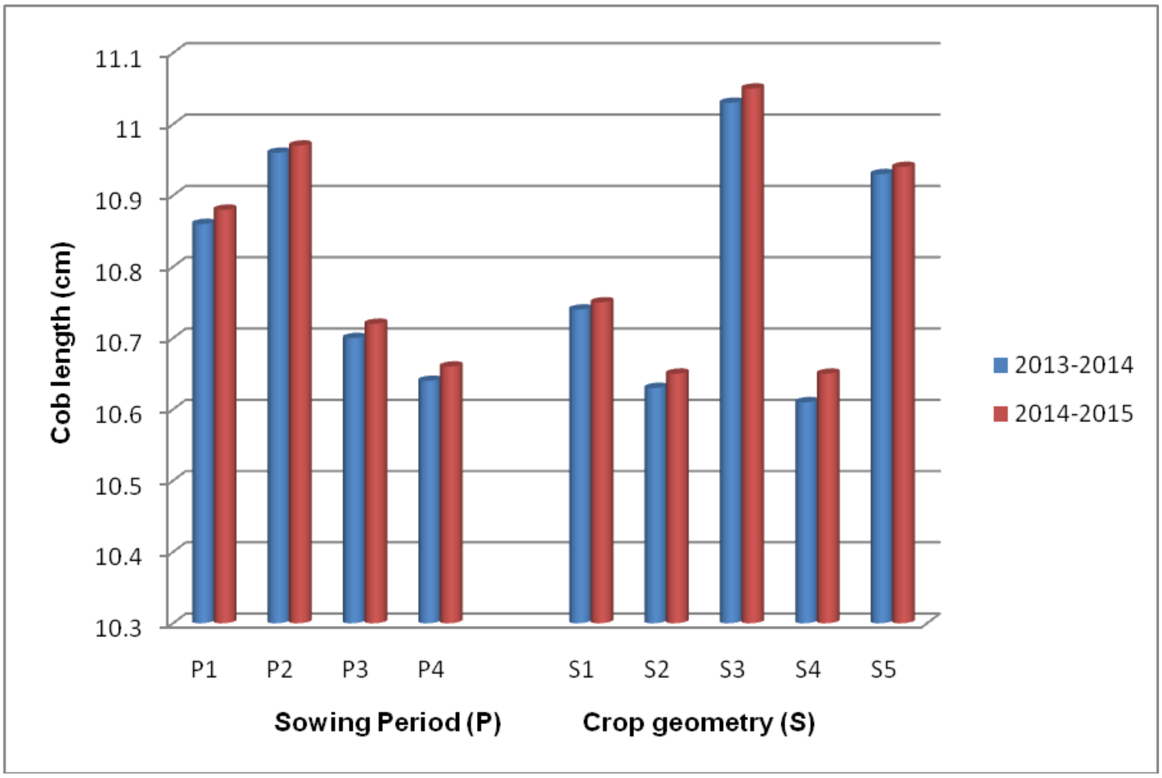


Fig.11 (a) Influence of sowing period and crop geometry on cob length (cm) of baby corn (*Zea mays* L.)

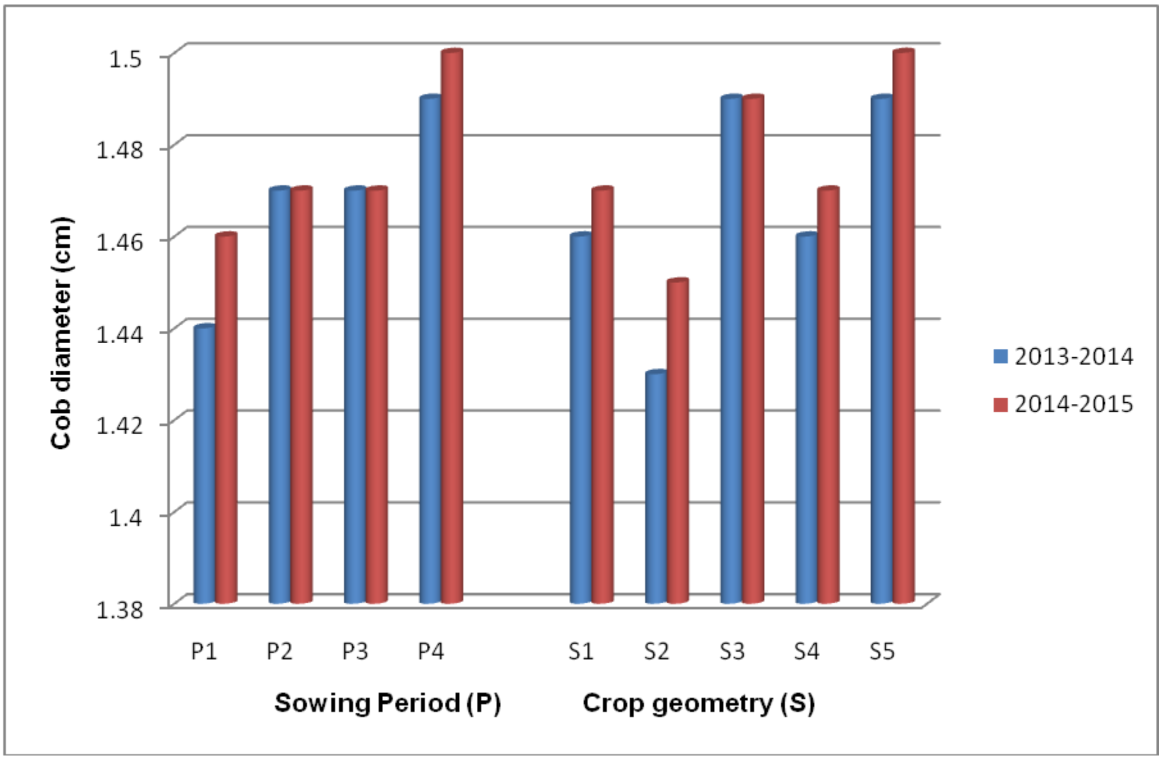


Fig. 11 (b) Influence of sowing period and crop geometry on cob diameter (cm) of baby corn (*Zea mays* L.)

4.9 Influence of sowing periods and crop geometry on cob weight with husk (g) and cob weight without husk (g) of baby corn (*Zea mays* L.)

The data pertaining to cob weight with husk (g) and weight without husk (g) of baby corn (*Zea mays* L.) as influenced by sowing periods and crop geometry, observed during the years 2013-14 and 2014-15 is represented in Table 14 and illustrated in figure 12 (a) and (b).

4.9.1 Influence of sowing periods

The data presented in Table 14, clearly indicates that the cob weight with husk (g) and weight without husk (g) of baby corn was influenced significantly due to sowing periods during both the years of experimentation.

During the year 2013-14, significantly the maximum cob weight with husk (49.72 g) and weight without husk (8.62 g) was recorded with the sowing period P_2 (39^{th} met. week) and the minimum cob weight with husk and without husk i.e. 44.45 g and 7.98 g respectively was recorded in the sowing period P_4 (48^{th} met. week).

Similarly during the year 2014-15, the maximum cob weight with husk (49.80 g) and weight without husk (9.31 g) was recorded with the sowing period P_2 (39^{th} met. week) and the minimum cob weight with husk and without husk i.e. 44.78 g and 8.52 g respectively was recorded in the sowing period P_4 (48^{th} met. week).

The pooled result also recorded significantly the maximum cob weight with husk (49.76 g) and weight without husk (8.97 g) was recorded with the sowing period P_2 (39^{th} met. week) and the minimum cob weight with husk and without husk i.e. 44.61 g and 8.25 g respectively was recorded in the sowing period P_4 (48^{th} met. week).

The highest cob weight with husk and without husk recorded with the sowing period P_2 (39^{th} met. week) irrespective of the years of experimentation which was followed by P_3 (43^{rd} met. week), may be due to the prevailing suitable growing environment. However, it was found to decrease with further delayed in sowing period.

4.9.2 Influence of crop geometry

The data presented in Table 14 revealed that, crop geometry influenced significantly the cob weight with husk (g) and weight without husk (g) of baby corn during both the years of experimentation.

During the year 2013-14, significantly the maximum cob weight with husk (50.91 g) was recorded with the crop geometry S_5 (60×30 cm) and found at par with S_3 (45×30 cm) i.e. 50.73 g. The minimum value (45.64 g) was recorded in the closer crop geometry S_2 (45×15 cm) also found at par with S_4 (60×15 cm) i.e. 45.94 g. However, the maximum cob weight without husk (8.79 g) was found in wider crop geometry S_3 (45×30 cm) also found at par with S_5 (60×30 cm) i.e. 8.67 g. The minimum (7.90 g) was obtained at S_4 (60×15 cm) found at par with S_2 (45×15 cm) i.e. 7.97 g.

Similarly, in the year 2014-15, significantly the maximum cob weight with husk (50.92 g) was recorded with the crop geometry S_3 (45×30 cm) and found at par with S_5 (60×30 cm) i.e. 50.83 g. The minimum value (46.20 g) was recorded in the closer crop geometry S_2 (45×15 cm) also found at par with S_1 (30×30 cm)and S_4 (60×15 cm) i.e. 46.56 g and 45.94 g respectively. On the other hand, the maximum cob weight without husk (9.54 g) was found in wider crop geometry S_3 (45×30 cm) and the minimum (8.33 g) was obtained at S_4 (60×15 cm).

Regarding the pooled mean of both years, significantly the maximum cob weight with husk (50.87 g) was recorded with the crop geometry S_5 (60×30 cm) which also found at par with S_3 (45×30 cm) i.e. 50.82 g. The minimum value (45.83 g) was recorded in the closer crop geometry S_2 (45×15 cm) also found at par with S_4 (60×15 cm) i.e. 46.00 g. On the other hand, the maximum cob weight without husk (9.17 g) was found in wider crop geometry S_3 (45×30 cm) and the minimum (8.11 g) was obtained at S_4 (60×15 cm).

The cob weight was found to decrease with reduce in crop geometry, which might be due to the fact that, there was increased in competition for various resources creating stress environment for plant growth resulting in lighter cobs. However, the enhanced yield component in wider geometry may be due increased number of leaves and LAI, leading to higher photosynthetic rate and accumulation of more assimilates which in turn increased the sink size. The result is close conformity with the findings of Sahoo and Mahapatra (2007), Singh *et al*. (2012) and Golada *et al*. (2013).

4.9.3 Interaction effect

The data presented in Table 15 indicates that interaction effect of sowing period and crop geometry on cob weight with husk (g) and cob weight without husk (g) was significant during both the years of experimentation (2013-14 and 2014-15).

During the year 2013-14, significantly the maximum cob weight with husk (54.27 g) was recorded with the treatment combination P_2S_5 (39th met. week + 60×30 cm) and found at par with P_2S_3 (39th met. week + 45×30 cm) and P_3S_3 (43rd met. week + 45×30 cm) i.e. 53.31 g and 52.80 g respectively. The minimum value (42.93 g) was recorded in the combinationP_4S_2 (48th met. week + 45×15 cm) also found at par with P_4S_4 (48th met. week + 60×15 cm) i.e. 43.44 g. However, the maximum cob weight without husk (9.22 g) was found in the treatment combination P_2S_3 (39th met. week + 45×30 cm) and the minimum (7.45 g) was obtained at P_4S_2 (48th met. week + 45×15 cm) which was also found at par with P_3S_4 (43rd met. week + 60×15 cm) i.e. 7.61 g.

Similarly during the year 2014-15, the significantly maximum cob weight with husk (54.41 g) was recorded with the treatment combination P_2S_5 (39th met. week + 60×30 cm) and found at par with P_2S_3 (39th met. week + 45×30 cm) and P_3S_3 (43rd met. week + 45×30 cm) i.e. 53.50 g and 52.95 g respectively. The minimum value (42.52 g) was recorded in the combination P_4S_2 (48th met. week + 45×15 cm) also found at par with P_4S_1 and P_4S_4 i. e., 45.11 g and 43.84 g respectively.

Table 14: Influence of sowing period and crop geometry on cob weight with husk (g) and cob weight without husk (g) of baby corn (*Zea mays* L.)

Treatments	Cob weight (g)					
	With husk			Without husk		
Sowing Period (P)	**2013-2014**	**2014-2015**	**Pooled mean**	**2013-2014**	**2014-2015**	**Pooled mean**
P_1	48.61	48.57	48.59	8.32	8.82	8.57
P_2	49.72	49.80	49.76	8.62	9.31	8.97
P_3	48.94	49.15	49.04	8.35	8.91	8.63
P_4	44.45	44.78	44.61	7.98	8.52	8.25
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)$\pm$	0.236	0.333	0.203	0.039	0.070	0.042
CD at 5%	0.675	0.955	0.582	0.110	0.202	0.119
Crop geometry (S)						
S_1	46.43	46.54	46.48	8.27	8.82	8.54
S_2	45.64	46.02	45.83	7.97	8.56	8.27
S_3	50.73	50.92	50.82	8.79	9.54	9.17
S_4	45.94	46.06	46.00	7.90	8.33	8.11
S_5	50.91	50.83	50.87	8.67	9.20	8.94
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)$\pm$	0.264	0.373	0.227	0.043	0.079	0.042
CD at 5%	0.755	1.067	0.650	0.123	0.226	0.133
Interaction effect (P × S)						
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)$\pm$	0.527	0.746	0.454	0.086	0.158	0.093
CD at 5%	1.509	2.134	1.300	0.247	0.451	0.266

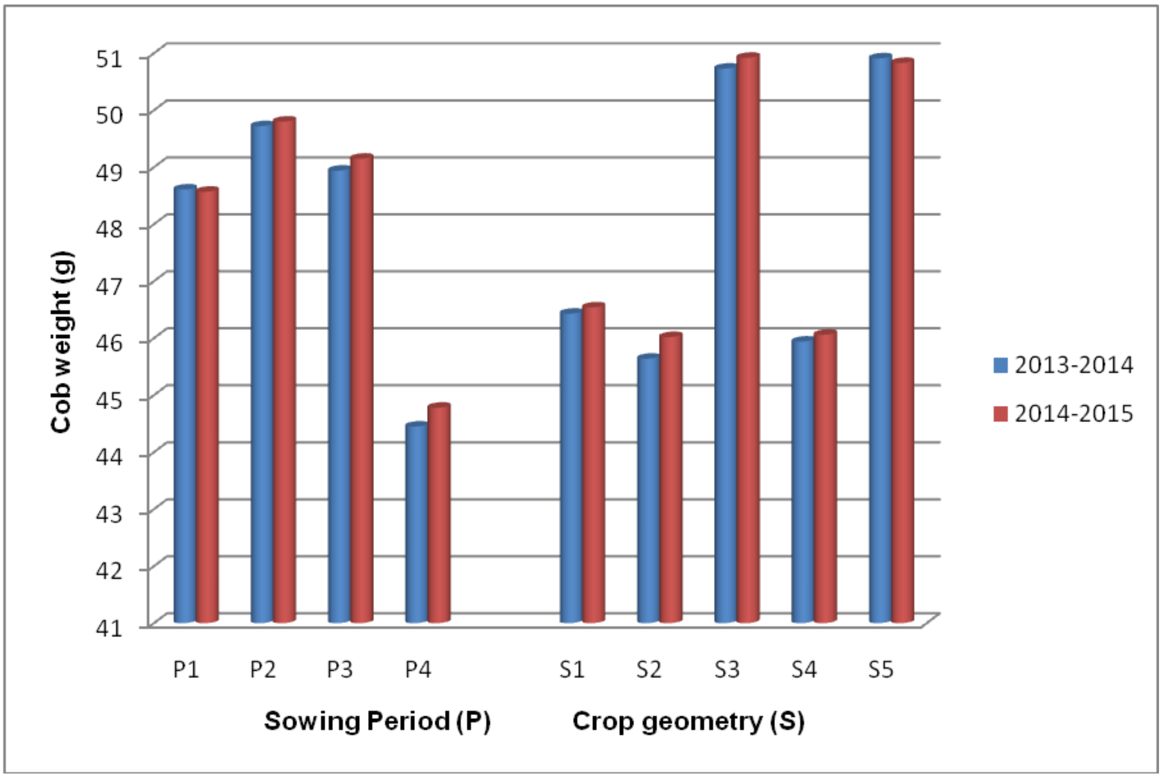


Fig. 12 (a) Influence of sowing period and crop geometry on cob weight with husk (g) of baby corn (*Zea mays* L.)

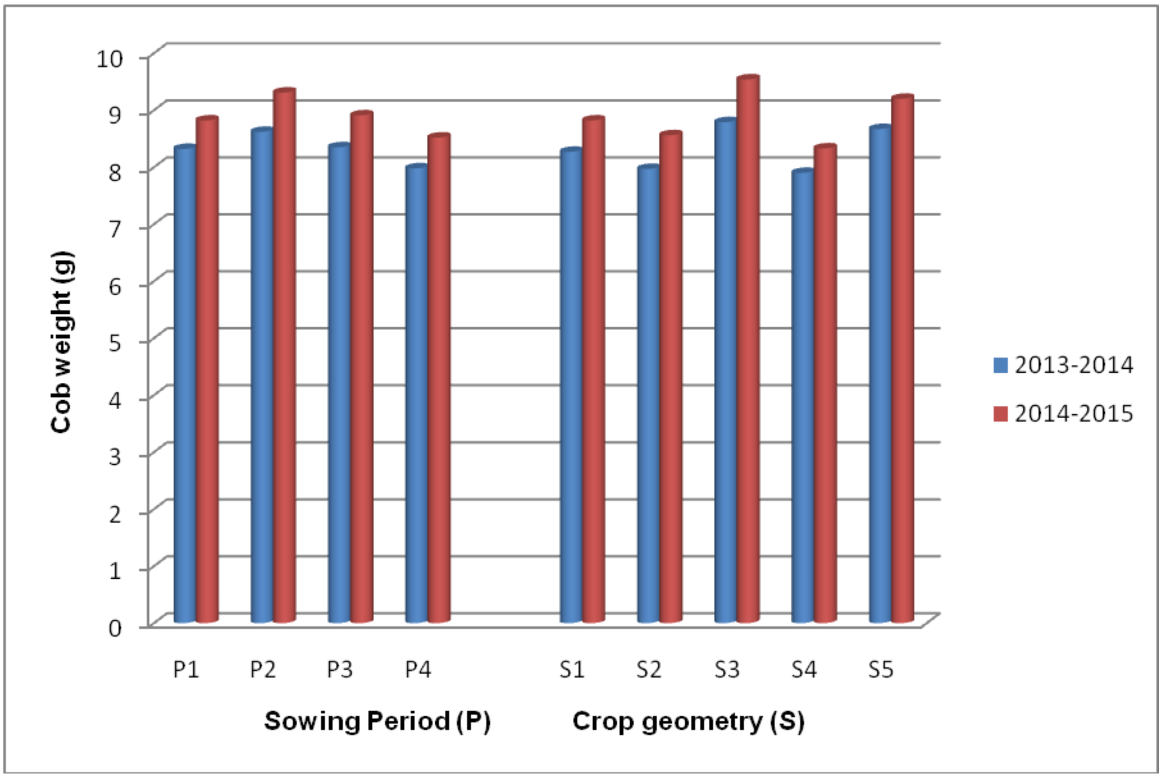


Fig. 12 (b) Influence of sowing period and crop geometry on cob weight without husk (g) of baby corn (*Zea mays* L.)

Table 15: Interaction effect of sowing period and crop geometry on cob weight with husk (g) and cob weight without husk (g) of baby corn (*Zea mays* L.)

Treatment combinations	Cob weight (g)					
	With husk			Without husk		
	2013-2014	2014-2015	Pooled mean	2013-2014	2014-2015	Pooled mean
P_1 S_1	46.59	46.63	46.61	8.33	8.90	8.62
P_1 S_2	46.26	46.49	46.38	8.07	8.53	8.30
P_1 S_3	51.37	51.16	51.26	8.70	9.22	8.96
P_1 S_4	46.50	46.51	46.50	7.87	8.34	8.11
P_1 S_5	52.35	52.08	52.22	8.65	9.12	8.89
P_2 S_1	47.23	47.33	47.28	8.49	9.03	8.76
P_2 S_2	46.95	46.77	46.86	8.20	8.86	8.53
P_2 S_3	53.31	53.50	53.41	9.22	10.52	9.87
P_2 S_4	46.83	46.97	46.90	8.27	8.65	8.46
P_2 S_5	54.27	54.41	54.34	8.93	9.50	9.22
P_3 S_1	46.83	47.07	46.95	8.39	8.97	8.68
P_3 S_2	46.43	47.29	46.86	8.15	8.71	8.43
P_3 S_3	52.80	52.95	52.88	8.88	9.46	9.17
P_3 S_4	46.98	46.93	46.96	7.61	8.14	7.88
P_3 S_5	51.64	51.49	51.56	8.73	9.24	8.99
P_4 S_1	45.07	45.11	45.09	7.85	8.38	8.11
P_4 S_2	42.93	43.52	43.22	7.45	8.16	7.80
P_4 S_3	45.42	46.07	45.75	8.37	8.95	8.66
P_4 S_4	43.44	43.84	43.64	7.84	8.19	8.02
P_4 S_5	45.37	45.35	45.36	8.37	8.94	8.66
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)$\pm$	0.527	0.746	0.454	0.086	0.158	0.093
CD at 5%	1.509	2.134	1.300	0.247	0.451	0.266

However, the maximum cob weight without husk (10.52 g) was found in the treatment combination P_2S_3 (39th met. week + 45×30 cm) and the minimum (8.14 g) was obtained at P_3S_4 (43rd met. week + 60×15 cm) which was also found at par with P_4S_2 (48th met. week + 45×15 cm) i.e. 8.16 g.

In the pooled mean of both the years, significantly the maximum cob weight with husk (54.34 g) was recorded with the treatment combination P_2S_5 (39th met. week + 60×30 cm) and found at par with P_2S_3 (39th met. week + 45×30 cm) i.e. 53.41 g. The minimum value (43.22 g) was recorded in the combination P_4S_2 (48th met. week + 45×15 cm) also found at par with P_4S_4 (48th met. week + 60×15 cm) i.e. 43.64 g. However, the maximum cob weight without husk (9.87 g) was found in the treatment combination P_2S_3 (39th met. week + 45×30 cm) and the minimum (7.80 g) was obtained at P_4S_2 (48th met. week + 45×15 cm) which was also found at par with P_3S_4 (43rd met. week + 60×15 cm) i.e. 7.88 g. The higher cob weight might be due to favourable growing environment and optimum availability of resources.

4.10 Influence of sowing periods and crop geometry on cob yield with husk (g) and cob yield without husk plant^{-1} (g) of baby corn (*Zea mays* L.)

The data pertaining to cob yield with husk (g) and yield without husk plant^{-1}(g) of baby corn (*Zea mays* L.) as influenced due to sowing periods and crop geometry, recorded during the years 2013-14 and 2014-15 is represented in Table 16, figure 13 (a) and (b).

4.10.1 Influence of sowing periods

The data presented in Table 16, clearly indicates that the cob yield with husk (g) and yield without husk plant^{-1} (g) of baby corn was influenced significantly due to sowing periods during both the years of experimentation.

During the year 2013-14, significantly the maximum per plant cob yield with husk (145.51 g) and yield without husk (25.16 g) was recorded with the sowing period P_2 (39th met. week) and the minimum cob yield with husk and without husk plant^{-1} i.e. 119.20 g and 21.42 g respectively was recorded in the sowing period P_4 (48th met. week). The minimum value of cob yield without husk was also found at par with that of sowing period P_1 (35th met. week) i.e. 21.44 g plant^{-1}.

Similarly during the year 2014-15, the maximum per plant cob yield with husk (148.38 g) and yield without husk plant^{-1} (27.70 g) was recorded with the sowing period P_2 (39th met. week) and the minimum cob yield with husk plant^{-1} (122.42 g) was observed in the sowing period P_4 (48th met. week), whereas the minimum cob yield without husk (23.31 g) in P_1 (48th met. week) and was also found significant with P_4 (48th met. week) i.e. 23.32 g plant^{-1}.

