

Effect of varied crop geometry and planting periods on growth and yield of garlic (Allium sativum L.)

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Abstract

Garlic is an important medicinal bulb crop known for its hepatoprotective, antiinflammatory, antifungal and wound healing properties. Garlic is also an excellent remedy for treating fever cough and stomach ache. A field experiment entitled “Effect of varied crop geometry and planting periods on growth and yield of garlic (Allium sativum L.)” was conducted with split plot design at Horticulture farm, MARS, University of Agricultural Sciences, Raichur during the year 2020-21. The crop was sown at different planting periods viz., second fortnight of October, first fortnight of November, second fortnight of November and first fortnight of December with varied spacings of 10 x 7.5 cm, 15 x 7.5 cm and 20 x 7.5 cm. The experiment was objectivised to know the response of garlic for varied crop geometry and planting periods, to standardize the suitable crop density and planting period for garlic and to workout economics of garlic for varied crop geometry and planting periods. The results emanated from the experiment revealed that, amongst the four different planting periods, early planted crop on second fortnight of October resulted in vigorous growth and high yield through maximum per cent emergence, plant height, number of leaves, leaf area, leaf area index, plant girth, neck thickness, fresh weight of bulb, number of cloves per bulb, bulb girth, bulb length, bulb diameter, average clove weight, test weight of cloves and bulb yield. Amongst the crop geometries, lower plant density with wider spacing of 20 x 7.5 cm (6, 66,667 plants per ha) resulted in better performance of the all parameters except the bulb yield. Maximum bulb yield was harvested with higher plant density of 13, 33,333 plants ha-1 in a spacing of 10 x 7.5 cm. It was evident that, garlic planted during second fortnight of October with the spacing of 20 x 7.5 cm resulted in better performance of all the parameters. Maximum bulb yield was recorded with planting on second fortnight of October by adopting the spacing of 10 x 7.5 cm for which B:C ratio was also found to be high (2.11)

Discussion

Early planted garlic had enough time to complete both their growth and developmental stages which might have enhanced the production and partitioning of photo assimilates, thus leading to an increase in growth and yield characters. Vigorous growth in garlic results in production of more leaves, which may help in the synthesis of more photosynthates, thus resulting in increased accumulation of carbohydrates and other metabolites which ultimately contributed for higher yield. Results obtained by Kavita and Choudhary (2018) in garlic support the findings obtained in the present study. Wider spacing provided the individual plant more feeding zone and there was reduced competition for light intensity, nutrients and soil moisture which might have led to the increased photosynthetic activity leading to vigorous growth. The wider spaced garlic plants got judicious area around each plant which did not cause them to compete with each other for food and nutrients and as results of which each plant performed better in respect of individual bulb characters. The results of Shatrunjay et al. (2020) who worked on garlic were in conformity with the result obtained in the present study. At closer spacing of 10 x 7.5 cm, yield per hectare was higher compared to wider spacings because, the accommodated plants per hectare (13,33,333 plants ha-1) are more compared to other spacings of 20 x 7.5 cm (6,66,667 plants ha-1).The results of Murmu et al. (2019) was also found similar with the present investigation.

Conclusion

Among the different planting periods garlic planted during second fortnight of October has recorded the higher growth and yield parameters. Among the different crop geometries, garlic planted with a spacing of 20 x 7.5 cm resulted in the higher growth and yield parameters except bulb yield per hectare In this regard also, garlic planted during second fortnight of October with spacing of 10 x 7.5 cm. could be suggested as an optimum planting period and spacing to get higher economic returns.