From the pooled mean of both years, the maximum cob yield plant^{-1} with husk (146.95 g) and without husk (26.43 g) was recorded with the sowing period P_2 (39th met. week) and the minimum cob yield with husk and without husk plant^{-1} i.e. 120.81 g and 22.37 g respectively was recorded in the sowing period P_4 (48th met. week). The minimum value of cob yield without husk was also found at par with that of sowing period P_1 (35th met. week) i.e. 22.38 g plant^{-1}.

The higher yield plant^{-1} might be owing to prevailing favourable environmental conditions resulting to the higher growth of the plant, more number of cobs plant^{-1}, higher cob length and cob weight under the sowing period P_2 (39th met. week). However, in comparison the earlier or later sowing periods exhibited lower yield plant^{-1}.

4.10.2 Influence of crop geometry

The data presented in Table 16 revealed that, crop geometry influenced significantly the cob yield plant^{-1} with husk (g) and without husk (g) of baby corn during both the years of experimentation.

During the year 2013-14, significantly the maximum cob yield with husk (153.15 g) and without husk plant^{-1} (26.03 g) was recorded with the crop geometry S_5 (60×30 cm). The minimum cob yield with husk and without husk plant^{-1} i.e. 112.55 and 19.65 g respectively was recorded in the closer crop geometry S_2 (45×15 cm).

It was also observed similarly during 2014-15 that, significantly the maximum cob yield with husk (157.10 g) and without husk plant^{-1} (28.39 g) was found with the crop geometry S_5 (60×30 cm). The minimum cob yield with husk and without husk plant^{-1} i.e. 115.73 and 21.55 g respectively was recorded in the closer crop geometry S_2 (45×15 cm).

The pooled mean of both the years indicated significantly the maximum cob yield with husk (155.13 g) and without husk plant^{-1} (27.21 g) with the crop geometry S_5 (60×30 cm). The minimum cob yield with husk and without husk plant^{-1} i.e. 114.14 and 20.60 g respectively was recorded in the closer crop geometry S_2 (45×15 cm).

The crop under the wider spacing S_5 (60×30 cm) has utilized the available resources more efficiently and hence producing more number of cobs plant^{-1}, higher cob diameter and cob weight attributing to higher cob yield plant^{-1}.

4.10.3 Interaction effect

The data presented in Table 17 indicates that interaction effect of sowing period and crop geometry on cob yield with husk (g) and yield without husk plant^{-1} (g) was significant during both the years of experimentation i.e. 2013-14 and 2014-15.

During the year 2013-14, significantly the maximum cob yield plant^{-1} with husk (184.53 g) and yield without husk (30.36 g)was recorded with the treatment combination P_2S_5 (39thmet. week + 60×30 cm). The minimum cob yield with husk plant^{-1} (105.82 g) was recorded in the combinationP_4S_2 (48th met. week + 45×15 cm), the cob yield without husk plant^{-1} (18.37 g) was also recorded in the combinationP_4S_2 (48th met. week + 45×15 cm) but found at par with P_1S_2 (35th met. week + 45×15 cm) i.e. 19.36 g plant^{-1}.

Table 16: Influence of sowing period and crop geometry on cob yield with husk and without husk plant^{-1} (g) of baby corn (*Zea mays* L.)

Treatments	Cob yield plant^{-1} (g)					
	With husk			Without husk		
Sowing Period (P)	**2013-2014**	**2014-2015**	**Pooled mean**	**2013-2014**	**2014-2015**	**Pooled mean**
P_1	125.41	128.46	126.93	21.44	23.31	22.38
P_2	145.51	148.38	146.95	25.16	27.70	26.43
P_3	133.47	137.93	135.70	22.77	24.96	23.87
P_4	119.20	122.42	120.81	21.42	23.32	22.37
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)±	1.252	0.624	0.741	0.205	0.160	0.123
CD at 5%	3.585	1.787	2.122	0.587	0.457	0.351
Crop geometry (S)						
S_1	121.49	123.23	122.36	21.63	23.35	22.49
S_2	112.55	115.73	114.14	19.65	21.55	20.60
S_3	145.64	149.53	147.58	25.24	28.06	26.65
S_4	121.67	125.89	123.78	20.94	22.77	21.85
S_5	153.15	157.10	155.13	26.03	28.39	27.21
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)±	1.400	0.698	0.829	0.229	0.179	0.137
CD at 5%	4.008	1.998	2.372	0.657	0.511	0.393
Interaction effect (P × S)						
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)±	2.800	1.396	1.657	0.459	0.357	0.274
CD at 5%	8.016	3.995	4.744	1.314	1.023	0.786

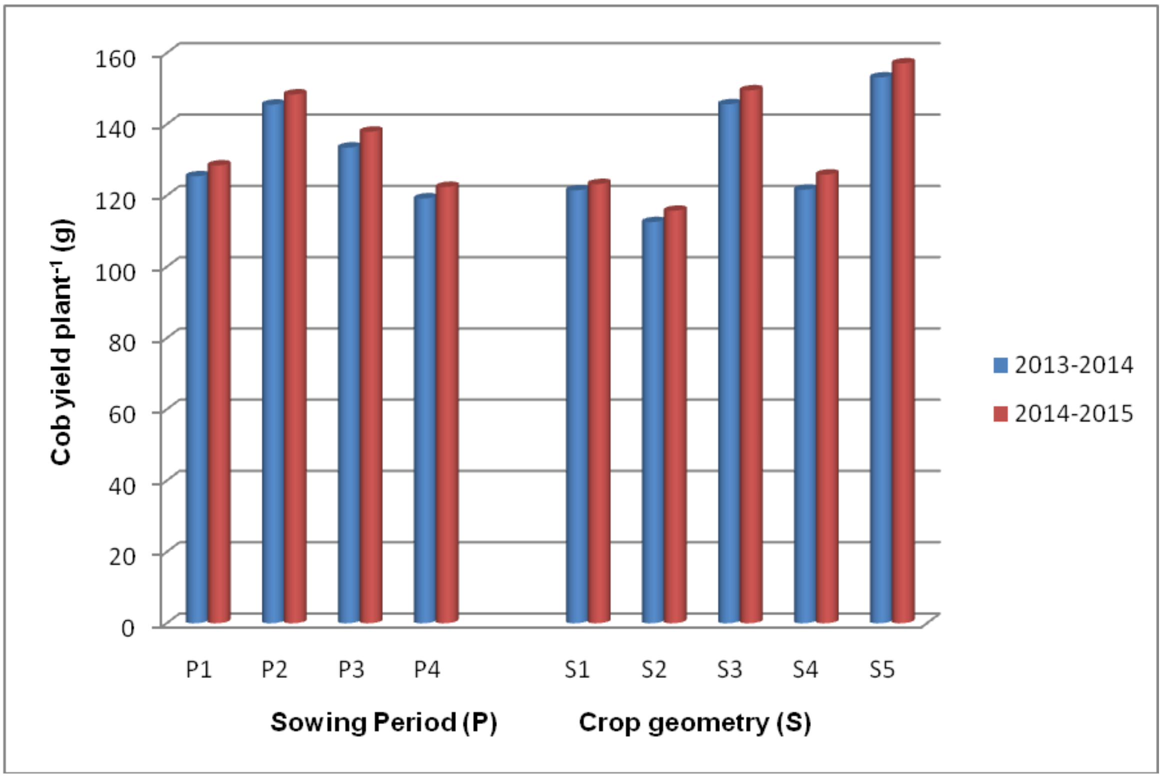


Fig. 13 (a) Influence of sowing period and crop geometry on cob yield with husk plant^{-1} (g) of baby corn (*Zea mays* L.)

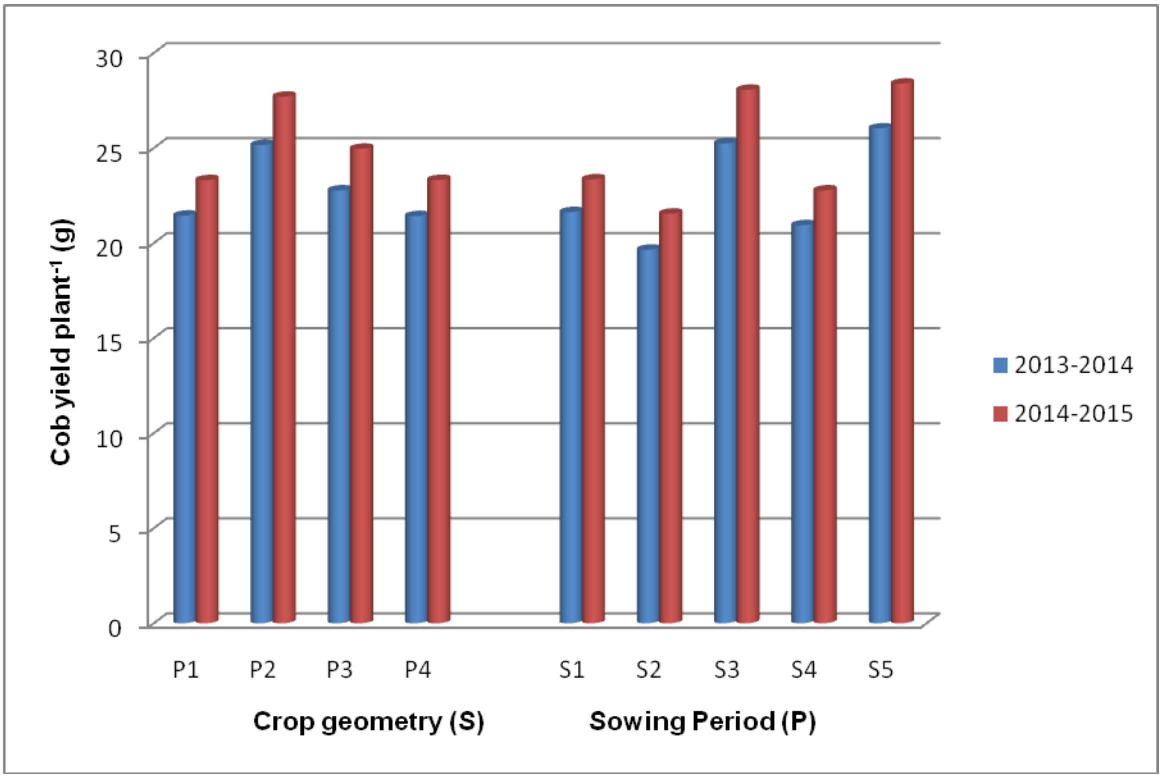


Fig. 13 (b) Influence of sowing period and crop geometry on cob yield without husk plant^{-1} (g) of baby corn (*Zea mays* L.)

Table 17: Interaction effect of sowing period and crop geometry on cob yield with husk and without husk plant^{-1}(g) of baby corn (*Zea mays* L.)

Treatment combinations	Cob yield plant^{-1} (g)					
	With husk			Without husk		
	2013-2014	2014-2015	Pooled mean	2013-2014	2014-2015	Pooled mean
P_1 S_1	114.84	118.01	116.42	20.55	22.51	21.53
P_1 S_2	111.02	114.52	112.77	19.36	21.01	20.19
P_1 S_3	136.99	139.67	138.33	23.20	25.20	24.20
P_1 S_4	117.69	120.92	119.31	19.93	21.69	20.81
P_1 S_5	146.51	149.18	147.85	24.17	26.12	25.15
P_2 S_1	129.10	129.25	129.17	23.20	24.66	23.93
P_2 S_2	118.91	121.40	120.15	20.76	23.03	21.90
P_2 S_3	167.07	171.21	169.14	28.87	33.66	31.27
P_2 S_4	127.94	131.51	129.72	22.59	24.22	23.40
P_2 S_5	184.53	188.54	186.53	30.36	32.91	31.64
P_3 S_1	124.83	125.46	125.15	22.38	23.91	23.14
P_3 S_2	114.44	119.74	117.09	20.10	22.05	21.08
P_3 S_3	151.31	155.27	153.29	25.45	27.73	26.59
P_3 S_4	125.23	131.40	128.32	20.32	22.80	21.56
P_3 S_5	151.54	157.76	154.65	25.61	28.32	26.96
P_4 S_1	117.17	120.22	118.70	20.40	22.31	21.36
P_4 S_2	105.82	107.27	106.55	18.37	20.11	19.24
P_4 S_3	127.18	131.98	129.58	23.44	25.64	24.54
P_4 S_4	115.82	119.73	117.77	20.91	22.36	21.64
P_4 S_5	130.03	132.92	131.47	23.99	26.20	25.09
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)$\pm$	2.800	1.396	1.657	0.459	0.357	0.274
CD at 5%	8.016	3.995	4.744	1.314	1.023	0.786

Similarly during the year 2014-15, the maximum cob yield plant^{-1} with husk (188.54 g) was recorded significantly with the treatment combination P_2S_5 (39th met. week + 60×30 cm) and yield without husk (33.66 g) was observed in P_2S_3 (39th met. week + 45×30 cm) which was also found at par with P_2S_5 (39th met. week + 60×30 cm) i.e. 32.91 g plant^{-1}. However, minimum cob yield plant^{-1} with husk (107.27 g) and without husk (20.11 g) was recorded in the combination P_4S_2 (48th met. week + 45×15 cm). The minimum cob yield without husk plant^{-1} was also found at par with P_1S_2 (35th met. week + 45×15 cm) i.e. 21.01 g plant^{-1}.

Regarding pooled mean of both the years, significantly the maximum cob yield plant^{-1} with husk (186.53 g) and without husk (31.64 g) was recorded with the treatment combination P_2S_5 (39th met. week + 60×30 cm). The cob yield plant^{-1} without husk was also found at par with P_2S_3 (39th met. week + 45×30 cm) i.e. 31.27 g. The minimum cob yield plant^{-1} with husk (106.55 g) and without husk (19.24 g) was recorded in the combination P_4S_2 (48th met. week + 45×15 cm). Better growing conditions accompanied with efficient use of available resources by the plants allowing the individual plant to achieve their maximum inherent potential might have attributed to higher yield attributes resulting in higher yield plant^{-1} in the treatment combination P_2S_5 (39th met. week + 60×30 cm).

4.11 Influence of sowing periods and crop geometry on cob yield plot^{-1} with husk (kg) and without husk (kg) of baby corn (*Zea mays* L.)

The data pertaining to cob yield plot^{-1}(kg) with husk and without husk of baby corn (*Zea mays* L.) as influenced due to sowing periods and crop geometry, recorded during the years 2013-14 and 2014-15 is represented in Table 18 and illustrated in figure 14 (a) and (b).

4.11.1 Influence of sowing periods

The data presented in Table 18, clearly indicates that the cob yield plot^{-1} (kg) with husk and without husk of baby corn was influenced significantly due to sowing periods during both the years of experimentation.

During the year 2013-14, significantly the maximum cob yield plot^{-1} with husk (10.37 kg) and without husk (1.80 kg) was recorded with the sowing period P_2 (39th met. week) and the minimum cob yield plot^{-1} with husk i.e. 8.71 kg was recorded in the sowing period P_4 (48th met. week), while the minimum cob yield plot^{-1} without husk (1.56 kg) each was found with sowing period P_1 (35th met. week) and P_4 (48th met. week).

Similarly during the year 2014-15, the maximum per plot cob yield with husk (10.57 kg) and yield plot^{-1} without husk (1.98 kg) was recorded with the sowing period P_2 (39th met. week) and the minimum cob yield plot^{-1} with husk (8.94 kg) and without husk (1.69 kg) was observed in the sowing period P_4 (48th met. week).

The pooled mean of both years, the maximum cob yield plot^{-1} with husk (10.47 kg) and without husk (1.89 kg) was recorded with the sowing period P_2 (39th met. week) and the minimum cob yield plot^{-1} with husk i.e. 8.83 kg was recorded in the sowing period P_4 (48th met. week), while the minimum cob yield plot^{-1} without husk (1.63 kg) each was found with sowing period P_1 (35th met. week) and P_4 (48th met. week).

The higher yield plot^{-1} might be owing to prevailing favourable environmental conditions resulting to the higher growth of the plant, more number of cobs plant^{-1}, higher cob length, cob weight and cob yield plant^{-1} under the sowing period P_2 (39th met. week).

4.11.2 Influence of crop geometry

The data presented in Table 18 revealed that, crop geometry influenced significantly the cob yield plot^{-1} (kg) with husk and without husk of baby corn during both the years of experimentation.

During the year 2013-14, significantly the maximum cob yield plot^{-1} with husk (11.25 kg) and without husk (1.96 kg) was recorded with the crop geometry S_2 (45×15 cm). The minimum cob yield plot^{-1} with husk and without husk i.e. 7.35 and 1.25 kg respectively was recorded in the wider crop geometry S_5 (60×30 cm).

It was also observed similarly during 2014-15 that, significantly the maximum cob yield plot^{-1} with husk (11.57 kg) and without husk (2.16 kg) was recorded with the crop geometry S_2 (45×15 cm). The minimum cob yield plot^{-1} with husk and without husk i.e. 7.54 and 1.36 kg respectively was recorded in the wider crop geometry S_5 (60×30 cm).

The pooled mean of both the years indicated significantly the maximum cob yield plot^{-1} with husk (11.41 kg) and without husk (2.06 kg) was recorded with the crop geometry S_2 (45×15 cm). The minimum cob yield plot^{-1} with husk and without husk i.e. 7.45 and 1.31 kg respectively was recorded in the wider crop geometry S_5 (60×30 cm).

Despite the fact that, higher yield attributes were being observed at wider spacing, the crop under closer geometry i.e. S_2 (45×15 cm) exhibited higher cob yield plot^{-1} due to accommodation of more number of plants per unit area.

4.10.3 Interaction effect

The data presented in Table 19 indicated that, the interaction effect of sowing period and crop geometry on cob yield plot^{-1}with husk (kg) and yield without husk (kg) was significant during both the years of experimentation i.e. 2013-14 and 2014-15.

During the year 2013-14, significantly the maximum cob yield plot^{-1} with husk (11.89kg) and without husk (2.08 kg) was recorded in P_2S_2 (39th met. week + 45×15 cm) which was also found at par with P_3S_2 (43rd met. week + 45×15 cm) i.e. 11.44 and 2.01 kg respectively. The minimum cob yield plot^{-1} with husk (6.24 kg) and without husk (1.15 kg) was recorded in the combination P_4S_5 (48th met. week + 60×30 cm).

Table 18: Influence of sowing period and crop geometry on cob yield plot-[1] (kg) with husk and without husk of baby corn (*Zea mays* L.)

Treatments	Cob yield plot^{-1} (kg)					
	With husk			Without husk		
Sowing Period (P)	**2013-2014**	**2014-2015**	**Pooled mean**	**2013-2014**	**2014-2015**	**Pooled mean**
P_1	9.08	9.32	9.20	1.56	1.70	1.63
P_2	10.37	10.57	10.47	1.80	1.98	1.89
P_3	9.66	9.98	9.82	1.65	1.81	1.73
P_4	8.71	8.94	8.83	1.56	1.69	1.63
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)±	0.082	0.053	0.051	0.016	0.013	0.010
CD at 5%	0.235	0.151	0.147	0.045	0.038	0.028
Crop geometry (S)						
S_1	10.20	10.35	10.28	1.82	1.96	1.89
S_2	11.25	11.57	11.41	1.96	2.16	2.06
S_3	8.74	8.97	8.85	1.51	1.68	1.60
S_4	9.73	10.07	9.90	1.67	1.82	1.75
S_5	7.35	7.54	7.45	1.25	1.36	1.31
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)±	0.092	0.059	0.057	0.018	0.015	0.011
CD at 5%	0.265	0.168	0.164	0.051	0.043	0.031
Interaction effect (P × S)						
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)±	0.183	0.118	0.115	0.035	0.030	0.022
CD at 5%	0.525	0.337	0.329	0.101	0.085	0.062

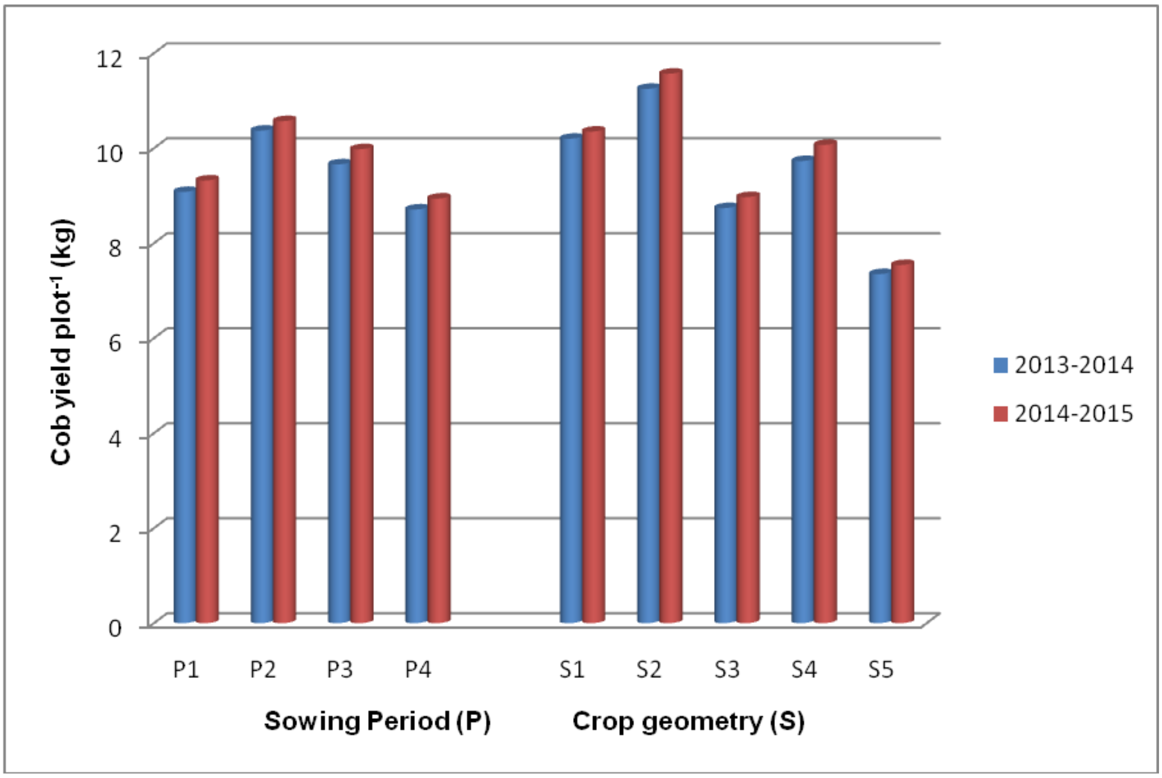


Fig. 14 (a) Influence of sowing period and crop geometry on cob yield plot-[1] (kg) with husk of baby corn (*Zea mays* L.)

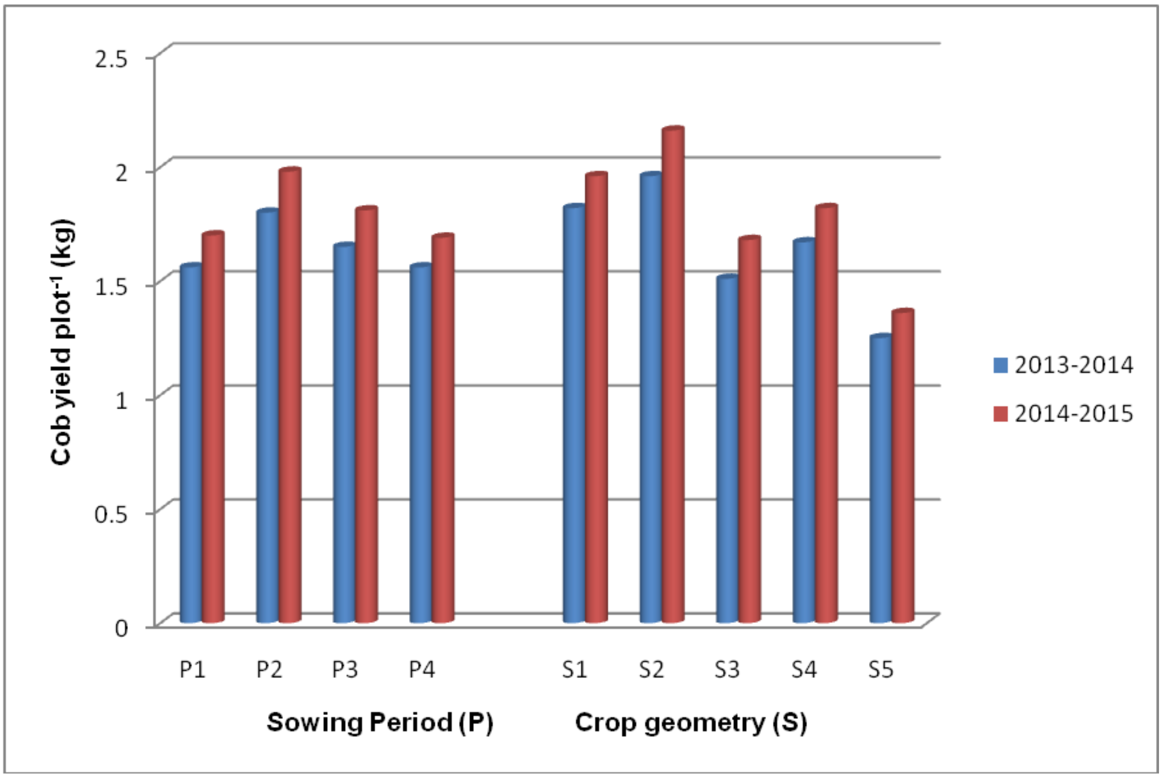


Fig. 14 (b) Influence of sowing period and crop geometry on cob yield plot-[1] (kg) without husk of baby corn (*Zea mays* L.)

Table 19: Interaction effect of sowing period and crop geometry on cob yield plot^{-1} (kg) with husk and without husk of baby corn (*Zea mays* L.)

Treatment combinations	Cob yield plot^{-1} (kg)					
	With husk			Without husk		
	2013-2014	2014-2015	Pooled mean	2013-2014	2014-2015	Pooled mean
P_1 S_1	9.65	9.91	9.78	1.73	1.89	1.81
P_1 S_2	11.10	11.45	11.28	1.94	2.10	2.02
P_1 S_3	8.22	8.38	8.30	1.39	1.51	1.45
P_1 S_4	9.42	9.67	9.54	1.59	1.74	1.66
P_1 S_5	7.03	7.16	7.10	1.16	1.25	1.21
P_2 S_1	10.84	10.86	10.85	1.95	2.07	2.01
P_2 S_2	11.89	12.14	12.02	2.08	2.30	2.19
P_2 S_3	10.02	10.27	10.15	1.73	2.02	1.88
P_2 S_4	10.24	10.52	10.38	1.81	1.94	1.87
P_2 S_5	8.86	9.05	8.96	1.46	1.58	1.52
P_3 S_1	10.49	10.54	10.51	1.88	2.01	1.94
P_3 S_2	11.44	11.97	11.71	2.01	2.21	2.11
P_3 S_3	9.08	9.32	9.20	1.53	1.66	1.60
P_3 S_4	10.02	10.51	10.27	1.63	1.82	1.72
P_3 S_5	7.27	7.57	7.42	1.23	1.36	1.29
P_4 S_1	9.84	10.10	9.97	1.71	1.87	1.79
P_4 S_2	10.58	10.73	10.65	1.84	2.01	1.92
P_4 S_3	7.63	7.92	7.77	1.41	1.54	1.47
P_4 S_4	9.27	9.58	9.42	1.67	1.79	1.73
P_4 S_5	6.24	6.38	6.31	1.15	1.26	1.21
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)$\pm$	0.183	0.118	0.115	0.035	0.030	0.022
CD at 5%	0.525	0.337	0.329	0.101	0.085	0.062

Similarly during the year 2014-15, the maximum cob yield plot^{-1} with husk (12.14 kg) and without husk (2.30 kg) was recorded in P_2S_2 (39th met. week + 45×15 cm). The cob yield with husk in this treatment combination was also found at par with P_3S_3 (43rd met. week + 45×30 cm) i.e. 11.97 kg. The minimum cob yield plot^{-1} with husk (6.38 kg) and without husk (1.26 kg) was recorded in the combination P_4S_5 (48th met. week + 60×30 cm).

Regarding pooled mean of both the years, significantly the maximum cob yield plot^{-1} with husk (12.02 kg) and without husk (2.19 kg) was recorded in P_2S_2 (39th met. week + 45×15 cm). The cob yield with husk in this treatment combination was also found at par with P_3S_3 (43rd met. week + 45×30 cm) i.e. 11.71 kg. The minimum cob yield plot^{-1} with husk (6.31 kg) was recorded in the combination P_4S_5 (48th met. week + 60×30 cm), while cob yield without husk (1.21 kg) each was found in the treatment combination P_4S_5 (48th met. week + 60×30 cm) and P_1S_5 (35th met. week+ 60×30 cm).

The highest cob yield plot^{-1} observed at the treatment combination P_2S_2 (39th met. week + 45×15 cm) might be owing to optimum growing conditions of environment accompanied with higher plant population per unit area at closer crop geometry.

4.12 Influence of sowing periods and crop geometry on cob yield ha^{-1} with husk (kg) and without husk (kg) of baby corn (*Zea mays* L.)

The data pertaining to cob yield ha^{-1}(q) with husk and without husk of baby corn (*Zea mays* L.) as influenced due to sowing periods and crop geometry, recorded during the years 2013-14 and 2014-15 is represented in Table 20 and illustrated in figure 15 (a) and (b).

4.12.1 Influence of sowing periods

The data presented in Table 20, clearly indicates that the cob yield ha^{-1} (q) with husk and without husk of baby corn was influenced significantly due to sowing periods during both the years of experimentation.

During the year 2013-14, significantly the maximum cob yield ha^{-1} with husk (384.09 q) and without husk (66.83 q) was recorded with the sowing period P_2 (39th met. week) and the minimum cob yield ha^{-1} with husk and without husk i.e. 322.68 q and 57.64 q respectively was recorded in the sowing period P_4 (48th met. week).

Similarly during the year 2014-15, the maximum cob yield ha^{-1} with husk (391.41 q) and without husk (73.43 q) was recorded with the sowing period P_2 (39th met. week) and the minimum cob yield ha^{-1} with husk and without husk i.e. 331.13 q and 62.74 q respectively was recorded in the sowing period P_4 (48th met. week).

The pooled mean of both years, the maximum cob yield ha^{-1} with husk (387.75 q) and without husk (70.13 q) was recorded with the sowing period P_2 (39th met. week) and the minimum cob yield ha^{-1} with husk and without husk i.e. 326.91 q and 60.19 q respectively was recorded in the sowing period P_4 (48th met. week).

The observed marked increases in baby corn yield appeared to be a resultant of remarkable improvement in different growth and yield attributes such as; number of cobs plant^{-1}, cob length, cob weight, cob yield plant^{-1} and cob yield plot^{-1} due to prevailing optimum environmental conditions. The result is in close conformity with the findings of Kgasago (2006) and Singh *et al*. (2015).

4.12.2 Influence of crop geometry

The data presented in Table 20 revealed that, crop geometry influenced significantly the cob yield ha^{-1} (q) with husk and without husk of baby corn during both the years of experimentation.

During the year 2013-14, significantly the maximum cob yield ha^{-1} with husk (416.85 q) and without husk (72.76 q) was recorded with the crop geometry S_2 (45×15 cm). The minimum cob yield ha^{-1} with husk and without husk i.e. 272.27 q and 46.28 q respectively was recorded in the wider crop geometry S_5 (60×30 cm).

Similarly in the year 2014-15, significantly the maximum cob yield ha^{-1} with husk (428.63 q) and without husk (79.82 q) was recorded with the crop geometry S_2 (45×15 cm). The minimum cob yield ha^{-1} with husk and without husk i.e. 279.29 q and 50.47 q respectively was recorded in the wider crop geometry S_5 (60×30 cm).

Regarding pooled mean, the significantly maximum cob yield ha^{-1} with husk (422.74 q) and without husk (76.29 q) was recorded with the crop geometry S_2 (45×15 cm). The minimum cob yield ha^{-1} with husk and without husk i.e. 275.78 q and 48.37 q respectively was recorded in the wider crop geometry S_5 (60×30 cm).

The crop under closer geometry i.e. S_2 (45×15 cm) exhibited higher cob yield ha^{-1} as compared to the wider geometry. Though the values of yield attributes were poor with closer spacing, the yield might have compensated these because of more number of plants ha^{-1}. The result is similar to the findings of Cho *et al*. (2001) and in close conformity to those findings of Thakur *et al*. (1997), Gosavi and Bhagat (2009), Mathukia *et al*. (2014) and Singh *et al*. (2015).

4.12.3 Interaction effect

The data presented in Table 21 indicated that, the interaction effect of sowing period and crop geometry on cob yield ha^{-1}(q) with husk and yield without husk was significant during both the years of experimentation i.e. 2013-14 and 2014-15.

During the year 2013-14, significantly the maximum cob yield ha^{-1} with husk (440.40 q) and without husk (76.89 q) was recorded in the treatment combination P_2S_2 (39th met. week + 45×15 cm) which was also found at par with P_3S_2 (43rd met. week + 45×15 cm) i.e. 423.85 and 74.44 q respectively. The minimum cob yield ha^{-1} with husk (231.16 q) and without husk (42.65 q) was recorded in the combination P_4S_5 (48th met. week +

Table 20: Influence of sowing period and crop geometry on cob yield hectare^{-1} (q) with husk and without husk of baby corn (*Zea mays* L.)

Treatments	Cob yield hectare^{-1} (q)					
	With husk			Without husk		
Sowing Period (P)	**2013-2014**	**2014-2015**	**Pooled mean**	**2013-2014**	**2014-2015**	**Pooled mean**
P_1	336.42	345.03	340.72	57.84	62.92	60.38
P_2	384.09	391.41	387.75	66.83	73.43	70.13
P_3	357.78	369.73	363.75	61.27	67.11	64.19
P_4	322.68	331.13	326.91	57.64	62.74	60.19
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)±	3.037	1.948	1.901	0.585	0.494	0.357
CD at 5%	8.695	5.576	5.441	1.674	1.414	1.022
Crop geometry (S)						
S_1	377.95	383.39	380.67	67.30	72.64	69.97
S_2	416.85	428.63	422.74	72.76	79.82	76.29
S_3	323.63	332.29	327.96	56.09	62.35	59.22
S_4	360.50	373.01	366.76	62.03	67.46	64.75
S_5	272.27	279.29	275.78	46.28	50.47	48.37
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)±	3.396	2.177	2.125	0.654	0.552	0.399
CD at 5%	9.721	6.234	6.084	1.871	1.580	1.142
Interaction effect (P × S)						
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)±	6.791	4.355	4.250	1.307	1.104	0.798
CD at 5%	19.443	12.467	12.167	3.743	3.161	2.285

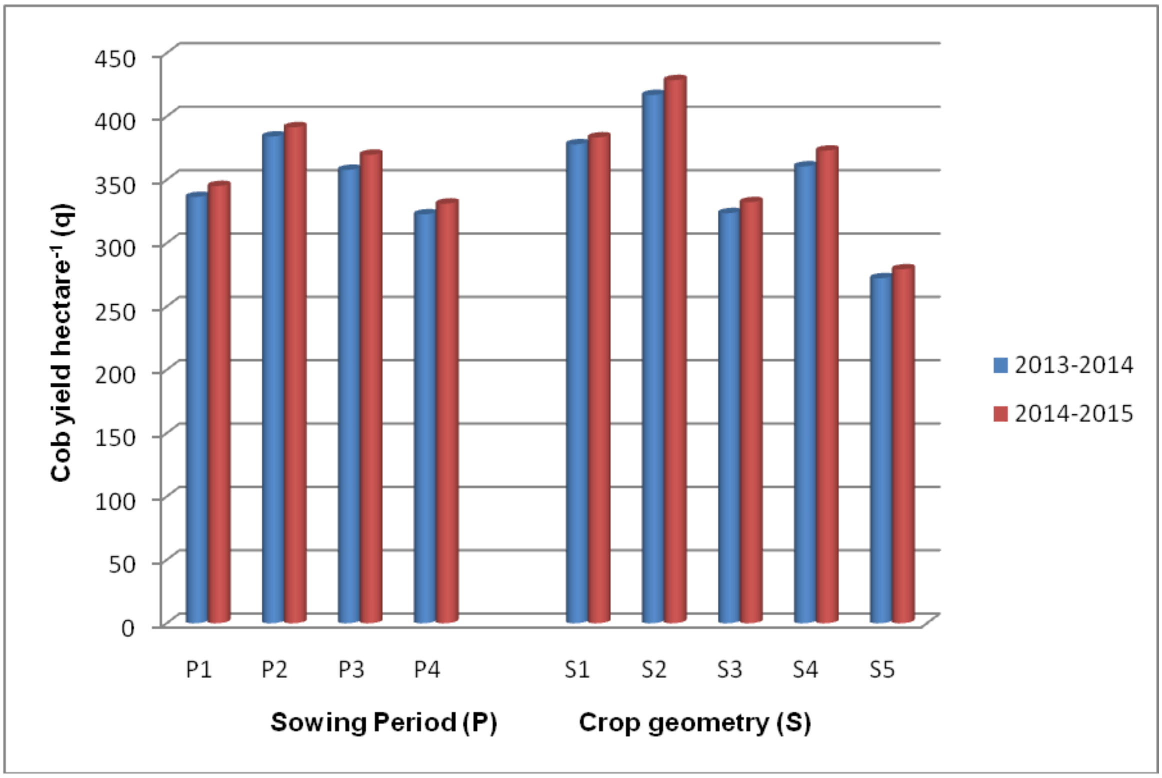


Fig. 15 (a) Influence of sowing period and crop geometry on cob yield hectare^{-1} (q) with husk of baby corn (*Zea mays* L.)

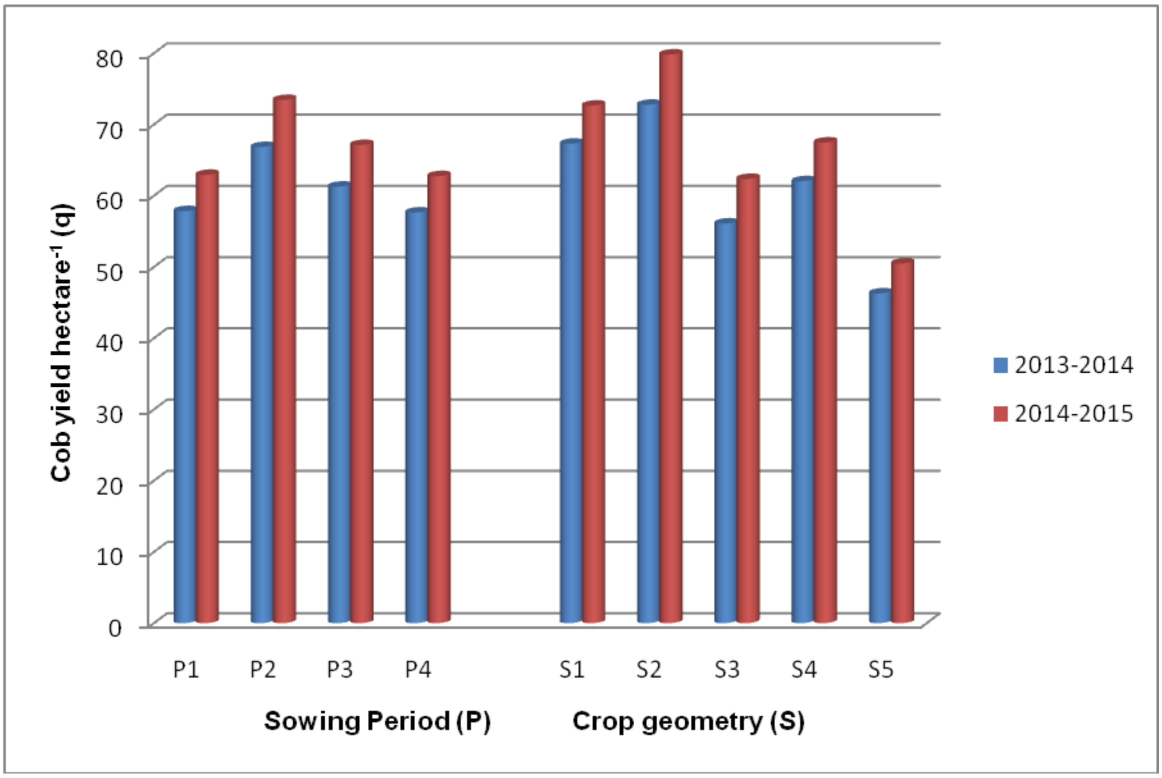


Fig. 15 (b) Influence of sowing period and crop geometry on cob yield hectare^{-1} (q) without husk of baby corn (*Zea mays* L.)

Table 21: Interaction effect of sowing period and crop geometry on cob yield hectare^{-1} (q) with husk and without husk of baby corn (*Zea mays* L.)

Treatment combinations	Cob yield hectare^{-1} (q)					
	With husk			Without husk		
	2013-2014	2014-2015	Pooled mean	2013-2014	2014-2015	Pooled mean
P_1 S_1	357.27	367.15	362.21	63.93	70.03	66.98
P_1 S_2	411.20	424.14	417.67	71.70	77.83	74.77
P_1 S_3	304.42	310.37	307.39	51.56	56.00	53.78
P_1 S_4	348.72	358.28	353.50	59.05	64.28	61.66
P_1 S_5	260.47	265.21	262.84	42.97	46.44	44.71
P_2 S_1	401.63	402.10	401.87	72.18	76.73	74.46
P_2 S_2	440.40	449.62	445.01	76.89	85.31	81.10
P_2 S_3	371.27	380.47	375.87	64.16	74.81	69.49
P_2 S_4	379.09	389.65	384.37	66.93	71.76	69.35
P_2 S_5	328.05	335.18	331.62	53.98	58.51	56.24
P_3 S_1	388.37	390.31	389.34	69.64	74.38	72.01
P_3 S_2	423.85	443.47	433.66	74.44	81.67	78.06
P_3 S_3	336.24	345.05	340.64	56.55	61.62	59.08
P_3 S_4	371.04	389.35	380.20	60.19	67.56	63.87
P_3 S_5	269.40	280.46	274.93	45.53	50.35	47.94
P_4 S_1	364.54	374.02	369.28	63.47	69.42	66.44
P_4 S_2	391.94	397.30	394.62	68.02	74.47	71.25
P_4 S_3	282.61	293.28	287.95	52.08	56.97	54.53
P_4 S_4	343.17	354.76	348.96	61.97	66.25	64.11
P_4 S_5	231.16	236.30	233.73	42.65	46.57	44.61
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)$\pm$	6.791	4.355	4.250	1.307	1.104	0.798443
CD at 5%	19.443	12.467	12.167	3.743	3.161	2.285

60×30 cm). The cob yield without husk was also found at par with P_1S_5 (35^{th} met. week + 60×30 cm) i.e. 42.97 q ha^{-1}.

Similarly during the year 2014-15, the maximum cob yield ha^{-1} with husk (449.62 q) and without husk (85.31 q) was recorded in the treatment combination P_2S_2 (39^{th} met. week + 45×15 cm), the cob yield ha^{-1} with husk in this treatment was also found at par with P_3S_2 (43^{rd} met. week + 45×15 cm) i.e. 443.47 q. The minimum cob yield ha^{-1} with husk (236.30 q) was recorded in the combination P_4S_5 (48^{th} met. week + 60×30 cm), while without husk (46.44 q) was observed in P_1S_5 (35^{th} met. week + 60×30 cm) which was also found at par with P_4S_5 (48^{th} met. week + 60×30 cm) i.e. 46.57 q ha^{-1}.

The pooled mean of both the years indicated significantly the maximum cob yield ha^{-1} with husk (445.01 q) and without husk (81.10 q) in the treatment combination P_2S_2 (39^{th} met. week + 45×15 cm), the cob yield ha^{-1} with husk in this treatment was also found at par with P_3S_2 (43^{rd} met. week + 45×15 cm) i.e. 433.66 q. The minimum cob yield ha^{-1} with husk (233.73 q) and without husk (44.61 q) was recorded in the combination P_4S_5 (48^{th} met. week + 60×30 cm). The cob yield without husk was also found at par with P_1S_5 (35^{th} met. week + 60×30 cm) i.e. 44.71 q ha^{-1}.

The highest cob yield ha^{-1} observed at the treatment combination P_2S_2 (39^{th} met. week + 45×15 cm) might be owing to optimum growing conditions of environment accompanied with higher plant population per unit area with closer crop geometry.

4.13 Influence of sowing periods and crop geometry on green fodder yield (t ha^{-1}) of baby corn (*Zea mays* L.)

The data pertaining to green fodder yield (t ha^{-1}) of baby corn (*Zea mays* L.) as influenced due to sowing periods and crop geometry, recorded during the years 2013-14 and 2014-15 is represented in Table 22 and illustrated in figure 16.

4.13.1 Influence of sowing periods

The data presented in Table 22, clearly indicates that the green fodder yield (t ha^{-1}) of baby corn was influenced significantly due to sowing periods during both the years of experimentation.

During the year 2013-14, significantly the maximum green fodder yield (36.00 t ha^{-1}) was recorded with the sowing period P_2 (39^{th} met. week) and the minimum (35.36 t ha^{-1}) was recorded in the sowing period P_1 (35^{th} met. week) which was also at par with P_4 (48^{th} met. week) i.e. 35.57 t ha^{-1}.

Similarly during the year 2014-15, the maximum green fodder yield (36.69 t ha^{-1}) was recorded with the sowing period P_2 (39^{th} met. week) and the minimum (t ha^{-1}) was recorded in the sowing period P_4 (48^{th} met. week) which was also at par with P_1 (35^{th} met. week) i.e. 36.26 t ha^{-1}.

The pooled mean of both years, the maximum green fodder yield (36.34 t ha^{-1}) was recorded with the sowing period P_2 (39^{th} met. week) and the minimum (35.81 t ha^{-1}) was recorded in the sowing period P_1 (35^{th} met. week) which was also at par with P_4 (48^{th} met. week) i.e. 35.90 t ha^{-1}. The observed higher fodder yield might be as a result of better growth and development of the crop under sowing period P_2 (39^{th} met. week). The result is in close conformity with the finding of Singh *et al*. (2015).

4.13.2 Influence of crop geometry

The data presented in Table 22 revealed that, crop geometry influenced significantly the fodder yield (t ha^{-1}) of baby corn during both the years of experimentation.

During the year 2013-14, significantly the maximum fodder yield (40.61 t ha^{-1}) was recorded with the closer crop geometry S_2 (45×15 cm). The minimum fodder yield (30.40 t ha^{-1}) was recorded in the wider crop geometry S_5 (60×30 cm).

Similarly in the year 2014-15, significantly the maximum fodder yield (40.26 t ha^{-1}) was recorded with the closer crop geometry S_2

(45×15 cm) and the minimum fodder yield (32.57 t ha^{-1}) was recorded in the wider crop geometry S_5 (60×30 cm).

Regarding the pooled mean, significantly the maximum fodder yield (40.44 t ha^{-1}) was recorded with the closer crop geometry S_2 (45×15 cm) and the minimum fodder yield (31.48 t ha^{-1}) was recorded in the wider crop geometry S_5 (60×30 cm).