Introduction

Garlic is a small underground medicinally important bulb crop. Garlic is the oldest cultivated herb and its origin is linked to central Asia and north-eastern Iran. During 2018, world production of garlic was 28.5 million tons and India was at second position, producing over 1.1 million metric tons. Rajasthan recorded the highest production of garlic in India, amounting to over 582 thousand metric tons . The bulb contains a colourless, odourless, water soluble and sulphur containing compound called allicin, an active constituent of garlic which, along with its decomposition products diallyl disulfide and diallyl trisulfide, are major contributors to the characteristic odour of garlic. Garlic is a wonderful remedy for treating fever, coughs, headache, stomach ache, haemorrhoids, asthma and bronchitis, low as well as high blood sugar and snakebites. It is also known for its hepatoprotective, antihelmantics, antiinflammatory, antioxidant, antifungal and wound healing properties. It provides protection against various types of cancers. Among several factors influencing production of the crop, plant geometry and planting seasons are considered important which can be manipulated to boost up the productivity. Planting period plays an important role on the growth and yield of garlic (Shuvra et al., 2017). The short day and cool temperature are favourable for vegetative growth of garlic plants, meanwhile, long day and high temperatures are better environmental conditions for bulb development . The time of planting is most important factor for obtaining vigour and highest yield in garlic . Planting of garlic at optimum spacing also increases the yield and improves the grade of bulbs. Accommodation of reduced number of plants per unit area involves wider spacing and this directly reduces the yield . Hence an experiment was conducted to know the response of garlic for varied crop geometry and planting periods, and to workout economics of garlic for varied crop geometry and planting periods.

Material and methods

The experiment was conducted during late rabi season in the fields of Herbal Garden, Main agricultural research station (MARS), University of Agricultural Sciences (UAS), Raichur which has a semi-arid type of climate. The experiment was laid out in split plot design and consisted of four planting periods (D1- 2 nd fortnight of October, D2- 1 st fortnight of November, D3- 2 nd fortnight of November and D4- 1 st fortnight of December) and three spacings (S1- 10 x 7.5 cm, S2- 15 x 7.5 cm and S3- 20 x 7.5 cm) comprising of 12 treatment combinations. Observations were recorded on ten randomly selected and labelled plants for growth parameters and yield parameters were recorded at harvest.



General view of the experimental site

Results

Garlic planted on second fortnight of October with spacing of 20 x 7.5 cm (D₁S₃) has significantly recorded higher growth and yield attributes except the total yield, whereas the bulb yield ha⁻¹ was higher in the garlic planted during second fortnight of October with spacing of 10 x 7.5 cm. Among the treatments, garlic planted during second fortnight of October with spacing of 20 x 7.5 cm resulted in significantly higher growth and yield components, such as per cent emergence (90.96%), plant height (51.04 cm), number of leaves per plant (11.43), plant girth (1.75 cm), leaf area index (0.92) fresh weight of bulb (23.62 g), number of cloves per bulb (24.16) and average clove weight (1.14 g) .Garlic planted on second fortnight of October at spacing of 10 x 7.5 cm (D₁S₁) resulted in significantly higher bulb yield per hectare (93.44 q ha⁻¹).

Treatments	Per cent emergence (%)	Plant height (cm)	Number of leaves	Plant girth (cm)	Leaf area index	Fresh wt. of bulb (g)	No. of cloves per bulb	Yield per hectare (q ha ⁻¹)
D ₁ S ₁	86.15	44.67	9.15	1.54	1.15	18.25	22.27	93.44
D ₁ S ₂	88.81	48.32	10.27	1.66	0.99	20.95	23.38	71.78
D ₁ S ₃	90.96	51.04	11.43	1.75	0.92	23.62	24.16	61.44
D ₂ S ₁	82.20	41.34	8.26	1.38	1.04	17.12	20.61	89.56
D ₂ S ₂	84.61	43.41	8.54	1.49	0.91	19.87	21.59	65.22
D ₂ S ₃	85.20	47.12	9.99	1.69	0.85	22.92	22.40	55.56
D ₃ S ₁	80.73	39.71	7.83	1.28	0.95	14.15	18.52	74.33
D ₃ S ₂	81.50	41.72	8.02	1.35	0.83	17.16	19.81	58.78
D ₃ S ₃	84.06	43.26	8.51	1.50	0.77	19.99	20.74	47.89
D ₄ S ₁	76.93	34.57	7.15	1.11	0.81	13.59	16.66	70.11
D ₄ S ₂	78.62	37.18	7.63	1.24	0.76	16.78	17.61	56.00
D ₄ S ₃	79.90	40.03	8.13	1.31	0.70	18.88	18.93	44.67
S.Em.±	6.80	2.52	0.73	0.11	0.13	1.38	1.19	6.73
C.D. @ 5%	14.41	5.34	1.55	0.23	0.29	2.93	2.53	14.28

References

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