The higher fodder yield observed at the closer geometry was due to higher plant population. The result is in close agreement with the findings of Kar *et al*. (2006), Golada *et al*. (2013) and Singh *et al*. (2015).

4.13.3 Interaction effect

The data presented in Table 23 indicated that, the interaction effect of sowing period and crop geometry on green fodder yield (t ha^{-1}) was significant during both the years of experimentation i.e. 2013-14 and 2014-15.

During the year 2013-14, significantly the maximum fodder yield (41.07 t ha^{-1}) was recorded in the treatment combination P_2S_2 (39th met. week + 45×15 cm) which was also found at par with P_3S_2 (43rd met. week + 45×15 cm) and P_4S_2 (48th met. week + 45×15 cm) i.e. 40.84 and 40.60 t ha^{-1} respectively. The minimum fodder yield (30.20 t ha^{-1}) was recorded in the combination P_4S_5 (48th met. week + 60×30 cm) and was also found at par with P_1S_5 (35th met. week + 60×30 cm), P_2S_5 (39th met. week + 60×30 cm) and P_3S_5 (43rd met. week + 60×30 cm) i.e. 30.29, 30.54 and 30.55 t ha^{-1}respectively.

Similarly during the year 2014-15, significantly the maximum fodder yield (40.63 t ha^{-1}) was recorded in the treatment combination P_2S_2 (39th met. week + 45×15 cm) which was also found at par with P_3S_2 (43rd met. week + 45×15 cm) and P_4S_2 (48th met. week + 45×15 cm) i.e. 40.44 and 40.39 t ha^{-1} respectively. The minimum fodder yield (31.89 t ha^{-1}) was recorded in the combination P_3S_5 (43rd met. week + 60×30 cm).

Table 22: Influence of sowing period and crop geometry on green fodder yield (t ha^{-1}) of baby corn (*Zea mays* L.)

Treatments	Green fodder yield (t ha^{-1})		
Sowing Period (P)	**2013-2014**	**2014-2015**	**Pooled mean**
P_1	35.36	36.26	35.81
P_2	36.00	36.69	36.34
P_3	35.72	36.37	36.04
P_4	35.57	36.22	35.90
F test	Sig.	Sig.	Sig.
SE(m)±	0.095	0.062	0.064
CD at 5%	0.273	0.178	0.183
Crop geometry (S)			
S_1	37.42	37.54	37.48
S_2	40.61	40.26	40.44
S_3	33.60	35.26	34.43
S_4	36.29	36.29	36.29
S_5	30.40	32.57	31.48
F test	Sig.	Sig.	Sig.
SE(m)±	0.107	0.069	0.072
CD at 5%	0.306	0.199	0.205
Interaction effect (P × S)			
F test	Sig.	Sig.	Sig.
SE(m)±	0.213	0.139	0.143
CD at 5%	0.611	0.397	0.410

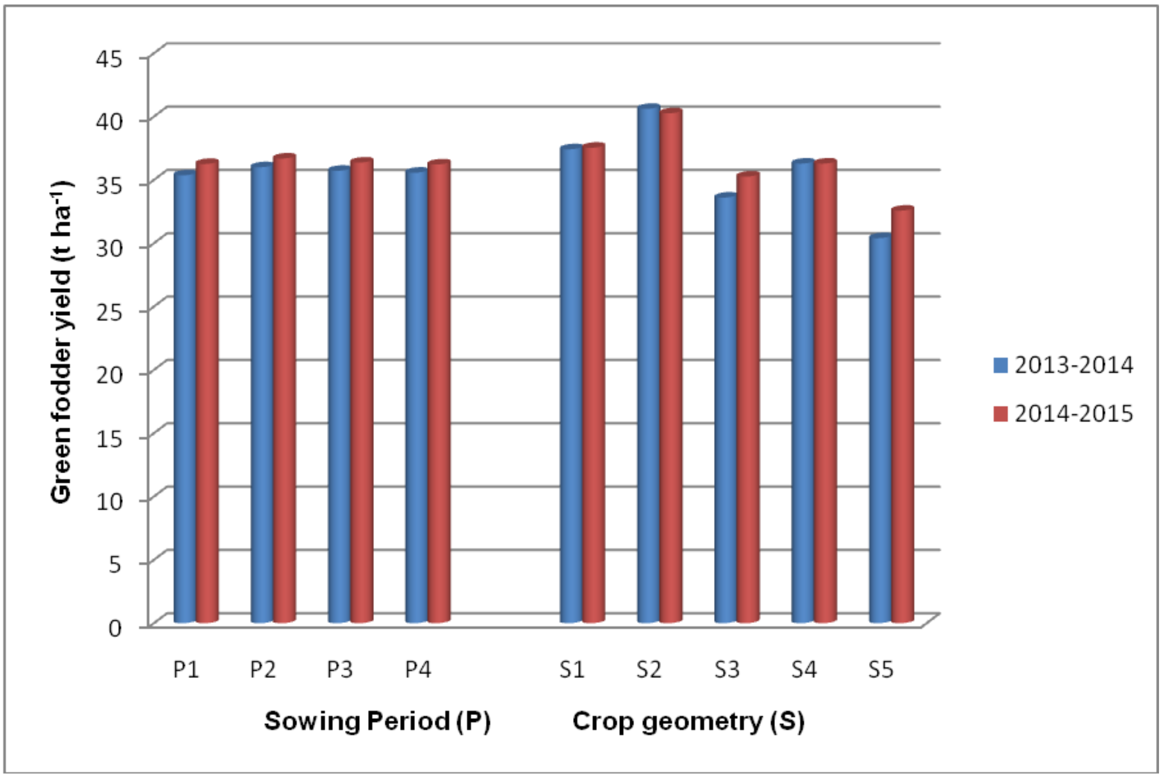


Fig. 16 Influence of sowing period and crop geometry on green fodder yield (t ha^{-1}) of baby corn (*Zea mays* L.)

Table 23: Interaction effect of sowing period and crop geometry on green fodder yield (t ha^{-1}) of baby corn (*Zea mays* L.)

Treatment combinations	Green fodder yield (t ha^{-1})		
	2013-2014	2014-2015	Pooled mean
P_1 S_1	37.28	37.43	37.36
P_1 S_2	39.93	39.60	39.76
P_1 S_3	33.13	35.13	34.13
P_1 S_4	36.18	36.18	36.18
P_1 S_5	30.29	32.95	31.62
P_2 S_1	37.33	37.66	37.50
P_2 S_2	41.07	40.63	40.85
P_2 S_3	34.53	35.53	35.03
P_2 S_4	36.55	36.55	36.55
P_2 S_5	30.54	33.07	31.80
P_3 S_1	37.57	37.57	37.57
P_3 S_2	40.84	40.44	40.64
P_3 S_3	33.27	35.57	34.42
P_3 S_4	36.37	36.36	36.36
P_3 S_5	30.55	31.89	31.22
P_4 S_1	37.49	37.49	37.49
P_4 S_2	40.60	40.39	40.50
P_4 S_3	33.49	34.82	34.16
P_4 S_4	36.06	36.06	36.06
P_4 S_5	30.20	32.36	31.28
F test	Sig.	Sig.	Sig.
SE(m)$\pm$	0.213	0.139	0.143
CD at 5%	0.611	0.397	0.410

The pooled mean indicated that, significantly the maximum fodder yield (40.85 t ha^{-1}) was recorded in the treatment combination P_2S_2 (39th met. week + 45×15 cm) which was also found at par with P_3S_2 (43rd met. week + 45×15 cm) and P_4S_2 (48thmet. week + 45×15 cm) i.e. 40.64 and 40.50 t ha^{-1}respectively. The minimum fodder yield (31.22 t ha^{-1}) was recorded in the combination P_3S_5 (43rd met. week + 60×30 cm) and was also found at par with P_1S_5 (35th met. week + 60×30 cm), P_2S_5 (39th met. week + 60×30 cm) and P_4S_5 (48th met. week + 60×30 cm) i.e. 31.62, 31.80 and 31.28 t ha^{-1} respectively. Better growing period accompanied with higher plant population per unit area resulted in higher fodder yield ha^{-1}.

4.14 Influence of sowing periods and crop geometry on total dry matter accumulation plant^{-1} (g) of baby corn (*Zea mays* L.)

The data pertaining to total dry matter accumulation plant^{-1} (g) of baby corn (*Zea mays* L.) as influenced due to sowing periods and crop geometry, recorded during the years 2013-14 and 2014-15 is represented in Table 24 and illustrated in figure 17.

4.14.1 Influence of sowing periods

The data presented in Table 24, clearly indicates that the total dry matter accumulation plant^{-1} (g) of baby corn was influenced significantly due to sowing periods during both the years of experimentation.

During the year 2013-14, significantly the maximum total dry matter accumulation plant^{-1} (165.72 g) was recorded with the sowing period P_3 (43rd met. week) and the minimum (143.42 g) was recorded in the sowing period P_1 (35th met. week).

Similarly during the year 2014-15, the maximum total dry matter accumulation plant^{-1} (166.34 g) was recorded with the sowing period P_3 (43rd met. week) and the minimum (143.63 g) was recorded in the sowing period P_1 (35th met. week) g plant^{-1}.

Regarding the pooled mean of both years, the maximum total dry matter accumulation plant^{-1} (166.03 g) was recorded with the sowing period P_3 (43^{rd} met. week) and the minimum (143.52 g) was recorded in the sowing period P_1 (35^{th} met. week) g plant^{-1}. This may be due to the prevailing favourable environmental conditions of temperature, nutrients and light during the sowing period P_3 (43^{rd} met. week) which have resulted in the better growth attributes and thereby total dry matter accumulation plant^{-1}. The result is in close agreement with the findings of Singh *et al.* (2015).

4.14.2 Influence of crop geometry

The data presented in Table 24 revealed that, crop geometry influenced significantly the total dry matter accumulation plant^{-1} (g) of baby corn during both the years of experimentation.

During the year 2013-14, significantly the maximum total dry matter accumulation plant^{-1} (172.79 g) was recorded with the wider crop geometry S_5 (60×30 cm) and the minimum (140.60 g) was recorded in the closer crop geometry S_2 (45×15 cm).

Similarly in the year 2014-15, significantly the maximum total dry matter accumulation plant^{-1} (172.99 g) was recorded with the wider crop geometry S_5 (60×30 cm) and the minimum (141.27 g) was recorded in the closer crop geometry S_2 (45×15 cm).

Regarding the pooled mean of both the year, significantly the maximum total dry matter accumulation plant^{-1} (172.89 g) was recorded with the wider crop geometry S_5 (60×30 cm) and the minimum (140.93 g) was recorded in the closer crop geometry S_2 (45×15 cm).

The wider crop geometry had helped the individual plants to make better spatial utilization of available moisture, nutrients and higher interception of solar radiation with lesser competition contributed towards more dry matter production. The findings are in close agreement with the results obtained by Sobhana *et al*. (2012) and Vishuddha (2015).

4.14.3 Interaction effect

The data presented in Table 25 indicated that, the interaction effect of sowing period and crop geometry on total dry matter accumulation $plant^{-1}$ (g) was significant during both the years of experimentation i.e. 2013-14 and 2014-15.

During the year 2013-14, significantly the maximum total dry matter accumulation $plant^{-1}$ (188.50 g) was recorded in the treatment combination P_3S_5 (43^{rd} met. week + 60×30 cm), while the minimum (133.52 g) was recorded in the combinationP_1S_2 (35^{th} met. week + 45×15 cm).

Similarly in the year 2014-15, significantly the maximum total dry matter accumulation $plant^{-1}$ (188.56 g) was recorded in the treatment combination P_3S_5 (43^{rd} met. week + 60×30 cm), while the minimum (133.52 g) was recorded in the combinationP_1S_2 (35^{th} met. week + 45×15 cm).

The pooled mean of both the year recorded, significantly the maximum total dry matter accumulation $plant^{-1}$ (188.53 g) in the treatment combination P_3S_5 (43^{rd} met. week + 60×30 cm), while the minimum (133.52 g) was recorded in the combinationP_1S_2 (35^{th} met. week + 45×15 cm). The result obtained might be due to the favourable growing environment along with better utilization of available resources by the plants with lesser competition among the population under wider crop geometry.

Table 24: Influence of sowing period and crop geometry on total dry accumulation plant^{-1} (g) of baby corn (*Zea mays* L.)

Treatments	**Total dry matter accumulation plant^{-1} (g)**		
Sowing Period (P)	**2013-2014**	**2014-2015**	**Pooled me+an**
P_1	143.42	143.63	143.52
P_2	158.68	159.08	158.88
P_3	165.72	166.34	166.03
P_4	160.52	160.79	160.65
F test	Sig.	Sig.	Sig.
SE(m)±	0.389	0.300	0.282
CD at 5%	1.115	0.858	0.808
Crop geometry (S)			
S_1	156.83	157.13	156.98
S_2	140.60	141.27	140.93
S_3	169.64	170.03	169.84
S_4	145.57	145.88	145.73
S_5	172.79	172.99	172.89
F test	Sig.	Sig.	Sig.
SE(m)±	0.435	0.335	0.316
CD at 5%	1.246	0.959	0.904
Interaction effect (P × S)			
F test	Sig.	Sig.	Sig.
SE(m)±	0.871	0.670	0.631
CD at 5%	2.492	1.918	1.807

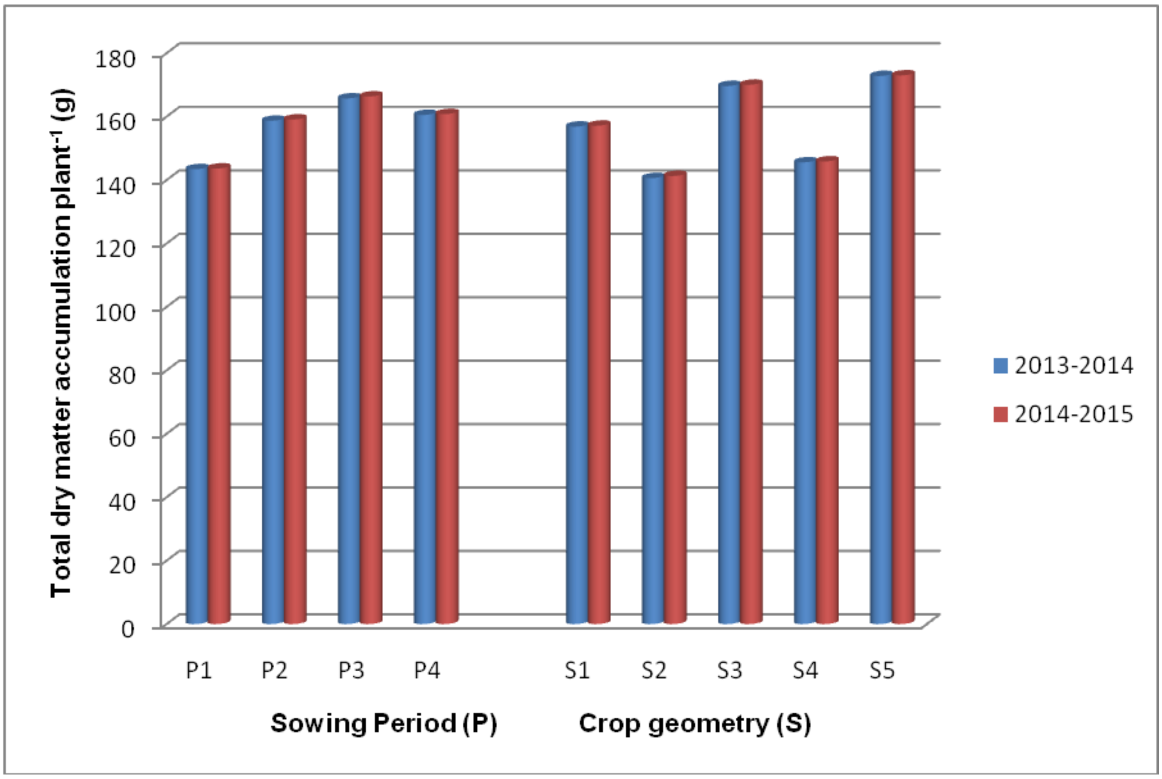


Fig. 17 Influence of sowing period and crop geometry on total dry matter accumulation plant^{-1} (g) of baby corn (*Zea mays* L.)

Table 25: Interaction effect of sowing period and crop geometry on total dry accumulation plant^{-1} (g) of baby corn (*Zea mays* L.)

Treatment combinations	Total dry matter accumulation plant^{-1} (g)		
	2013-2014	2014-2015	Pooled mean
P_1 S_1	138.06	138.61	138.33
P_1 S_2	133.52	133.52	133.52
P_1 S_3	160.98	161.20	161.09
P_1 S_4	137.56	137.83	137.70
P_1 S_5	146.98	146.98	146.98
P_2 S_1	162.26	162.49	162.38
P_2 S_2	139.40	140.03	139.72
P_2 S_3	176.53	177.08	176.81
P_2 S_4	144.73	144.92	144.83
P_2 S_5	170.50	170.89	170.70
P_3 S_1	168.73	168.83	168.78
P_3 S_2	146.96	148.95	147.96
P_3 S_3	177.01	177.65	177.33
P_3 S_4	147.41	147.71	147.56
P_3 S_5	188.50	188.56	188.53
P_4 S_1	158.28	158.57	158.43
P_4 S_2	142.51	142.57	142.54
P_4 S_3	164.06	164.21	164.13
P_4 S_4	152.57	153.06	152.81
P_4 S_5	185.17	185.52	185.34
F test	Sig.	Sig.	Sig.
SE(m)$\pm$	0.871	0.670	0.631
CD at 5%	2.492	1.918	1.807

3. **Quality parameters**

4.15 Influence of sowing periods and crop geometry on fibre content (%) of baby corn (*Zea mays* L.)

The data pertaining to fibre content (%) of baby corn (*Zea mays* L.) as influenced due to sowing periods and crop geometry, recorded during the years 2013-14 and 2014-15 is represented in Table 26 and illustrated in figure 18.

4.15.1 Influence of sowing periods

The data presented in Table 26, clearly indicates that the fibre content (%) of baby corn was influenced significantly due to sowing periods during both the years of experimentation.

During the year 2013-14, significantly the maximum fibre content (5.56 %) was recorded with the sowing period P_3 (43^{rd} met. week) and the minimum (5.53 %) was recorded in the sowing period P_1 (35^{th} met. week) as well as P_4 (48^{th} met. week).

Similarly during the year 2014-15, the maximum fibre content (5.58 %) was recorded with the sowing period P_3 (43^{rd} met. week) and the minimum (5.54 %) was recorded in the sowing period P_1 (35^{th} met. week) as well as P_4 (48^{th} met. week).

Regarding the pooled mean of both years, the maximum fibre content (5.57 %) was recorded with the sowing period P_3 (43^{rd} met. week) and the minimum (5.53 %) was recorded in the sowing period P_4 (48^{th} met. week).

The fibre content was observed significantly increasing from the first sowing period P_1 (35^{th} met. week) and reached maximum at the third sowing period P_3 (43^{rd} met. week), after which it was found minimum at the last sowing period P_4 (48^{th} met. week).

4.15.2 Influence of crop geometry

The data presented in Table 26 revealed that, crop geometry influenced significantly the fibre content (%) of baby corn during both the years of experimentation.

During the year 2013-14, significantly the maximum fibre content (5.59 %) was recorded with the crop geometry S_1 (30×30 cm) and the minimum (5.48 %) was recorded in the wider crop geometry S_3 (45×30 cm).

Similarly in the year 2014-15, significantly the maximum fibre content (5.59 %) was recorded with the crop geometry S_1 (30×30 cm) and the minimum (5.50 %) was recorded in the wider crop geometry S_3 (45×30 cm).

The pooled mean of both the year recorded significantly maximum fibre content (5.59 %) with the crop geometry S_1 (30×30 cm) and the minimum (5.49 %) was recorded in the wider crop geometry S_3 (45×30 cm).

Higher fibre content was observed in the closest geometry S_1 (30×30 cm) and further goes decreasing with the rest of the crop geometry, however found minimum at the optimum geometry S_3 (45×30 cm). The finding is in close conformity to the result obtained by Talware (2013).

4.15.3 Interaction effect

The interaction effect of sowing period and crop geometry on fibre content (%) was found to be non-significant during both the years of experimentation (Appendix VIII).

Table 26: Influence of sowing period and crop geometry on fibre content (%) of baby corn (*Zea mays* L.)

Treatments	Fibre content (%)		
Sowing Period (P)	**2013-2014**	**2014-2015**	**Pooled mean**
P_1	5.53	5.54	5.54
P_2	5.55	5.56	5.56
P_3	5.56	5.58	5.57
P_4	5.53	5.54	5.53
F test	Sig.	Sig.	Sig.
SE(m)±	0.005	0.006	0.005
CD at 5%	0.014	0.017	0.013
Crop geometry (S)			
S_1	5.59	5.59	5.59
S_2	5.57	5.58	5.58
S_3	5.48	5.50	5.49
S_4	5.57	5.58	5.57
S_5	5.51	5.52	5.51
F test	Sig.	Sig.	Sig.
SE(m)±	0.005	0.007	0.005
CD at 5%	0.016	0.019	0.015
Interaction effect (P × S)			
F test	NS	NS	NS
SE(m)±	0.011	0.013	0.010
CD at 5%	-	-	-

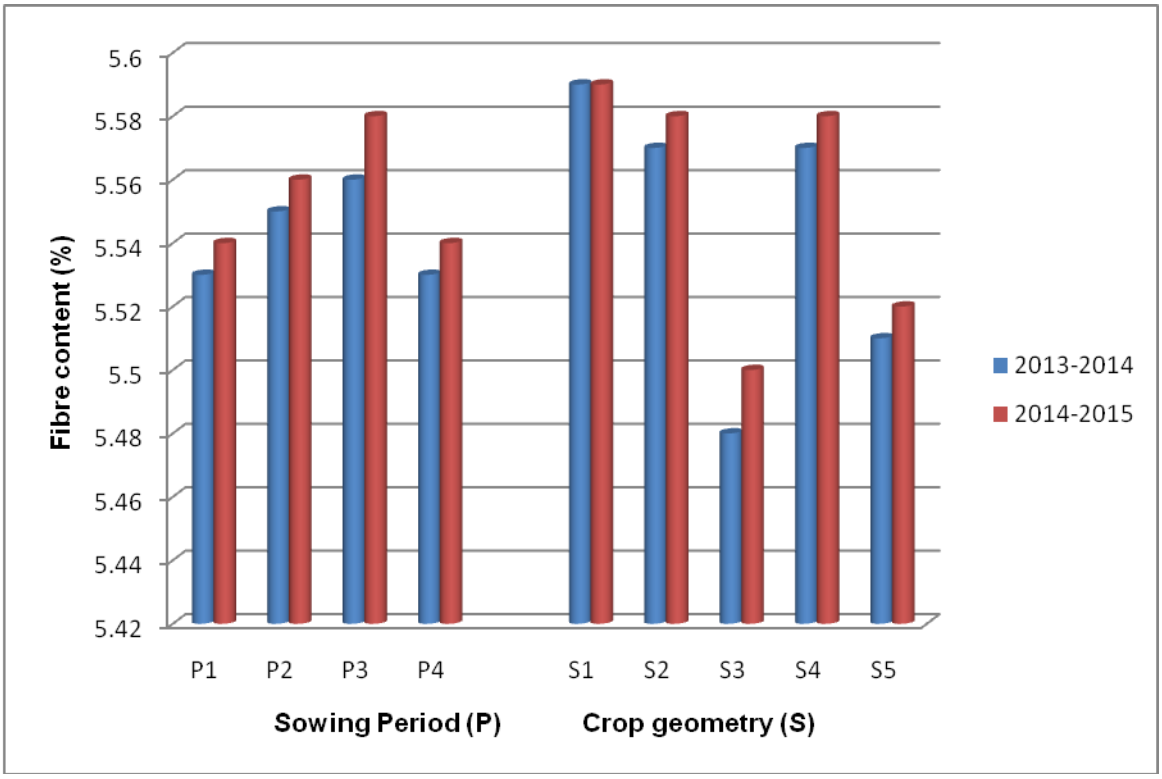


Fig. 18 Influence of sowing period and crop geometry on fibre (%) content of baby corn (*Zea mays* L.)

4.16 Influence of sowing periods and crop geometry on protein content (%) of baby corn (*Zea mays* L.)

The data pertaining to protein content (%) of baby corn (*Zea mays* L.) as influenced due to sowing periods and crop geometry, recorded during the years 2013-14 and 2014-15 is represented in Table 27 and illustrated in figure 19.

4.16.1 Influence of sowing periods

The data presented in Table 27, clearly indicates that the protein content (%) of baby corn was influenced significantly due to sowing periods during both the years of experimentation.

During the year 2013-14, significantly the maximum protein content (17.23 %) was recorded with the sowing period P_3 (43^{rd} met. week), which was also found at par with P_2 (39^{th} met. week) i.e. 17.00 %. The minimum protein content (16.68 %) was recorded in the sowing period P_1 (35^{th} met. week).

Similarly during the year 2014-15, the maximum protein content (17.51 %) was recorded with the sowing period P_3 (43^{rd} met. week) and the minimum (16.93 %) was recorded in the sowing period P_1 (35^{th} met. week).

Regarding the pooled mean of both years, the maximum protein content (17.37 %) was recorded with the sowing period P_3 (43^{rd} met. week) and the minimum (16.81 %) was recorded in the sowing period P_1 (35^{th} met. week).

With the advancement in the sowing period, the protein content in the baby corn cobs were also observed to be increasing, however highest found at P_3 (43^{rd} met. week). Verma *et al*. (2012) also found the highest protein content in maize at 25^{th} October sowing, which is in close agreement to result of the study.

4.16.2 Influence of crop geometry

The data presented in Table 27 revealed that, crop geometry influenced significantly the protein content (%) of baby corn during both the years of experimentation.

During the year 2013-14, significantly the maximum protein content (17.73 %) was recorded with the crop geometry S_3 (45×30 cm)and the minimum (16.32 %) was recorded in the crop geometryS_2 (45×15 cm) and was also found at par with the protein content (16.50 %) in S_4 (60×15 cm).

Similarly in the year 2014-15, significantly the maximum protein content (18.17 %) was recorded with the crop geometry S_3 (45×30 cm) and the minimum (16.49 %) was recorded in the crop geometry S_2 (45×15 cm) and was also found at par with the protein content (16.67 %) in S_4 (60×15 cm).

The pooled mean of both the year recorded significantly maximum protein content (17.95 %) was recorded with the crop geometry S_3 (45×30 cm) and the minimum (16.41 %) was recorded in the crop geometry S_2 (45×15 cm) and was also found at par with the protein content (16.58 %) in S_4 (60×15 cm).

The observed higher protein content at wider geometry might be attributed to the higher N content in the plant. However, at closer crop geometry with higher plant density, competition for photo-assimilates due to deficiency of N and K caused reduction in protein content Rafiq *et al*. (2010). The result is in close agreement with the finding of Kole (2010).

4.16.3 Interaction effect

The interaction effect of sowing period and crop geometry on protein content (%) was found to be non-significant during both the years of experimentation (Appendix IX).

Table 27: Influence of sowing period and crop geometry on protein content (%) of baby corn (*Zea mays* L.)

Treatments	Protein content (%)		
Sowing Period (P)	**2013-2014**	**2014-2015**	**Pooled mean**
P_1	16.68	16.93	16.81
P_2	17.00	17.28	17.14
P_3	17.23	17.51	17.37
P_4	17.02	17.29	17.16
F test	Sig.	Sig.	Sig.
SE(m)±	0.084	0.074	0.073
CD at 5%	0.241	0.212	0.208
Crop geometry (S)			
S_1	16.81	16.95	16.88
S_2	16.32	16.49	16.41
S_3	17.73	18.17	17.95
S_4	16.50	16.67	16.58
S_5	17.55	17.98	17.77
F test	Sig.	Sig.	Sig.
SE(m)±	0.094	0.083	0.081
CD at 5%	0.269	0.237	0.232
Interaction effect (P × S)			
F test	NS	NS	NS
SE(m)±	0.188	0.165	0.162
CD at 5%	-	-	-

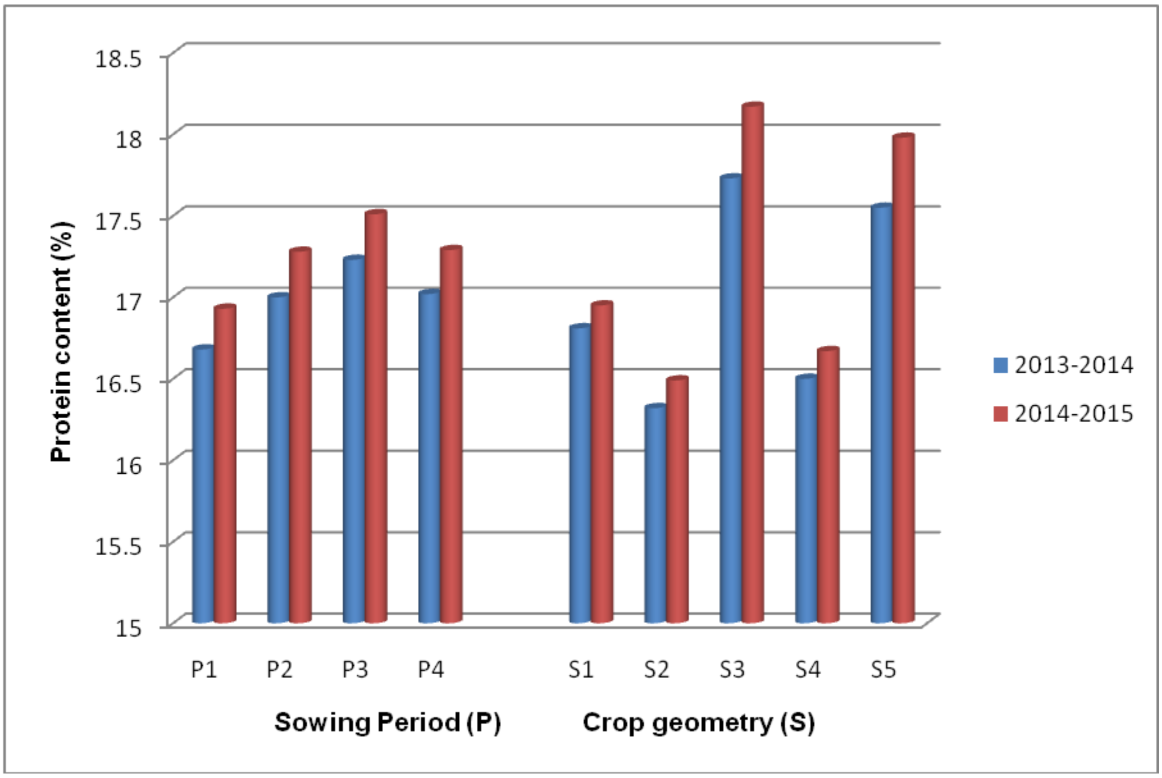


Fig. 19 Influence of sowing period and crop geometry on protein (%) and content of baby corn (*Zea mays* L.)

4.17 Influence of sowing periods and crop geometry on moisture content (%) of baby corn (*Zea mays* L.)

The data pertaining to moisture content (%) of baby corn (*Zea mays* L.) as influenced due to sowing periods and crop geometry, recorded during the years 2013-14 and 2014-15 is represented in Table 28 and illustrated in figure 20.

4.17.1 Influence of sowing periods

The data presented in Table 28, clearly indicates that the moisture content (%) of baby corn was influenced significantly due to sowing periods during both the years of experimentation.

During the year 2013-14, significantly the maximum moisture content (89.05 %) was recorded with the sowing period P_2 (39^{th} met. week), which was also found at par with P_3 (43^{rd} met. week) i.e. 88.71 %. The minimum moisture content (88.21 %) was recorded in the sowing period P_1 (35^{th} met. week) and also found at par with P_4 (48^{th} met. week) i.e. 88.23 %.

Similarly during the year 2014-15, the maximum moisture content (89.19 %) was recorded with the sowing period P_2 (39^{th} met. week), which was also found at par with P_3 (43^{rd} met. week) i.e. 88.80 %. The minimum moisture content (88.31 %) was recorded in the sowing period P_1 (35^{th}met. week) and also found at par with P_4 (48^{th} met. week) i.e. 88.49 %.

Regarding the pooled mean of both years, the maximum moisture content (89.12 %) was recorded with the sowing period P_2 (39^{th} met. week), which was also found at par with P_3 (43^{rd} met. week) i.e. 88.76 %. The minimum moisture content (88.26 %) was recorded in the sowing period P_1 (35^{th} met. week) and also found at par with P_4 (48^{th} met. week) i.e. 88.36 %.

The moisture content observed highest in the treatment might be due to the optimum growing conditions with sufficient available moisture to the plants for its better growth and its further development and optimum temperature at this period.

4.17.2 Influence of crop geometry

The data presented in Table 28 revealed that, crop geometry influenced significantly the moisture content (%) of baby corn during both the years of experimentation.

During the year 2013-14, significantly the maximum moisture content (89.50 %) was recorded with the crop geometry S_3 (45×30 cm) and was also found at par with S_5 (60×30 cm) i.e. 89.13 % moisture, while the minimum (87.97 %) was recorded in the crop geometryS_2 (45×15 cm) as well as S_4 (60×15 cm) and was also found at par with S_1 (30×30 cm) i.e. 88.19 % moisture content.

During the year 2014-15, significantly the maximum moisture content (89.53 %) was recorded with the crop geometry S_5 (60×30 cm) and was also found at par with S_3 (45×30 cm) i.e. 89.52 %, while the minimum (88.10 %) was recorded in the crop geometry S_2 (45×15 cm) and was also found at par with S_1 (30×30 cm) as well as S_4 (60×15 cm) i.e. 88.19 and 88.15 % moisture content respectively.

The pooled mean of both the year recorded significantly maximum moisture content (89.51 %) was recorded with the crop geometry S_3 (45×30 cm) and was also found at par with S_5 (60×30 cm) i.e. 89.33 %, while the minimum (88.04 %) was recorded in the crop geometry S_2 (45×15 cm) and was also found at par with S_1 (30×30 cm) as well as S_4 (60×15 cm) i.e. 88.19 and 88.06 % moisture content respectively.

Better utilization of the available resources by the individual plants in the wider crop geometry might have attributed to higher moisture content. This is in close agreement with the result obtained by Das *et al*. (2009).

4.17.3 Interaction effect

The interaction effect of sowing period and crop geometry on moisture content (%) was found to be non-significant during both the years of experimentation (Appendix X).

Table 28: Influence of sowing period and crop geometry on moisture content (%) of baby corn (*Zea mays* L.)

Treatments	Moisture content (%)		
Sowing Period (P)	**2013-2014**	**2014-2015**	**Pooled mean**
P_1	88.21	88.31	88.26
P_2	89.05	89.19	89.12
P_3	88.71	88.80	88.76
P_4	88.23	88.49	88.36
F test	Sig.	Sig.	Sig.
SE(m)±	0.148	0.178	0.144
CD at 5%	0.424	0.509	0.413
Crop geometry (S)			
S_1	88.19	88.19	88.19
S_2	87.97	88.10	88.04
S_3	89.50	89.52	89.51
S_4	87.97	88.15	88.06
S_5	89.13	89.53	89.33
F test	Sig.	Sig.	Sig.
SE(m)±	0.166	0.199	0.161
CD at 5%	0.474	0.569	0.462
Interaction effect (P × S)			
F test	NS	NS	NS
SE(m)±	0.331	0.398	0.323
CD at 5%	-	-	-

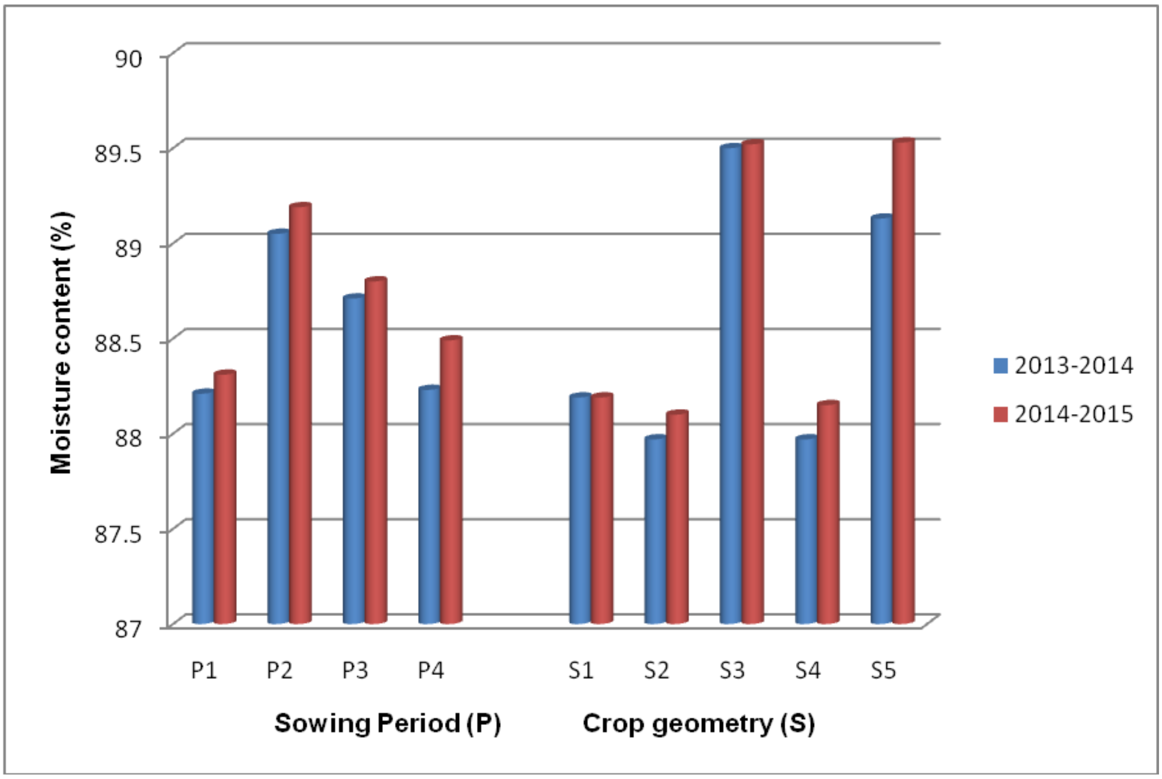


Fig. 20 Influence of sowing period and crop geometry on moisture (%) content of baby corn (*Zea mays* L.)

4.18 Influence of sowing periods and crop geometry on total sugar content (%) of baby corn (*Zea mays* L.)

The data pertaining to total sugar content (%) of baby corn (*Zea mays* L.) as influenced due to sowing periods and crop geometry, recorded during the years 2013-14 and 2014-15 is represented in Table 29 and illustrated in figure 21.

4.18.1 Influence of sowing periods

The data presented in Table 29, clearly indicates that the total sugar content (%) of baby corn was influenced significantly due to sowing periods during both the years of experimentation.

During the year 2013-14, significantly the maximum total sugar content (3.31 %) was recorded with the sowing period P_3 (43rd met. week), while the minimum (3.27 %) was recorded in the sowing period P_1 (35th met. week).

Similarly during the year 2014-15, the maximum total sugar content (3.34 %) was recorded with the sowing period P_3 (43rd met. week), while the minimum (3.29 %) was recorded in the sowing period P_1 (35th met. week).

The pooled mean of both years also recorded significantly, the maximum total sugar content (3.33 %) with the sowing period P_3 (43rd met. week), while the minimum (3.28 %) was recorded in the sowing period P_1 (35th met. week).

The total sugar content in the cob was observed to be at increasing trend with advance in the sowing period and obtained the highest value at the third sowing period P_3 (43rd met. week) when optimum conditions of environment prevailed, however further delay reduces the value.

4.18.2 Influence of crop geometry

The data presented in Table 29 revealed that, crop geometry influenced significantly the total sugar content (%) of baby corn during both the years of experimentation.

During the year 2013-14, significantly the maximum total sugar content (3.35 %) was recorded with the crop geometry S_3 (45×30 cm) which was also at par with S_5 (60×30 cm) i.e. 3.34 %, while the minimum (3.24 %) was recorded in the crop geometry S_2 (45×15 cm).

During the year 2014-15, significantly the maximum total sugar content (3.37 %) was recorded with the crop geometry S_3 (45×30 cm) which was also at par with S_5 (60×30 cm) i.e. 3.36 %, while the minimum (3.26 %) was recorded in the crop geometry S_2 (45×15 cm).

The pooled mean of both the year recorded significantly maximum total sugar content (3.36 %) with the crop geometry S_3 (45×30 cm) which was also at par with S_5 (60×30 cm) i.e. 3.35 %, while the minimum (3.25 %) was recorded in the crop geometry S_2 (45×15 cm).

With wider crop geometry, the total sugar content in the baby cob was also observed maximum. Kole (2010) recorded highest total sugar at 45×30 cm spacing, which closely corroborate the result of this study.

4.18.3 Interaction effect

The interaction effect of sowing period and crop geometry on total sugar content (%) was found to be non-significant during both the years of experimentation (Appendix XI).

Table 29: Influence of sowing period and crop geometry on total sugar content (%) of baby corn (*Zea mays* L.)

Treatments	**Total sugar content (%)**		
Sowing Period (P)	**2013-2014**	**2014-2015**	**Pooled mean**
P_1	3.27	3.29	3.28
P_2	3.29	3.31	3.30
P_3	3.31	3.34	3.33
P_4	3.30	3.31	3.31
F test	Sig.	Sig.	Sig.
SE(m)±	0.006	0.007	0.005
CD at 5%	0.017	0.019	0.015
Crop geometry (S)			
S_1	3.27	3.28	3.27
S_2	3.24	3.26	3.25
S_3	3.35	3.37	3.36
S_4	3.27	3.29	3.28
S_5	3.34	3.36	3.35
F test	Sig.	Sig.	Sig.
SE(m)±	0.007	0.008	0.006
CD at 5%	0.019	0.022	0.017
Interaction effect (P × S)			
F test	NS	NS	NS
SE(m)±	0.013	0.015	0.012
CD at 5%	-	-	-

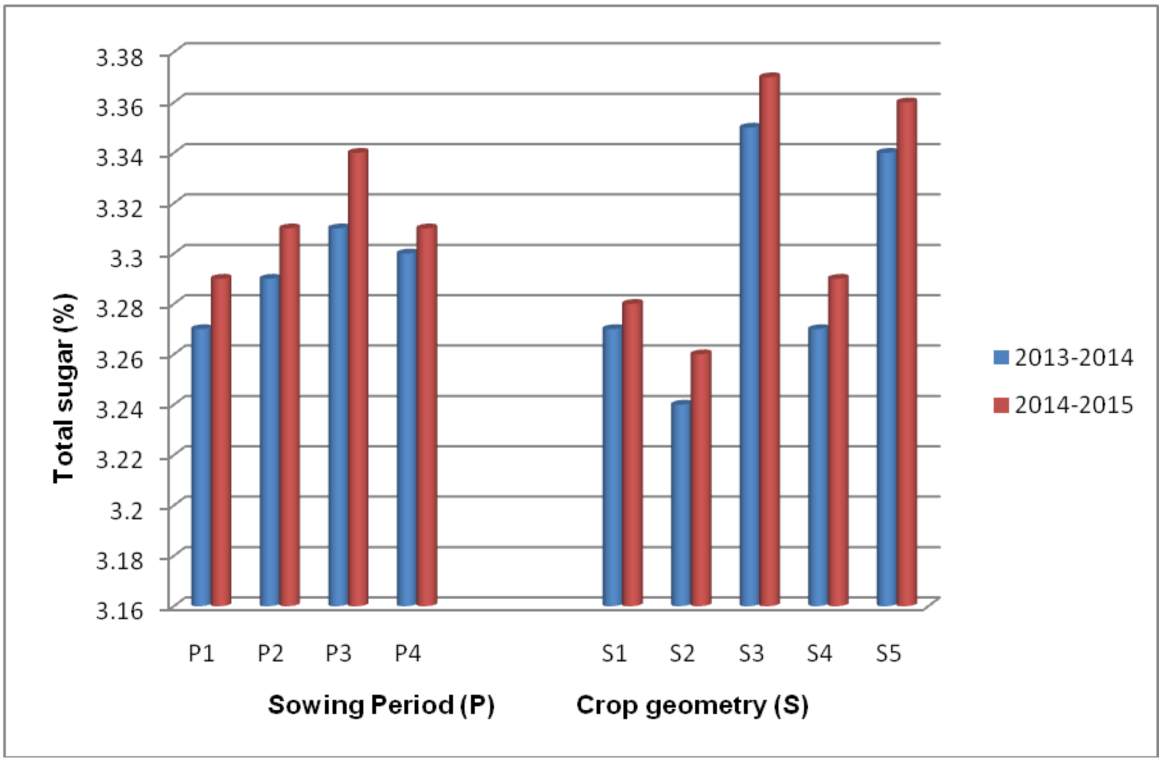


Fig. 21 Influence of sowing period and crop geometry on total sugar (%) content of baby corn (*Zea mays* L.)

4.19 Influence of sowing periods and crop geometry on reducing sugar content (%) of baby corn (*Zea mays* L.)

The data pertaining to reducing sugar content (%) of baby corn (*Zea mays* L.) as influenced due to sowing periods and crop geometry, recorded during the years 2013-14 and 2014-15 is represented in Table 30 and illustrated in figure 22.

4.19.1 Influence of sowing periods

The data presented in Table 30, clearly indicates that the reducing sugar content (%) of baby corn was influenced significantly due to sowing periods during both the years of experimentation.

During the year 2013-14, significantly the maximum reducing sugar content (3.27 %) was recorded with the sowing period P_3 (43rd met. week), while the minimum (3.19 %) was recorded in the sowing period P_1 (35th met. week).

Similarly during the year 2014-15, the maximum reducing sugar content (3.30 %) was recorded with the sowing period P_3 (43rd met. week), while the minimum (3.21 %) was recorded in the sowing period P_1 (35th met. week).

The pooled mean of both years also recorded significantly, the maximum reducing sugar content (3.29 %) with the sowing period P_3 (43rd met. week), while the minimum (3.20 %) was recorded in the sowing period P_1 (35th met. week).

The reducing sugar content in the cob was observed to be at increasing trend with advance in the sowing period and obtained the highest value at the third sowing period P_3 (43rd met. week) with optimum conditions of environment.

4.19.2 Influence of crop geometry

The data presented in Table 30 revealed that, crop geometry influenced significantly the reducing sugar content (%) of baby corn during both the years of experimentation.

During the year 2013-14, significantly the maximum reducing sugar content (3.31 %) was recorded with the crop geometry S_3 (45×30 cm) which was also at par with S_5 (60×30 cm) i.e. 3.29 %, while the minimum (3.17 %) was recorded in the crop geometry S_2 (45×15 cm).

During the year 2014-15, significantly the maximum reducing sugar content (3.34 %) was recorded with the crop geometry S_3 (45×30 cm) which was also at par with S_5 (60×30 cm) i.e. 3.32 %, while the minimum (3.20 %) was recorded in the crop geometry S_2 (45×15 cm).

The pooled mean of both the year also recorded significantly maximum reducing sugar content (3.32 %) with the crop geometry S_3 (45×30 cm) which was also at par with S_5 (60×30 cm) i.e. 3.30 %, while the minimum (3.18 %) was recorded in the crop geometry S_2 (45×15 cm).

The wider crop geometry exhibited maximum value for reducing sugar content in the baby cob and when the plant spacing was reduced there was a significant difference in the value, which is in close agreement with the finding of Kole (2010).

4.19.3 Interaction effect

The interaction effect of sowing period and crop geometry on reducing sugar content (%) was found to be non-significant during both the years of experimentation (Appendix XII).

Table 30: Influence of sowing period and crop geometry on reducing sugar (%) content of baby corn (*Zea mays* L.)

Treatments	Reducing sugar content (%)		
Sowing Period (P)	**2013-2014**	**2014-2015**	**Pooled mean**
P_1	3.19	3.21	3.20
P_2	3.23	3.26	3.25
P_3	3.27	3.30	3.29
P_4	3.25	3.27	3.26
F test	Sig.	Sig.	Sig.
SE(m)±	0.009	0.009	0.007
CD at 5%	0.024	0.025	0.021
Crop geometry (S)			
S_1	3.20	3.23	3.21
S_2	3.17	3.20	3.18
S_3	3.31	3.34	3.32
S_4	3.20	3.24	3.22
S_5	3.29	3.32	3.30
F test	Sig.	Sig.	Sig.
SE(m)±	0.010	0.010	0.008
CD at 5%	0.027	0.028	0.024
Interaction effect (P × S)			
F test	NS	NS	NS
SE(m)±	0.019	0.019	0.016
CD at 5%	-	-	-

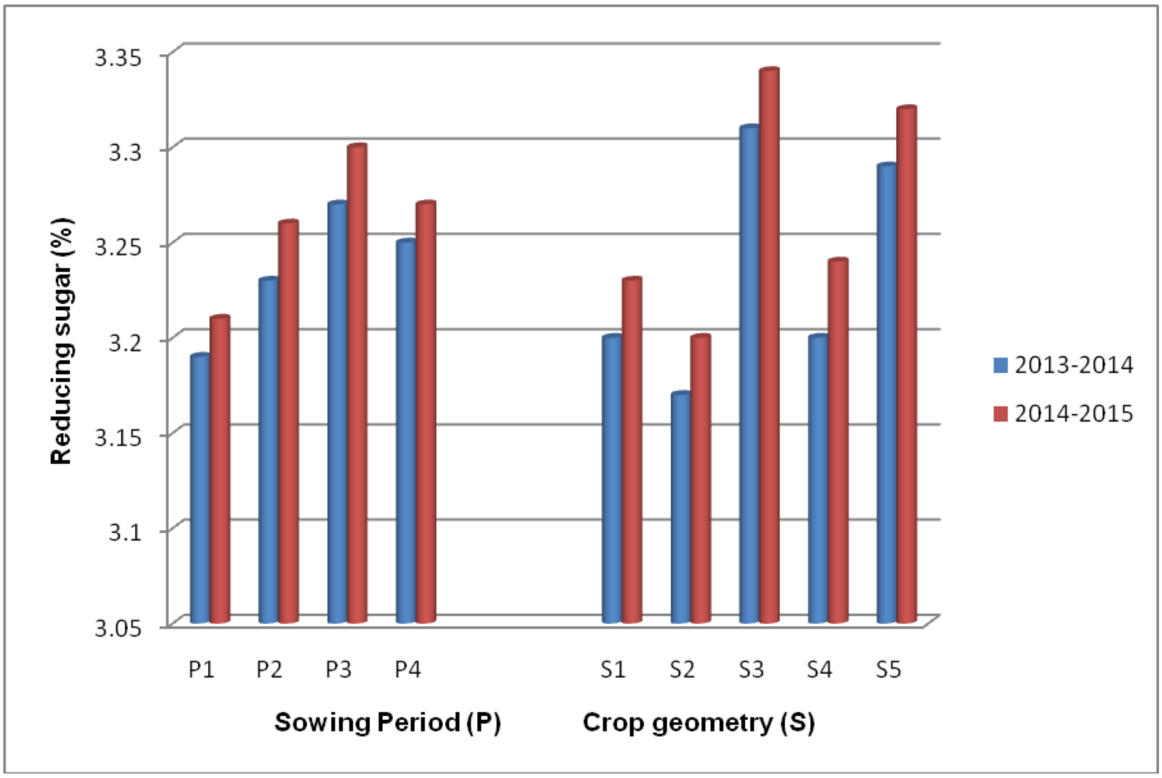


Fig. 22 Influence of sowing period and crop geometry on reducing sugar (%) content of baby corn (*Zea mays* L.)

4.20 Influence of sowing periods and crop geometry on non-reducing sugar content (%) of baby corn (*Zea mays* L.)

The data pertaining to non-reducing sugar content (%) of baby corn (*Zea mays* L.) as influenced due to sowing periods and crop geometry, recorded during the years 2013-14 and 2014-15 is represented in Table 31 and illustrated in figure 23.

4.20.1 Influence of sowing periods

The data presented in Table 31, clearly indicates that the non-reducing sugar content (%) of baby corn was influenced significantly due to sowing periods during both the years of experimentation.

During the year 2013-14, significantly the maximum non-reducing sugar content (0.24 %) was recorded with the sowing period P_1 (35^{th} met. week). However the best and the minimum value (0.21 %) was recorded in the sowing period P_3 (43^{rd} met. week).

Similarly during the year 2014-15, the maximum non-reducing sugar content (0.23%) was recorded with the sowing period P_1 (35^{th} met. week). However the best and the minimum value (0.20 %) was recorded in the sowing periodP_3 (43^{rd} met. week).

The pooled mean of both years also recorded significantly, the maximum non-reducing sugar content (0.24 %) with the sowing period P_1 (35^{th} met. week). However the best and the minimum value (0.21 %) was recorded in the sowing period P_3 (43^{rd} met. week).

Unlike the total and reducing sugar, non-reducing sugar was found to decrease with the advancement in the sowing period. The significantly lowest but the best value was found in the last two sowing periods.

4.20.2 Influence of crop geometry

The data presented in Table 31 revealed that, crop geometry influenced significantly the non-reducing sugar content (%) of baby corn during both the years of experimentation.

During the year 2013-14, significantly the maximum non-reducing sugar content (0.23 %) each was recorded with the crop geometry S_1 (30×30 cm), S_2 (45×15 cm) and S_4 (60×15 cm). However the wider crop geometry, S_3 (45×30 cm) and S_5 (60×30 cm) recorded the minimum but the best value of non-reducing sugar content i.e. 0.21 % each.

During the year 2014-15, significantly the maximum non-reducing sugar content (0.23 %) was recorded with the crop geometry S_2 (45×15 cm)and also found at par with S_1 (30×30 cm) and S_4 (60×15 cm) i.e. 0.22 % each. However the wider crop geometry, S_3 (45×30 cm) recorded the minimum (0.20 %) but the best value of non-reducing sugar content and was at par with S_5 (60×30 cm) i.e. 0.21 %.

The pooled mean of both the year also recorded significantly maximum non-reducing sugar content (0.23 %) was recorded with the crop geometry S_2 (45×15 cm) and also found at par with S_1 (30×30 cm) and S_4 (60×15 cm) i.e. 0.22 % each. However the wider crop geometry, S_3 (45×30 cm) recorded the minimum (0.20 %) but the best value of non-reducing sugar content and was at par with S_5 (60×30 cm) i.e. 0.21 %. This was in conformity with the result obtained by Talware (2013) and close agreement with the finding of Kole (2010).

4.20.3 Interaction effect

The interaction effect of sowing period and crop geometry on non-reducing sugar content (%) was found to be non-significant during both the years of experimentation (Appendix XIII).

Table 31: Influence of sowing period and crop geometry on non-reducing sugar (%) content of baby corn (*Zea mays* L.)

Treatments	Non-reducing sugar content (%)		
Sowing Period (P)	**2013-2014**	**2014-2015**	**Pooled mean**
P_1	0.24	0.23	0.24
P_2	0.22	0.21	0.22
P_3	0.21	0.20	0.21
P_4	0.22	0.21	0.21
F test	Sig.	Sig.	Sig.
SE(m)±	0.005	0.004	0.003
CD at 5%	0.015	0.011	0.010
Crop geometry (S)			
S_1	0.23	0.22	0.22
S_2	0.23	0.23	0.23
S_3	0.21	0.20	0.20
S_4	0.23	0.22	0.22
S_5	0.21	0.21	0.21
F test	Sig.	Sig.	Sig.
SE(m)±	0.006	0.004	0.004
CD at 5%	0.016	0.012	0.011
Interaction effect (P × S)			
F test	NS	NS	NS
SE(m)±	0.012	0.008	0.008
CD at 5%	-	-	-

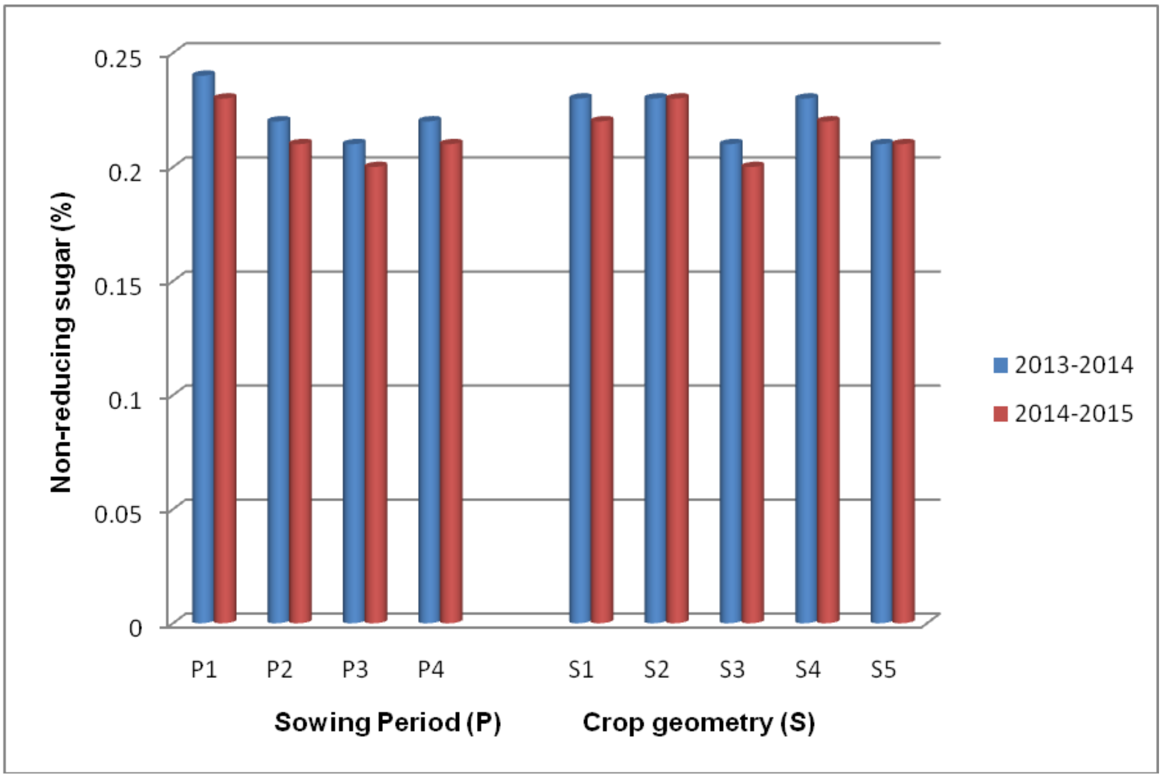


Fig. 23 Influence of sowing period and crop geometry on non-reducing sugar (%) content of baby corn (*Zea mays* L.)

4. Light interception

4.21 Influence of sowing periods and crop geometry on light interception (%) by baby corn (*Zea mays* L.) crop

The data pertaining to light interception (%) by baby corn (*Zea mays* L.) crop as influenced due to sowing periods and crop geometry, recorded during the years 2013-14 and 2014-15 is represented in Table 32 and illustrated in figure 24.

4.21.1 Influence of sowing periods

The data presented in Table 32, clearly indicates that the light interception (%) by baby corn crop was influenced significantly due to sowing periods during both the years of experimentation.

During the year 2013-14, significantly the maximum light interception (72.34 %) was recorded with the sowing period P_2 (39^{th} met. week), while the minimum light interception (68.18 %) was observed in the sowing periodP_4 (48^{th} met. week) which was also found at par with 68.37 % in the sowing period P_1 (35^{th} met. week).

Similarly during the year 2014-15, the maximum light interception (73.54 %) was recorded with the sowing period P_2 (39^{th} met. week), while the minimum (69.67 %) was observed in the sowing periodP_4 (48^{th} met. week).

The pooled mean of both years also recorded significantly, the maximum light interception (72.93 %) was recorded with the sowing period P_2 (39^{th} met. week), while the minimum light interception (68.92 %) was observed in the sowing period P_4 (48^{th} met. week). Thavaprakaash and Velayudham (2008) observed Maximum light interception during June-September.

4.21.2 Influence of crop geometry

The data presented in Table 32 revealed that, crop geometry influenced significantly the light interception (%) of baby corn during both the years of experimentation.

During the year 2013-14, significantly the maximum light interception (72.00 %) each was recorded with the crop geometry S_5 (60×30 cm), while the minimum (67.42 %) was found in S_1 (30×30 cm).

During the year 2014-15, significantly the maximum light interception (73.76 %) each was recorded with the crop geometry S_5 (60×30 cm), while the minimum (68.58 %) was found in S_1 (30×30 cm).

Regarding the pooled mean of both the year, the crop geometry S_3 (45×30 cm), recorded significantly maximum light interception (72.88 %), while the minimum (68.00 %) was found in S_1 (30×30 cm).

The higher light interception at wider crop geometry might be due to the increased growth parameters of the baby corn. The result closely corroborates the finding of Thavaprakaash and Velayudham (2008).

4.21.3 Interaction effect

The data presented in Table 33 indicated that, the interaction effect of sowing period and crop geometry on total light interception (%) was significant during both the years of experimentation i.e. 2013-14 and 2014-15.

During the year 2013-14, significantly the maximum light interception (73.99 %) was recorded in the treatment combination P_2S_5 (39^{th} met. week + 60×30 cm) which was also found at par with P_2S_3 (39^{th} met. week + 45×30 cm) and P_3S_5 (43^{rd} met. week + 60×30 cm) i.e. 73.90 and 73.19 % respectively, while the minimum (65.27 %) was recorded in the combination P_4S_1 (48^{th} met. week + 45×15 cm).

Table 32: Influence of sowing period and crop geometry on light interception (%) by baby corn (*Zea mays* L.) crop

Treatments	Light interception (%)		
Sowing Period (P)	**2013-2014**	**2014-2015**	**Pooled mean**
P_1	68.37	70.47	69.42
P_2	72.34	73.53	72.93
P_3	69.89	71.40	70.65
P_4	68.18	69.67	68.92
F test	Sig.	Sig.	Sig.
SE(m)±	0.234	0.197	0.150
CD at 5%	0.671	0.563	0.430
Crop geometry (S)			
S_1	67.42	68.58	68.00
S_2	68.32	69.73	69.03
S_3	71.26	72.92	72.09
S_4	69.47	71.34	70.41
S_5	72.00	73.76	72.88
F test	Sig.	Sig.	Sig.
SE(m)±	0.262	0.220	0.168
CD at 5%	0.751	0.629	0.481
Interaction effect (P × S)			
F test	Sig.	Sig.	Sig.
SE(m)±	0.524	0.440	0.336
CD at 5%	1.501	1.258	0.961

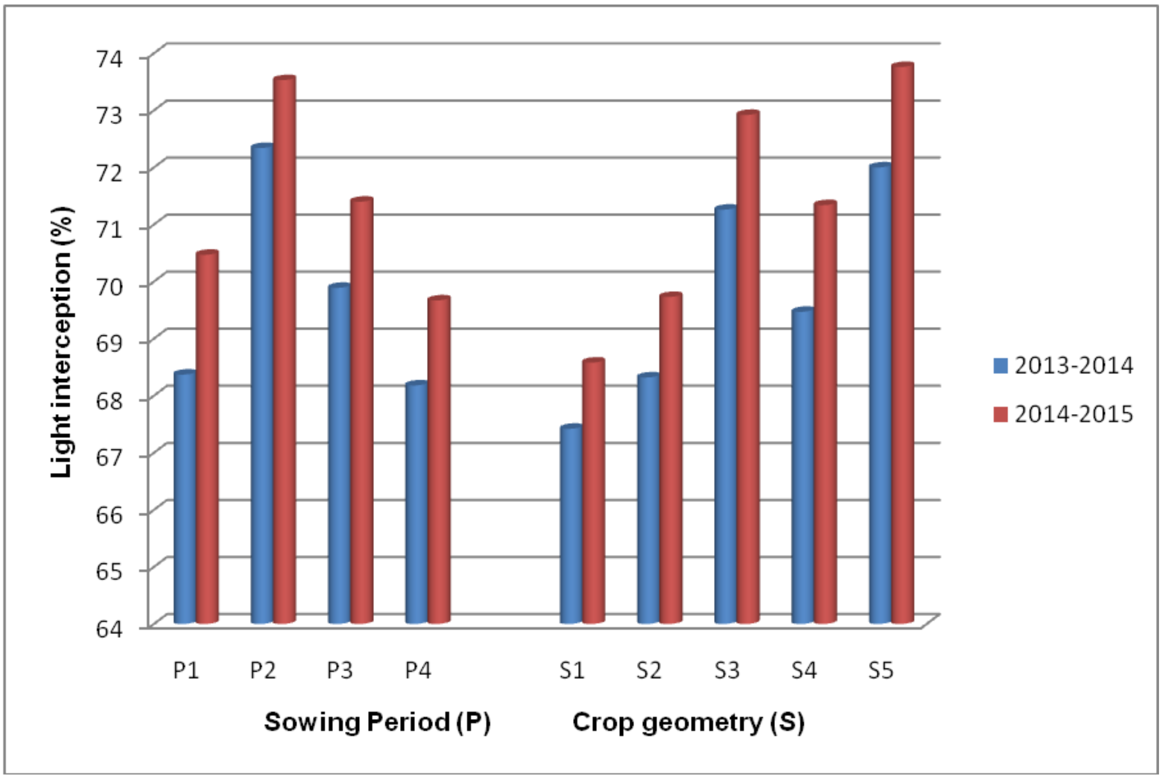


Fig. 24 Influence of sowing period and crop geometry on light interception (%) by baby corn (*Zea mays* L.) crop

Table 33: Interaction effect of sowing period and crop geometry on light interception (%) by baby corn (*Zea mays* L.) crop

Treatment combinations	Light interception (%)		
	2013-2014	2014-2015	Pooled mean
P_1 S_1	66.88	67.85	67.37
P_1 S_2	67.13	68.92	68.02
P_1 S_3	69.08	71.65	70.37
P_1 S_4	68.23	71.12	69.67
P_1 S_5	70.52	72.53	71.67
P_2 S_1	70.90	71.41	71.15
P_2 S_2	71.70	72.53	72.11
P_2 S_3	73.90	74.98	74.77
P_2 S_4	71.21	72.95	72.08
P_2 S_5	73.99	75.76	74.87
P_3 S_1	66.65	68.26	67.45
P_3 S_2	66.80	68.74	67.78
P_3 S_3	72.26	74.06	73.16
P_3 S_4	70.59	71.77	71.18
P_3 S_5	73.19	74.17	73.16
P_4 S_1	65.27	66.79	66.03
P_4 S_2	67.68	68.72	68.20
P_4 S_3	69.81	70.97	70.39
P_4 S_4	67.84	69.54	68.69
P_4 S_5	70.29	72.31	71.30
F test	Sig.	Sig.	Sig.
SE(m)$\pm$	0.524	0.440	0.336
CD at 5%	1.501	1.258	0.961

During the year 2014-15, significantly the maximum light interception (75.76 %) was recorded in the treatment combination P_2S_5 (39th met. week + 60×30 cm) which also found at par with P_2S_3 (39th met. week + 45×30 cm) i.e. 74.98 %, while the minimum (66.79 %) was recorded in the combination P_4S_1 (48th met. week + 30×30 cm).

The pooled mean of both the year recorded, significantly the maximum light interception (74.87 %) was recorded in the treatment combination P_2S_5 (39th met. week + 60×30 cm) which was found at par with P_2S_3 (39th met. week + 45×30 cm) i.e. 74.77 %, while the minimum (66.03 %) was recorded in the combination P_4S_1 (48th met. week + 30×30 cm).

The higher light interception in treatment combinations with sowing at 39th met. week with wider geometry 60×30 cm and 45×30 cm was presumably due to better growth of the plants especially larger leaf surface for better absorption of light. The maximum the light was intercepted corresponded to higher LAI.

5. Economics

4.22 Influence of sowing periods and crop geometry on gross and net monetary returns (Rs. ha^{-1}) and cost benefit ratio of baby corn (*Zea mays* L.) crop

The data pertaining to gross and net monetary returns (Rs. ha^{-1}) and cost benefit ratio of baby corn (*Zea mays* L.) crop as influenced due to sowing periods and crop geometry, recorded during the years 2013-14 and 2014-15 is represented in Table 34.

During the first year of experiments (2013-14), the data pertaining to gross and net monetary returns exhibited that the treatment combination P_2S_2 (39th met. week + 45×15 cm) had recorded significantly the maximum returns (Rs. 312800.00 ha^{-1} and Rs. 176476.31 ha^{-1} respectively). Whereas, gross and net monetary returns were recorded to be significantly minimum (Rs. 18836400 ha^{-1} and Rs. 79669.64 ha^{-1} respectively) in the treatment combination P_4S_5 (48th met. week + 60×30 cm).

Similarly during the year 2014-15, significantly the maximum gross and net monetary returns (Rs. 337194.08 and Rs. 196804.70 ha^{-1} respectively) was recorded in the treatment combination P_2S_2 (39^{th} met. week + 45×15 cm). Whereas, the minimum gross and net monetary returns (Rs. 204428.89 ha^{-1} and Rs. 93057.05 ha^{-1} respectively) were recorded in the treatment combination P_4S_5 (48^{th} met. week + 60×30 cm).

The pooled mean of both the year recorded, significantly the maximum gross and net monetary returns (Rs. 324997.03 ha^{-1} and Rs. 186640.51 ha^{-1} respectively) was recorded in the treatment combination P_2S_2 (39^{th} met. week + 45×15 cm). Whereas, the minimum gross and net monetary returns (Rs. 196396.44 ha^{-1} and Rs. 86363.34 ha^{-1} respectively) were recorded significantly in the treatment combination P_4S_5 (48^{th} met. week + 60×30 cm).

During the year and 2014-15, 2013-14 maximum cost benefit ratio (2.29 and 2.35 respectively) was recorded due to the treatment combination P_2S_2 (39^{th} met. week + 45×15 cm). The minimum cost benefit ratio (1.73) during 2013-14 was recorded due to the treatment combination P_4S_5 (48^{th} met. week + 60×30 cm), while during 2014-15 the minimum (1.84) was observed in P_1S_5 (35^{th} met. week + 60×30 cm) as well as P_4S_5 (48^{th} met. week + 60×30 cm).

Regarding the pooled result, maximum cost benefit ratio (2.35) was worked out due to the treatment combination P_2S_2 (39^{th} met. week + 45×15 cm).Whereas, the minimum cost benefit ratio (1.79) was recorded in P_1S_5 (35^{th} met. week + 60×30 cm) as well as P_4S_5 (48^{th} met. week + 60×30 cm).

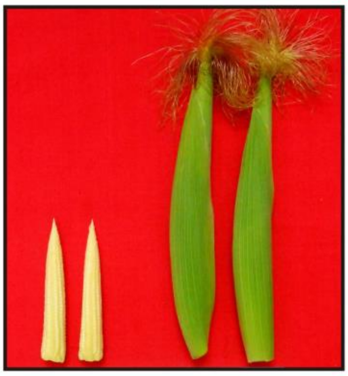
The suitable combination of sowing period with closer crop geometry with higher plant population per unit area resulted into the production of maximum yield of baby corn (both with husk and without husk) and green fodder yield. Thus from the higher production of baby corn, maximum gross and net monetary return and B:C ratio would have been obtained from this treatment. This result is in close agreement with the finding of Singh (2015).

Table 34: Interaction effect of sowing period and crop geometry on cost of cultivation, gross monetary returns, net monetary returns and cost benefit ratio of baby corn (*Zea mays* L.)

Treatment combinations	Cost of cultivation			Gross monetory returns Rs. /ha			Net monetory returns Rs./ha			B:C ratio		
	2013-14	2014-15	Pooled mean	2013-14	2014-15	Pooled mean	2013-14	2014-15	Pooled mean	2013-14	2014-15	Pooled mean
P1S1	126460.92	129561.62	128011.27	266347.11	284947.56	275647.33	139886.19	155385.94	147636.06	2.11	2.2	2.15
P1S2	133352.21	136304.06	134828.14	294971.11	312682.22	303826.66	161618.90	176378.16	168998.53	2.21	2.29	2.25
P1S3	115712.58	118601.47	117157.03	220933.33	238266.67	229600	105220.75	119665.20	112442.98	1.91	2.01	1.96
P1S4	123122.21	125736.53	124429.37	249491.11	265177.04	257334.07	126368.90	139440.51	132904.7	2.03	2.11	2.07
P1S5	108882.14	111504.95	110193.55	189490.67	205227.56	197359.11	80608.53	93722.61	87165.57	1.74	1.84	1.79
P2S1	130604.73	132988.8	131796.77	291206.22	305510.67	298358.44	160601.49	172521.87	166561.68	2.23	2.3	2.26
P2S2	136323.69	140389.37	138356.53	312800	337194.07	324997.04	176476.31	196804.71	186640.51	2.29	2.4	2.35
P2S3	122481.84	128138.14	125309.99	261548.89	295486.67	278517.78	139067.05	167348.53	153207.79	2.14	2.31	2.22
P2S4	127188.26	129604.06	128396.16	273887.41	288382.22	281134.82	146699.15	158778.16	152738.65	2.15	2.23	2.19
P2S5	114467.69	117579.99	116023.84	223004	241677.78	232340.89	108536.31	124097.79	116317.05	1.95	2.06	2
P3S1	129412.29	131782.95	130597.62	284051.56	298275.56	291163.56	154639.27	166492.61	160565.94	2.19	2.26	2.23
P3S2	135025.92	138503.69	136764.81	305013.33	325880	315446.67	169987.41	187376.31	178681.86	2.26	2.35	2.31
P3S3	118252.95	121555.55	119904.25	236175.56	255991.11	246083.33	117922.61	134435.56	126179.08	2	2.11	2.05
P3S4	123758.38	127440.11	125599.25	253308.15	275398.52	264353.33	129549.77	147958.41	138754.09	2.05	2.16	2.1
P3S5	110248.06	113102.58	111675.32	197686.22	214813.33	206249.78	87438.16	101710.75	94574.46	1.79	1.9	1.85
P4S1	126303.55	129276.73	127790.14	265399.11	283238.22	274318.67	139095.56	153961.49	146528.53	2.1	2.19	2.15
P4S2	131734.68	134888.38	133311.53	285265.93	304188.15	294727.04	153531.25	169299.77	161415.51	2.17	2.26	2.21
P4S3	116093.69	118983.32	117538.51	223220	240557.78	231888.89	107126.31	121574.46	114350.38	1.92	2.02	1.97
P4S4	124544.06	126687.27	125615.67	258022.22	270881.48	264451.85	133478.16	144194.21	138836.19	2.07	2.14	2.11
P4S5	108694.36	111371.84	110033.1	188364	204428.89	196396.44	79669.64	93057.05	86363.34	1.73	1.84	1.78

S$_1$ - 30 × 30 cm

S$_2$ - 45 × 15 cm



S$_3$ - 45 × 30 cm

S$_4$ - 60 × 15 cm

S$_5$ - 60 × 30 cm

Plate 3a. Sowing period (P$_1$)- 35th meteorological week (Last Week Aug.)

S_1 - 30 × 30 cm

S_2 - 45 × 15 cm

S_3 - 45 × 30 cm

S_4 - 60 × 15 cm

S_5 - 60 × 30 cm

Plate 3b. Sowing period (P_2) 39th meteorological week (Last Week Sept.)

S_1 - 30 × 30 cm

S_2 - 45 × 15 cm

S_3 - 45 × 30 cm

S_4 - 60 × 15 cm

S_5 - 60 × 30 cm

Plate 3c. Sowing period (P_3) 43rd meteorological week (Last Week Oct.)

S_1 - 30 × 30 cm

S_2 - 45 × 15 cm

S_3 - 45 × 30 cm

S_4 - 60 × 15 cm

S_5 - 60 × 30 cm

Plate 3d. Sowing period (P_4) 48th meteorological week (Last Week Nov.)

CHAPTER V

SUMMARY AND CONCLUSIONS

Baby corn is one among the most important vegetable crop gaining popularity among the growers in India due to its growing demands and aggravated consumptions because of awareness among the people and their shift in the food habit from non-vegetarian to vegetarian especially in India. However, baby corn production in the country being a recent development and at juvenile stage, standardization of agro-techniques especially proper time for sowing and crop geometry is needed to ensure higher income to farmers.

Considering the needs and importance of present scenario, the present investigation entitled "Response of baby corn (*Zea mays* L.) to sowing periods and crop geometry" was carried out at Main garden, Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, during the year 2013-14 and 2014-15 under Akola conditions with the following objectives.

1. To study the effect of different sowing period on yield and quality of baby corn
2. To study the effect of crop geometry on yield and quality of baby corn
3. To find out the most suitable combination of sowing period and crop geometry on yield and quality of baby corn under Akola condition.

The experiment was laid out in factorial randomized block design with three replications and twenty treatment combinations with factor A i.e. four levels of sowing periods (35^{th}, 39^{th}, 43^{rd} and 48^{th} meteorological week) and factor B i.e. five different crop geometry (30 cm × 30 cm, 45 cm × 15 cm, 45 cm × 30 cm, 60 cm × 15 cm and 60 cm × 30 cm having plant population of approximately 2222.222, 2962.962, 1481.481, 2222.222 and 1111.111 plants per 100 m^2 respectively.

The experiment was conducted to study the response of different sowing periods and crop geometry on treatments on growth, yield, quality parameters and economics of its cultivation. The results obtained in this respect are summarised in this chapter.

5.1 Growth parameters

The growth characteristics viz., number of leaves plant^{-1} (12.96 and 13.04), leaf area (509.28 cm^2 and 511.76 cm^2), LAI (3.49 and 3.56) and leaf chlorophyll content (1.95 mg g^{-1} and 2.34 mg g^{-1} were found maximum in sowing period P_2 (39th met. week) and crop geometry S_3 (45 × 30 cm) respectively. Whereas, the minimum values pertaining to most of the parameters were observed in sowing period P_1 (35th met. week) and crop geometry S_2 (45 × 15 cm). Among the treatment combinations, it was observed that P_2S_3 (39th met. week + 45 × 30 cm) exhibited highest values for almost all the growth parameters; number of leaves plant^{-1} (13.63), leaf area (512.62 cm^2), LAI (3.62) and chlorophyll content (2.40 mg g^{-1}). Whereas the treatment combination P_2S_2 (39th met. week + 45 × 15 cm) gave highest plant height (205.47 cm).

The significantly minimum number of days to 50% cob emergence, 50% tasseling, 50% silking and harvest i.e. 48.77 and 52.33 days, 48.57 and 50.25 days, 51.82 and 54.58 day, 52.4 and 56.54 days respectively was observed in the sowing period P_1 (35th met. week) and crop geometry S_2 (45 × 15 cm) respectively, while, the maximum value was exhibited in the sowing period P_4 (48th met. week) and crop geometry S_5 (60 × 15 cm). However, the interaction effect was found non-significant for these parameters.

5.2 Yield parameters

The yield attributing characters like number of cobs plant^{-1} (2.96 and 3.04) and cob weight with husk (49.76 g and 50.87 g) was found in the sowing period P_2 (39th met. week) and crop geometry S_5 (45 × 30 cm), while the cob weight without husk (8.97 and 19.17 g) and cob length (10.96 cm and 11.04 cm) observed maximum at the same sowing period and crop geometry S_3 (45 × 30 cm) respectively. Whereas the minimum cob length was observed at P_4 (48th met. week) and both crop geometry S_2 (45 × 15 cm) and S_4 (60 ×

15 cm) and weight of cob with husk and without husk at sowing period P_4 (48th met. week) and crop geometry S_5 (45 × 30 cm). However, the cob diameter 1.49 and 1.50 cm was found at the sowing period P_4 (48th met. week) and crop geometry S_5 (45 × 30 cm), while minimum cob diameter observed at sowing period P_1 (35th met. week) and crop geometry S_2 (45 × 15 cm).

Among the treatment combinations the highest number of cobs plant^{-1} (3.43), cob weight with husk (54.34 g) were found highest in P_2S_5 (39th met. week + 60 × 30 cm). While the treatment combination P_2S_3 (39th met. week + 45 × 30 cm) recorded maximum cob weight without husk (9.87 g).

5.3 Yield

The maximum cob yield plant^{-1} with husk (146.95 and 155.13 g) and without husk (26.43 and 27.21 g) respectively was obtained in sowing period P_2 (39th met. week) and wider geometry S_5 (60 × 30 cm). However, at the same sowing period with closer geometry S_2 (45 × 15 cm) maximum yield plot^{-1} with husk (10.47 and 11.41 kg) and without husk (1.89 and 2.06 kg), yield hectare^{-1} with husk (387.75 and 422.74 q) and without husk (70.13 and 76.29 q) and fodder yield hectare^{-1} (36.24 and 40.44 t ha^{-1}) were observed. Whereas minimum value cob yield plant^{-1} with husk and without husk was found at P_4 (48th met. week) and S_2 (45 × 15 cm), cob yield plot^{-1} and hectare^{-1} with husk and without husk was found at P_4 (48th met. week) and S_5 (60 × 30 cm).

Among the treatment combinations P_2S_5 (39th met. week + 60 × 30 cm) exhibited the highest cob yield plant^{-1} with husk (186.53 g) and without husk (31.64 g). However, P_2S_2 (39th met. week + 45 × 15 cm) exhibited highest fodder yield (40.85 t ha^{-1}), yield plot^{-1}; with husk (12.02 kg) and without husk (2.19 kg), yield hectare^{-1}; with husk (445.01 q) and without husk (81.10 q). Whereas the minimum yield plant^{-1} was recorded in the combination P_4S_2, cob yield plot^{-1} with husk in P_4S_5 while without husk in P_4S_5 and P_1S_5, cob yield ha^{-1} with husk and without husk in P_4S_5 and fodder yield at P_3S_5 and also found at par with P_1S_5, P_2S_5 and P_4S_5.

5.4 Quality parameters

Significantly, maximum values for almost all the quality parameters; protein (17.37 % and 17.95 %), total sugar (3.33 % and 3.36 %) and reducing sugar (3.29 % and 3.32 %) content were exhibited by sowing period, P_3 (43rd met. week) and crop geometry, S_3 (45 × 30 cm) respectively whereas the minimum value was observed under sowing period P_1 (35th met. week) and crop geometry S_2 (45 × 15 cm). However, the fibre content (5.57 % and 5.59 %) was observed at the same sowing period and S_1 (30 × 30 cm), while the moisture (89.12 % and 89.51 %) was found at P_2 (39th met. week) and S_3 (45 × 30 cm) respectively and its minimum value observed at sowing period P_1 (35th met. week) and crop geometry S_4 (45 × 30 cm).

The maximum protein (18.57 %), total sugar (3.40 %) and reducing sugar content (3.38 %) were recorded in P_3S_3 (43rd met. week + 45 × 30 cm); maximum fibre content (5.60 %) in P_3S_1 (43rd met. week + 30 × 30 cm) and moisture content (89.99 %) in the treatment combination P_2S_3 (39th met. week + 45 × 30 cm) though difference was non-significant.

5.6 Light interception

The significantly maximum light interception (72.93 % and 72.88 %) was recorded with the sowing period P_2 (39th met. week) and crop geometry S_3 (45×30 cm) respectively, while the minimum (68.92 % and 68.00 %) was observed in the sowing period P_4 (48th met. week) and crop geometry S_1 (30×30 cm) respectively.

The treatment combination P_2S_5 (39th met. week + 60×30 cm) recorded significantly the maximum light interception (74.87 %), which was also found at par with P_2S_3 (39th met. week + 45×30 cm) i.e. 74.77 %, while the minimum (66.03 %) was recorded in the combination P_4S_1 (48th met. week + 30×30 cm).

Plate 4. superior treatment combination for yield/plant (g)

Plate 5. superior treatment combination for quality

Plate 6. superior treatment combination for yield ha^{-1} (q)

5.7 Economics

The maximum gross and net monetary returns (Rs. 324997.03 and Rs. 186640.51 ha^{-1} respectively) were recorded in the treatment combination P_2S_2 (39^{th} met. week + 45×15 cm). Whereas, the minimum gross and net monetary returns recorded (Rs. 196396.44 and Rs. 86363.34 ha^{-1} respectively) were recorded in the treatment combination P_4S_5 (48^{th} met. week + 60×30 cm).

The maximum cost benefit ratio (2.35) was worked out due to the treatment combination P_2S_2 (39^{th} met. week + 45×15 cm).Whereas, the minimum cost benefit ratio (1.79) was recorded in P_1S_5 (35^{th} met. week + 60×30 cm) as well as P_4S_5 (48^{th} met. week + 60×30 cm).

Conclusions

Based on the present investigation, following conclusions are drawn;

- ❖ Among the sowing periods, P_2 (39^{th} met. week) exhibited maximum values of almost all the plant growth characteristics such as plant height, number of leaves $plant^{-1}$, leaf area, LAI and leaf chlorophyll content as well as yield and its attributing characters like cob length, number of cobs $plant^{-1}$, cob weight, cob yield $plant^{-1}$, yield $plot^{-1}$, yield $hectare^{-1}$ and fodder yield $hectare^{-1}$. The treatment P_3 (43^{rd} met. week) exhibited highest quality parameters; protein, total sugar and reducing sugar content as well as total dry matter accumulation $plant^{-1}$.

- ❖ Regarding the crop geometry, most of the growth parameters were found maximum in S_3 (45 × 30 cm), which also shows the maximum cob length, cob weight (without husk) and all the quality parameters. The dry matter accumulation $plant^{-1}$, No. of cobs $plant^{-1}$, cob weight (with husk), cob yield $plant^{-1}$ were obtained in the wider spacing S_5 (60 × 30 cm). However, the closer spacing S_2 (45 × 15 cm) gives highest yield $plot^{-1}$, yield $hectare^{-1}$ and fodder yield $hectare^{-1}$.

- ❖ The treatment combination, P_2S_3 (39^{th} met. week + 45 × 30 cm) exhibited highest values for almost all the growth parameters; number of leaves, leaf area, LAI and chlorophyll content. While the highest plant height was found in P_2S_2 (39th met. week + 45 × 15 cm).

- ❖ Yield and yield attributing characters such as, number of cobs plant^{-1}, cob weight (with husk) and cob yield plant^{-1} (with and without husk) were found highest in P_2S_5 (39th met. week + 60 × 30 cm). While the maximum cob weight (without husk) and cob length were observed in P_2S_3 (39th met. week + 45 × 30 cm). However, P_2S_2 (39th met. week + 45 × 15 cm) highest fodder yield hectare^{-1}, yield plot^{-1}, yield hectare^{-1} and B:C ratio.

- ❖ The maximum protein, total sugar and reducing sugar content were recorded in P_3S_3 (43rd met. week + 45 × 30 cm); maximum fibre content in P_3S_1 (43rd met. week + 30 × 30 cm) and moisture content in the treatment combination P_2S_3 (39th met. week + 45 × 30 cm).

- ❖ The results inferred from the present investigation are however suggestive and can be used by farmers for taking Baby corn crop under Akola conditions to get higher yield and better returns.

CHAPTER VI

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Appendix I

Weekly Weather data for the year 2013-14 recorded at Meteorological Observatory Department of Agronomy Dr. PDKV., Akola

		Actual				2013										Normal		1971-2010		
Weeks	Dates	T MAX (ºC)		T MIN (ºC)		BSH (hrs)		WS (km/hr)		RH I (%)		RH II (%)		Evap (mm)		RF (mm)		CRF (mm)	Rainy Days	
		N	A	N	A	N	A	N	A	N	A	N	A	N	A	N	A		N	A
31	30-5 Aug	30.9	26.8	23.3	22.3	3.5	1.5	10.6	9.6	86	95	67	89	4.6	3.8	49.6	109.0	642.3	2.4	4.0
32	6-12	29.9	29.0	23.0	23.1	3.2	1.5	10.9	6.2	88	90	70	70	4.1	4.0	61.0	6.5	648.8	2.8	1.0
33	13-19	30.4	30.4	23.0	23.3	4.0	3.1	12.4	5.1	87	88	67	62	4.5	5.0	35.9	7.0	655.8	2.0	5.0
34	20-26	30.4	25.1	22.8	21.8	4.1	0.0	11.9	11.6	87	95	67	89	4.3	2.6	42.5	47.9	703.7	1.9	0.0
35	27-2 Sep	30.5	30.2	22.7	22.8	4.2	3.9	9.3	4.1	87	85	66	54	4.6	3.8	42.4	4.5	708.2	2.1	0.0
36	3-9	31.0	32.2	22.5	22.6	5.3	7.4	8.6	4.3	87	83	62	46	5.3	5.7	33.6	2.0	710.2	1.5	2.0
37	10-16	32.1	34.2	22.4	23.1	6.6	6.0	8.0	2.1	85	86	57	46	5.1	5.1	22.0	44.7	754.9	1.1	4.0
38	17-23	32.9	30.2	22.4	22.8	6.8	2.7	6.4	3.5	84	92	55	69	5.2	3.8	23.7	104.3	859.2	1.4	0.0
39	24-30	33.5	32.0	22.1	22.8	7.3	6.0	5.1	2.6	84	81	50	46	5.0	4.2	24.4	0.9	860.1	1.4	2.0
40	1-7 Oct	33.7	31.6	21.2	23.1	7.6	5.0	4.8	4.3	82	92	47	62	5.4	5.2	23.4	68.4	928.5	1.1	1.0
41	8-14	34.0	31.5	19.8	22.3	8.1	6.0	4.5	2.3	78	90	40	51	5.3	4.5	13.1	15.4	943.9	0.7	0.0
42	15-21	33.7	33.5	18.3	20.4	8.2	7.7	4.6	0.8	76	82	37	37	5.3	4.5	6.1	1.0	944.9	0.4	0.0
43	22-28	33.1	31.3	16.8	20.3	8.3	6.3	4.4	1.7	74	88	34	49	5.3	4.1	7.6	1.5	946.4	0.4	0.0
44	29-4 Nov	32.7	32.6	16.0	15.9	8.4	7.9	4.1	0.8	73	85	32	29	5.3	4.1	2.3	0.0	946.4	0.2	0.0
45	5-11	32.3	31.6	15.2	15.6	8.4	6.6	3.9	1.4	71	85	32	30	5.1	4.5	3.0	0.0	946.4	0.2	0.0
46	12-18	31.6	29.5	14.6	13.4	8.3	5.6	3.9	1.3	73	83	32	26	4.8	4.2	5.3	0.0	946.4	0.2	0.0
47	19-25	31.0	31.0	13.3	14.5	8.4	7.3	3.7	1.3	72	82	30	30	4.6	4.6	7.7	0.0	946.4	0.3	0.0
48	26-2 Dec	30.5	30.4	12.8	16.3	8.4	5.0	3.6	1.2	71	78	32	35	4.4	3.8	5.5	0.0	946.4	0.3	0.0
49	3-9	30.0	29.6	11.9	12.5	8.4	6.8	3.8	1.0	71	81	30	23	4.3	3.8	1.0	0.0	946.4	0.1	0.0
50	10-16	29.6	28.9	10.9	8.4	8.4	8.6	3.6	0.5	71	82	28	17	4.2	3.7	0.8	0.0	946.4	0.1	0.0
51	17-23	29.5	29.5	10.8	9.8	8.5	7.9	3.8	0.7	70	84	29	21	4.1	3.8	0.9	0.0	946.4	0.1	0.0
52	24-31	29.1	28.8	11.1	13.6	8.3	4.2	4.5	1.0	71	84	30	31	4.2	3.8	2.6	0.0	946.4	0.2	0.0
2014																				
1	1-7 Jan	28.8	29.0	11.0	13.0	8.2	4.8	4.4	1.0	71	80	31	31	4.2	4.4	2.8	0.0	0.0	0.2	0.0
2	8-14	29.3	28.5	11.7	13.9	8.3	4.6	4.4	2.3	71	80	30	34	4.4	3.7	3.3	0.0	0.0	0.2	0.0
3	15-21	30.0	29.2	12.0	15.8	8.6	3.4	4.5	2.0	68	76	28	33	4.9	4.7	0.7	0.4	0.4	0.1	0.0
4	22-28	30.6	28.9	12.0	14.5	8.8	3.3	4.6	1.9	65	81	26	31	5.2	4.2	0.9	0.0	0.4	0.1	0.0
5	29-4 Feb	31.0	30.0	12.6	11.0	8.8	8.4	4.9	1.7	62	59	25	16	5.5	5.2	3.0	0.0	0.4	0.2	0.0
6	5-11	31.4	31.9	12.7	14.0	8.8	7.6	5.0	1.7	59	60	23	20	5.9	5.3	3.7	0.0	0.4	0.3	0.0
7	12-18	32.7	29.4	14.4	12.7	9.0	7.4	5.4	2.3	55	64	22	24	6.6	6.7	0.1	0.0	0.4	0.0	0.0
8	19-25	33.4	31.7	14.5	16.2	9.1	5.9	5.7	2.0	54	64	21	29	7.3	6.2	2.5	2.0	2.4	0.2	0.0

Appendix II

Weekly Weather data for the year 2014-15 recorded at Meteorological Observatory Department of Agronomy Dr. PDKV., Akola

		Actual				2014										Normal		1971-2010		
Weeks	Dates	T MAX (°C)		T MIN (°C)		BSH (hrs)		WS (km/hr)		RH I (%)		RH II (%)		Evap (mm)		RF (mm)		CRF (mm)	Rainy Days	
		N	A	N	A	N	A	N	A	N	A	N	A	N	A	N	A		N	A
31	30-5 Aug	*30.9*	31.6	*23.3*	24.2	*3.5*	3.2	10.6	7.6	*86*	89	*67*	66	*4.6*	6.0	*49.6*	16.4	404.8	*2.4*	1.0
32	6-12	*29.9*	32.2	*23.0*	23.6	*3.2*	5.9	10.9	11.9	*88*	87	*70*	48	*4.1*	8.3	*61.0*	13.7	418.5	*2.8*	2.0
33	13-19	*30.4*	33.6	*23.0*	23.6	*4.0*	6.9	12.4	9.5	*87*	89	*67*	46	*4.5*	7.1	*35.9*	6.9	425.4	*2.0*	2.0
34	20-26	*30.4*	33.8	*22.8*	23.6	*4.1*	5.6	11.9	1.9	*87*	92	*67*	57	*4.3*	4.1	*42.5*	28.9	454.3	*1.9*	4.0
35	27-2 Sep	*30.5*	29.1	*22.7*	22.4	*4.2*	2.1	9.3	4.1	*87*	94	*66*	81	*4.6*	5.0	*42.4*	73.6	527.9	*2.1*	5.0
36	3-9	*31.0*	28.8	*22.5*	22.7	*5.3*	3.3	8.6	8.7	*87*	93	*62*	65	*5.3*	7.0	*33.6*	109.2	637.1	*1.5*	3.0
37	10-16	*32.1*	30.3	*22.4*	22.6	*6.6*	4.2	8.0	7.3	*85*	88	*57*	65	*5.1*	5.7	*22.0*	0.7	637.8	*1.1*	0.0
38	17-23	*32.9*	32.5	*22.4*	23.1	*6.8*	6.0	6.4	6.4	*84*	90	*55*	56	*5.2*	5.2	*23.7*	0.5	638.3	*1.4*	0.0
39	24-30	*33.5*	34.5	*22.1*	20.7	*7.3*	8.5	5.1	1.0	*84*	81	*50*	37	*5.0*	4.2	*24.4*	2.0	640.3	*1.4*	0.0
40	1-7 Oct	*33.7*	36.5	*21.2*	21.1	*7.6*	7.4	4.8	1.4	*82*	73	*47*	29	*5.4*	5.2	*23.4*	0.0	640.3	*1.1*	0.0
41	8-14	*34.0*	36.8	*19.8*	20.9	*8.1*	5.6	4.5	1.7	*78*	66	*40*	26	*5.3*	5.4	*13.1*	0.0	640.3	*0.7*	0.0
42	15-21	*33.7*	34.5	*18.3*	21.8	*8.2*	5.6	4.6	1.4	*76*	76	*37*	37	*5.3*	5.6	*6.1*	0.0	640.3	*0.4*	0.0
43	22-28	*33.1*	31.9	*16.8*	18.0	*8.3*	4.3	4.4	1.1	*74*	77	*34*	37	*5.3*	4.0	*7.6*	0.0	640.3	*0.4*	0.0
44	29-4 Nov	*32.7*	33.8	*16.0*	15.9	*8.4*	7.9	4.1	1.3	*73*	68	*32*	21	*5.3*	4.7	*2.3*	0.0	640.3	*0.2*	0.0
45	5-11	*32.3*	33.5	*15.2*	16.6	*8.4*	6.5	3.9	1.4	*71*	69	*32*	28	*5.1*	5.2	*3.0*	0.0	640.3	*0.2*	0.0
46	12-18	*31.6*	30.0	*14.6*	20.4	*8.3*	3.2	3.9	2.2	*73*	87	*32*	46	*4.8*	3.5	*5.3*	20.1	660.4	*0.2*	2.0
47	19-25	*31.0*	31.7	*13.3*	12.9	*8.4*	7.4	3.7	0.9	*72*	72	*30*	16	*4.6*	4.2	*7.7*	0.0	660.4	*0.3*	0.0
48	26-2 Dec	*30.5*	32.2	*12.8*	12.4	*8.4*	7.2	3.6	0.6	*71*	75	*32*	15	*4.4*	3.6	*5.5*	0.0	660.4	*0.3*	0.0
49	3-9	*30.0*	30.8	*11.9*	10.9	*8.4*	8.3	3.8	0.9	*71*	73	*30*	18	*4.3*	4.4	*1.0*	0.0	660.4	*0.1*	0.0
50	10-16	*29.6*	29.5	*10.9*	14.4	*8.4*	4.7	3.6	1.5	*71*	74	*28*	33	*4.2*	4.6	*0.8*	0.9	661.3	*0.1*	0.0
51	17-23	*29.5*	26.4	*10.8*	6.9	*8.5*	8.3	3.8	1.6	*70*	71	*29*	16	*4.1*	5.0	*0.9*	0.0	661.3	*0.1*	0.0
52	24-31	*29.1*	28.6	*11.1*	8.3	*8.3*	8.6	4.5	1.5	*71*	69	*30*	16	*4.2*	5.2	*2.6*	0.0	661.3	*0.2*	0.0
2015																				
1	1-7 Jan	*28.8*	23.7	*11.0*	13.4	*8.2*	4.2	4.4	1.1	*71*	88	*31*	49	*4.2*	3.3	*2.8*	51.4	51.4	*0.2*	2.0
2	8-14	*29.3*	26.9	*11.7*	7.0	*8.3*	9.1	4.4	0.7	*71*	81	*30*	14	*4.4*	4.0	*3.3*	0.0	51.4	*0.2*	0.0
3	15-21	*30.0*	27.8	*12.0*	10.1	*8.6*	8.3	4.5	1.5	*68*	77	*28*	28	*4.9*	5.2	*0.7*	0.0	51.4	*0.1*	0.0
4	22-28	*30.6*	29.3	*12.0*	15.3	*8.8*	6.1	4.6	2.4	*65*	86	*26*	35	*5.2*	6.2	*0.9*	0.0	51.4	*0.1*	0.0
5	29-4 Feb	*31.0*	29.5	*12.6*	11.9	*8.8*	8.3	4.9	1.9	*62*	71	*25*	23	*5.5*	6.2	*3.0*	0.0	51.4	*0.2*	0.0
6	5-11	*31.4*	31.1	*12.7*	14.7	*8.8*	7.6	5.0	2.9	*59*	73	*23*	27	*5.9*	6.5	*3.7*	4.0	55.4	*0.3*	1.0
7	12-18	*32.7*	32.4	*14.4*	12.9	*9.0*	9.0	5.4	1.9	*55*	64	*22*	19	*6.6*	5.1	*0.1*	0.0	55.4	*0.0*	0.0
8	19-25	*33.4*	35.2	*14.5*	14.2	*9.1*	9.0	5.7	1.8	*54*	60	*21*	16	*7.3*	5.4	*2.5*	0.0	55.4	*0.2*	0.0

Appendix III

Details of Biometric observation recorded during investigation

Sr. No.	Particular	Frequency	Stages
(A) Growth stage			
1.	Plant Height (cm)	2	30 DAS and at harvest
2.	No. of leaves plant^{-1}	2	30 DAS and at harvest
3.	Leaf area (cm^{2})	1	At harvest
4.	Leaf area index	1	At harvest
5.	Days to 50 % tasseling	1	After sowing
6.	Days to 50 % cob emergence	1	After sowing
7.	Days to 50 % silking	1	After sowing
8.	Days to cob harvest	1	After sowing
5.	Chlorophyll content (mg g^{-1})	1	At harvesting
(B) Yield Stage			
1.	Number of cobs plant^{-1}	1	At harvest
2	Cob Length (cm)	1	At harvest
3.	Cob diameter (cm)	1	At harvest
4.	Cob weight with husk (g)	1	After harvesting
5	Cob weight without husk (g)	1	After harvesting
5.	Cob yield/plant (g plant^{-1})	1	After harvesting
6.	Cob yield/plot (g plot^{-1})	1	After harvesting
7.	Cob yield/ha (q ha^{-1})	1	After harvesting
8.	Green fodder yield (t ha^{-1})	1	After harvesting
9.	Total dry matter accumulation/plant (g)	1	After harvesting
(C) Quality Stage			
1.	Protein content in cob (%)	1	After harvesting
2.	Sugars i. Reducing sugar (%) ii. Total sugar (%) iii. Non-reducing sugar (%)	1	After harvesting
3.	Moisture content (%)	1	After harvesting
4.	Fibre content (%)	1	After harvesting

Appendix IV

	Cost of Cultivation of baby corn(Per Hectare)					
SR. NO.	**I T E M**	**Unit**		**Input/ha.**	**Cost per Unit of Input (Rs.)**	**Total Cost Per ha. (Rs.)**
1	**2**	**3**		**4**	**5**	**6**
1	Hired Human Labour	Male	Days	56	200.00	11200.00
		Female	Days	125	150.00	18750.00
2	Bullock Labour		(Pair Days)	10	250.00	2500.00
3	Machine/tractor charges		Hours	8	500.00	4000.00
4	Seed (**P1S1**)		KGS.	21	500.00	10500.00
5	Manures		tonnes	10.00	600.00	6000.00
6	Fertilizer	N	KGS.	326.00	6.00	1956.00
		P	KGS.	375.00	8.00	3000.00
		K	KGS.	100.00	20.00	2000.00
7	Irrigation charges	(RS.)				3000.00
8	Bio-fertilizers/Micronutrient					0.00
9	Insecticide (Plant Protection)	(RS.)				2000.00
10	Incidental charges	(RS.)				500.00
11	Repairing Charges	(RS.)				1000.00
12	Working Capital (1 to 11)	(RS.)				**66406.00**
13	Interest on working Capital @ 6%/annum (Rs.)					3984.36
14	Depreciation in implements					500.00
	& farm building	(RS.)				
15	Land Revenue cess & other taxes	(RS.)				80.00
16	**COST "A" (Items 12 to 15)**	**(RS.)**				**70970.36**
17	Rental Value of Land	(RS.)				12426.67
18	Int. on Fixed Capital @ 10%/annum	(RS.)				3900.00
19	Amortization cost	(RS.)				0.00
20	**COST "B" (Items 16 to 19)**	**(RS.)**				**87297.03**
21	Family Human Labour	Male (days)		18.00	200.00	3600.00
		Female (days)		24.00	150.00	3600.00
22	**Cost " C " (Items 20+21)**	**(RS.)**				**94497.03**
	(Cost " C " i.e.total cost/ha.)					
23	Yield per hectare (q)	(RS.)		63.93	3000.00	191790.00
24	Fodder yield per hectare (t)	(RS.)		37.28	2000.00	74560.00

Note: The seed rate/ha will vary with different crop geometry.

Crop geometry	**Seed rate (kg/ha)**
S_1 – 30 × 30 cm	21
S_2 – 45 × 15 cm	25
S_3 – 45 × 30 cm	15
S_4 – 60 × 15 cm	20
S_5 – 60 × 30 cm	12

Appendix VIII

Interaction effect of sowing period and crop geometry on fibre content (%) of baby corn (*Zea mays* L.)

Treatment combinations	Fibre content (%)		
	2013-2014	2014-2015	Pooled mean
$P_1 S_1$	5.58	5.59	5.59
$P_1 S_2$	5.54	5.57	5.56
$P_1 S_3$	5.47	5.50	5.49
$P_1 S_4$	5.57	5.58	5.58
$P_1 S_5$	5.48	5.49	5.48
$P_2 S_1$	5.59	5.59	5.59
$P_2 S_2$	5.58	5.60	5.59
$P_2 S_3$	5.48	5.50	5.49
$P_2 S_4$	5.56	5.58	5.57
$P_2 S_5$	5.53	5.54	5.54
$P_3 S_1$	5.60	5.61	5.60
$P_3 S_2$	5.59	5.60	5.59
$P_3 S_3$	5.50	5.53	5.52
$P_3 S_4$	5.59	5.59	5.59
$P_3 S_5$	5.54	5.57	5.56
$P_4 S_1$	5.58	5.58	5.58
$P_4 S_2$	5.57	5.57	5.57
$P_4 S_3$	5.47	5.48	5.48
$P_4 S_4$	5.54	5.56	5.55
$P_4 S_5$	5.47	5.48	5.48
F test	NS	NS	NS
SE(m)±	0.011	0.013	0.010
CD at 5%	-	-	-

Appendix IX

Interaction effect of sowing period and crop geometry on protein content (%) of baby corn (*Zea mays* L.)

Treatment combinations	Protein content (%)		
	2013-2014	2014-2015	Pooled mean
P_1 S_1	16.36	16.56	16.46
P_1 S_2	15.88	16.05	15.97
P_1 S_3	17.34	17.75	17.55
P_1 S_4	16.38	16.55	16.46
P_1 S_5	17.43	17.76	17.60
P_2 S_1	16.98	17.17	17.08
P_2 S_2	16.32	16.39	16.35
P_2 S_3	17.70	18.15	17.93
P_2 S_4	16.42	16.58	16.51
P_2 S_5	17.58	18.09	17.84
P_3 S_1	16.98	17.07	17.03
P_3 S_2	16.67	16.95	16.81
P_3 S_3	18.38	18.77	18.57
P_3 S_4	16.40	16.55	16.48
P_3 S_5	17.71	18.20	17.95
P_4 S_1	16.90	17.01	16.96
P_4 S_2	16.43	16.57	16.50
P_4 S_3	17.50	18.00	17.75
P_4 S_4	16.81	16.98	16.90
P_4 S_5	17.47	17.87	17.67
F test	NS	NS	NS
SE(m)$\pm$	0.188	0.165	0.162
CD at 5%	-	-	-

Appendix X

Interaction effect of sowing period and crop geometry on moisture content (%) of baby corn (*Zea mays* L.)

Treatment combinations	Moisture content (%)		
	2013-2014	2014-2015	Pooled mean
P_1 S_1	88.04	88.12	88.08
P_1 S_2	87.34	87.54	87.44
P_1 S_3	89.26	88.91	89.09
P_1 S_4	87.70	87.76	87.73
P_1 S_5	88.72	89.26	88.99
P_2 S_1	88.46	88.50	88.48
P_2 S_2	88.95	89.05	89.00
P_2 S_3	89.97	90.02	89.99
P_2 S_4	88.34	88.55	88.45
P_2 S_5	89.52	89.81	89.67
P_3 S_1	88.47	88.48	88.47
P_3 S_2	88.31	88.35	88.34
P_3 S_3	89.49	89.57	89.53
P_3 S_4	87.96	88.10	88.03
P_3 S_5	89.33	89.49	89.41
P_4 S_1	87.80	87.68	87.74
P_4 S_2	87.28	87.46	87.37
P_4 S_3	89.29	89.58	89.44
P_4 S_4	87.87	88.19	88.03
P_4 S_5	88.93	89.55	89.24
F test	NS	NS	NS
SE(m)$\pm$	0.331	0.398	0.323
CD at 5%	-	-	-

Appendix XI

Interaction effect of sowing period and crop geometry on total sugar (%) of baby corn (*Zea mays* L.)

Treatment combinations	Total sugar (%)		
	2013-2014	2014-2015	Pooled mean
P_1 S_1	3.25	3.25	3.25
P_1 S_2	3.20	3.22	3.21
P_1 S_3	3.33	3.35	3.34
P_1 S_4	3.26	3.28	3.27
P_1 S_5	3.31	3.33	3.32
P_2 S_1	3.26	3.28	3.27
P_2 S_2	3.25	3.27	3.26
P_2 S_3	3.33	3.37	3.35
P_2 S_4	3.26	3.30	3.28
P_2 S_5	3.34	3.35	3.35
P_3 S_1	3.26	3.31	3.29
P_3 S_2	3.28	3.30	3.29
P_3 S_3	3.38	3.41	3.40
P_3 S_4	3.29	3.31	3.30
P_3 S_5	3.35	3.38	3.36
P_4 S_1	3.30	3.30	3.30
P_4 S_2	3.25	3.26	3.26
P_4 S_3	3.36	3.37	3.36
P_4 S_4	3.27	3.29	3.28
P_4 S_5	3.34	3.36	3.35
F test	NS	NS	NS
SE(m)$\pm$	0.013	0.015	0.012
CD at 5%	-	-	-

Appendix XII

Interaction effect of sowing period and crop geometry on reducing sugar (%) of baby corn (*Zea mays* L.)

Treatment combinations	Reducing sugar (%)		
	2013-2014	**2014-2015**	**Pooled mean**
P_1 S_1	3.15	3.17	3.16
P_1 S_2	3.09	3.12	3.11
P_1 S_3	3.27	3.29	3.28
P_1 S_4	3.18	3.21	3.19
P_1 S_5	3.26	3.28	3.27
P_2 S_1	3.19	3.22	3.21
P_2 S_2	3.17	3.19	3.18
P_2 S_3	3.28	3.34	3.31
P_2 S_4	3.20	3.25	3.23
P_2 S_5	3.30	3.32	3.31
P_3 S_1	3.21	3.27	3.24
P_3 S_2	3.22	3.25	3.24
P_3 S_3	3.36	3.40	3.38
P_3 S_4	3.23	3.26	3.24
P_3 S_5	3.31	3.35	3.33
P_4 S_1	3.24	3.26	3.25
P_4 S_2	3.19	3.21	3.20
P_4 S_3	3.32	3.33	3.32
P_4 S_4	3.19	3.22	3.21
P_4 S_5	3.29	3.31	3.30
F test	NS	NS	NS
SE(m)$\pm$	0.019	0.019	0.016
CD at 5%	-	-	-

Appendix XIII

Interaction effect of sowing period and crop geometry on non-reducing sugar (%) of baby corn (*Zea mays* L.)

Treatment combinations	Non-reducing sugar (%)		
	2013-2014	**2014-2015**	**Pooled mean**
P_1 S_1	0.257	0.238	0.248
P_1 S_2	0.261	0.253	0.257
P_1 S_3	0.220	0.221	0.221
P_1 S_4	0.242	0.231	0.236
P_1 S_5	0.216	0.214	0.215
P_2 S_1	0.226	0.218	0.222
P_2 S_2	0.232	0.233	0.233
P_2 S_3	0.214	0.197	0.206
P_2 S_4	0.220	0.209	0.215
P_2 S_5	0.212	0.203	0.207
P_3 S_1	0.214	0.203	0.209
P_3 S_2	0.224	0.209	0.217
P_3 S_3	0.185	0.183	0.184
P_3 S_4	0.225	0.213	0.219
P_3 S_5	0.199	0.197	0.198
P_4 S_1	0.216	0.203	0.209
P_4 S_2	0.216	0.211	0.213
P_4 S_3	0.206	0.203	0.205
P_4 S_4	0.233	0.225	0.229
P_4 S_5	0.215	0.209	0.212
F test	NS	NS	NS
SE(m)$\pm$	0.012	0.008	0.008
CD at 5%	-	-	-

APPENDIX V

Interaction effect of sowing period and crop geometry on number of days to 50% tasseling and 50% cob emergence of baby corn (*Zea mays* L.)

Treatment combinations	Days to 50% tasseling			Days to 50% cob emergence		
	2013-2014	2014-2015	Pooled mean	2013-2014	2014-2015	Pooled mean
P_1 S_1	49.00	50.67	49.83	47.33	48.33	47.83
P_1 S_2	47.33	48.67	48.00	45.33	46.00	45.67
P_1 S_3	48.00	49.00	48.50	46.33	48.67	47.50
P_1 S_4	47.67	48.67	48.17	45.00	45.33	45.17
P_1 S_5	51.33	52.33	51.83	49.00	50.00	49.50
P_2 S_1	54.00	54.67	54.33	51.67	52.67	52.17
P_2 S_2	52.00	53.00	52.50	49.67	50.67	50.17
P_2 S_3	56.67	56.33	56.50	54.00	54.33	54.17
P_2 S_4	54.33	54.67	54.50	52.00	53.00	52.50
P_2 S_5	57.00	57.00	57.00	55.00	54.67	54.83
P_3 S_1	53.33	54.00	53.67	51.00	51.67	51.33
P_3 S_2	52.00	53.67	52.83	49.67	50.00	49.83
P_3 S_3	54.00	54.33	54.17	52.67	53.33	53.00
P_3 S_4	54.67	55.00	54.83	51.67	52.00	51.83
P_3 S_5	57.67	57.67	57.67	55.33	56.67	56.00
P_4 S_1	57.00	58.33	57.67	54.67	55.00	54.83
P_4 S_2	56.33	57.00	56.67	53.33	54.00	53.67
P_4 S_3	58.00	59.67	58.83	55.00	57.00	56.00
P_4 S_4	56.33	58.00	57.17	55.67	56.00	55.83
P_4 S_5	59.33	61.00	60.17	56.67	58.00	57.33
F test	NS	NS	NS	NS	NS	NS
SE(m)$\pm$	1.194	0.982	1.005	1.022	0.701	0.715
CD at 5%	-	-	-	-	-	-

APPENDIX VI

Interaction effect of sowing period and crop geometry on number of days to 50% silking and days to cob harvest of baby corn (*Zea mays* L.)

Treatment combinations	Days to 50% silking			Days to cob harvest		
	2013-2014	2014-2015	Pooled mean	2013-2014	2014-2015	Pooled mean
P_1 S_1	51.67	52.33	52.00	53.67	53.33	53.50
P_1 S_2	49.33	50.00	49.67	51.67	51.67	51.67
P_1 S_3	50.00	51.67	50.83	53.00	54.33	53.67
P_1 S_4	49.00	50.67	49.83	52.67	53.00	52.83
P_1 S_5	52.67	54.33	53.50	55.33	55.00	55.17
P_2 S_1	55.67	56.00	55.83	58.00	58.67	58.33
P_2 S_2	53.00	55.00	54.00	56.00	56.67	56.33
P_2 S_3	58.00	58.33	58.17	61.00	61.33	61.17
P_2 S_4	55.33	56.33	55.83	58.33	58.00	58.17
P_2 S_5	58.33	58.67	58.50	61.67	62.00	61.83
P_3 S_1	54.33	54.67	54.50	57.33	57.67	57.50
P_3 S_2	53.00	53.33	53.17	56.67	56.67	56.67
P_3 S_3	56.00	56.67	56.33	57.67	58.33	58.00
P_3 S_4	55.00	55.67	55.33	57.00	58.00	57.50
P_3 S_5	59.33	59.00	59.17	61.67	62.33	62.00
P_4 S_1	60.00	60.33	60.17	62.33	63.00	62.67
P_4 S_2	58.67	59.00	58.83	60.67	61.00	60.83
P_4 S_3	61.00	62.00	61.50	63.00	64.33	63.67
P_4 S_4	59.33	60.33	59.83	60.67	62.00	61.33
P_4 S_5	62.33	63.67	63.00	65.00	66.00	65.50
F test	NS	NS	NS	NS	NS	NS
SE(m)$\pm$	0.875	0.757	0.650	0.937	0.524	0.629
CD at 5%	-	-	-	-	-	-

APPENDIX VII

Interaction effect of sowing period and crop geometry on cob length (cm) and cob diameter (cm) of baby corn (*Zea mays* L.)

Treatment combinations	Cob length cm)			Cob diameter (cm)		
	2013-2014	2014-2015	Pooled mean	2013-2014	2014-2015	Pooled mean
P_1 S_1	10.78	10.77	10.78	1.44	1.46	1.45
P_1 S_2	10.70	10.73	10.71	1.36	1.39	1.38
P_1 S_3	11.20	11.20	11.20	1.47	1.48	1.48
P_1 S_4	10.67	10.75	10.71	1.46	1.46	1.46
P_1 S_5	10.95	10.93	10.94	1.48	1.48	1.48
P_2 S_1	10.77	10.77	10.77	1.45	1.46	1.45
P_2 S_2	10.75	10.76	10.76	1.48	1.48	1.48
P_2 S_3	11.31	11.33	11.32	1.48	1.48	1.48
P_2 S_4	10.68	10.72	10.70	1.45	1.45	1.45
P_2 S_5	11.27	11.28	11.28	1.49	1.49	1.49
P_3 S_1	10.73	10.76	10.75	1.45	1.46	1.45
P_3 S_2	10.56	10.59	10.58	1.42	1.43	1.42
P_3 S_3	10.87	10.89	10.88	1.50	1.50	1.50
P_3 S_4	10.54	10.56	10.55	1.46	1.48	1.47
P_3 S_5	10.80	10.81	10.81	1.51	1.51	1.51
P_4 S_1	10.67	10.68	10.67	1.49	1.49	1.49
P_4 S_2	10.51	10.52	10.52	1.47	1.48	1.47
P_4 S_3	10.73	10.78	10.76	1.51	1.52	1.51
P_4 S_4	10.55	10.59	10.57	1.49	1.49	1.49
P_4 S_5	10.71	10.74	10.72	1.50	1.51	1.51
F test	NS	NS	NS	NS	NS	NS
SE(m)$\pm$	0.132	0.082	0.096	0.026	0.020	0.015
CD at 5%	-	-	-	-	-	-

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