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Original Research Article

Effect of Different Spacing on Growth and Yield of BBF Raised Summer Groundnut (*Arachis hypogea* L.) under Drip Irrigation

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A B S T R A C T

An agronomic field investigation was carried out during *summer* 2016 at experimental farm of AICRP on Irrigation Water Management, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani to study the effect of different spacing on growth and yield of broad bed furrow (BBF) raised summer groundnut (*Arachis hypogea* L.) under drip irrigation. The experiment was laid out in Randomized Block Design comprising of five treatments of spacing viz., 20cm×20cm (T_1), 22.5cm × 10cm (T_2), 30cm × 7.5cm (T_3), 30cm ×10cm (T_4), 30cm × 15 cm (T_5). All the treatments were replicated four times. The important findings emerged from this investigation revealed that summer groundnut sown at the of spacing 22.5cm × 10cm recorded significantly higher plant height of summer groundnut and was comparable with spacing 30cm ×10cm and 30cm × 7.5cm. Significantly higher number of leaves, leaf area per plant and dry matter accumulation of summer groundnut was observed in spacing 30cm×15cm and it was comparable with spacing 22.5cm × 10cm and 30cm ×10cm. Yield attributing characters viz. number of pods per plant, weight of pods per plant and shelling percentage were significantly higher in spacing 30cm×15cm and was comparable with spacing 20 cm × 20 cm and 30cm ×10 cm. Maximum dry pod yield on per hectare basis was produced in spacing 30cm × 7.5cm and was comparable with spacing 22.5 cm×10 cm and 30 cm×10 cm. Higher gross monetary returns, net monetary returns and B:C ratio was obtained in spacing 30cm×7.5cm.

Keywords

Groundnut, Spacing, BBF, Drip Irrigation

Introduction

Groundnut (*Arachis hypogea* L.) the king of oilseed crops plays a vital role in the economy of national edible oil. Worldwide groundnut is cultivated in more than 100 countries on an area of 26.4 million hectares with total production of 37.1 million metric tonnes and an average productivity of 1.4 metric t ha^{-1}. In India the area under groundnut cultivation during 2014-15 was 4.5 million ha with total production of 6.62 million tonnes with an average productivity of 1341 kg ha^{-1}. Gujarat, Andhra Pradesh, Tamil Nadu, Karnataka, Maharashtra are the major groundnut producing states in India, contributing more than 80% of total groundnut production.

The main reason for low productivity of groundnut is the cultivation of crop restricted to *kharif* season which is dependent on vagaries of monsoon and epidemics of foliar diseases. During deficit monsoon, crop suffers from soil droughts to different degrees while during above normal rainfall seasons, water logging, ill-drainage and inaccessibility to field for weed control measures aggravate the situation. These difficulties resulted into shift of this crop from *kharif* to *summer* season under irrigated conditions. The *summer* groundnut has become increasingly popular as it is an ideal season by keeping in view crop's requirement of sunshine and high temperature. Also the crop gives three times higher yield than that of *kharif.*

The cost effective technologies for utilization of natural resources such as optimum row spacing, precise nutrient and irrigation management, timely weed management etc are the important agronomic techniques for enhancing and stabilizing the yield of any crop. Considering the above facts, plant density is one of the important factors which play a vital role in enhancing the production and productivity of groundnut. Plant density (plant spacing) is an efficient management tool for maximizing grain yield by increasing capture of solar radiation within the canopy thereby increasing land use efficiency. Broad Bed Furrows (BBF) provide favourable soil atmosphere by lowering the bulk density in the surface layer with low soil strength. Groundnut pods grow underground, therefore the loose and well aerated seed bed is important as loose soil surface is useful for penetration of pegs and development of pods. Studies at ICRISAT showed that increasing yield of groundnut can be obtained by growing it on broad bed furrow. Nalawade and More (1993) reported significant response of broad bed furrow (BBF) technique resulting in higher pod yield.

Water is prime for all biological activities and now a day's water has been recognized more precious than the gold and oil. Soil and water being the basic limited resources, it is necessary to have proper planning to its optimal use for maximizing the production of food and fibre to satisfy the demand of increased food production. In drip irrigation water is supplied frequently with a volume of water approaching the consumptive use of plants and thereby minimizing conventional losses, deep percolation, runoff and soil water evaporation. Drip irrigation can save water up to 40-70 percent as well as increasing the crop production to extent of 20-100 percent (Reddy and Reddy 2003). The drip irrigation keep the root zone nearly at field capacity, thereby avoiding moisture stress and maintain proper soil aeration. Similarly system operates on much lower line pressure, thus providing saving in energy requirement. Hence, it is essential to give more concern to scheduling of drip irrigation as it fulfils the twin objectives of higher productivity and optimum use of water. Taking into consideration these facts and to explore the yield potential of summer groundnut under different spacing on broad bed furrow (BBF) with drip irrigation the present investigation was implemented at AICRP on Irrigation Water Management, VNMKV, Parbhani during summer 2016.

Materials and Methods

A field experiment was undertaken at, AlCRP on Irrigation Water Management, VNMKV, Parbhani during summer 2016 to study the effect of different spacing on growth and yield of broad bed furrow (BBF) raised summer groundnut (*Arachis hypogea* L.) under drip irrigation. The soil of the experimental field was clayey (52.0%) in texture, medium in organic carbon (0.52 %), poor in nitrogen (246.7kg ha^{-1}), medium in available phosphorus (12.96 kg ha^{-1}), high in potash (411.9kg ha^{-1}) and slightly alkaline in reaction (pH 8.10). The experiment was laid out in Randomized Block Design comprising of five treatments of spacing viz., 20cm×20cm (T_1), 22.5cm × 10cm (T_2), 30cm × 7.5cm (T_3), 30cm ×10cm (T_4), 30cm

× 15 cm (T_5). All the treatments were replicated four times. The broad bed furrows of 150 cm with top width of 90 cm were laid out in the experimental plot with the help of bullock drawn ridger and thereafter one lateral of 16 mm with discharge of 2.4 lps (litre per second) was laid down in the centre of each bed. Variety used for sowing was TAG-24. One common irrigation of 60 mm was applied to ensure good germination. The water was scheduled on daily basis at 1.0 PE from 15 days after sowing. The pan evaporation was measured daily from the U.S.W.B. class 'A' open pan evaporimeter installed at the Agro meteorology observatory, Department of meteorology, VNMKV, Parbhani during the period of experiment.

Results and Discussion

Effect of spacing on growth attributes

The data furnished in Table 1 revealed that spacing 22.5cm × 10cm (T_2) recorded significantly higher plant height of summer groundnut over spacing 20cm×20cm (T_1) and 30cm × 15 cm (T_5), however it was at par with spacing 30cm ×10cm (T_4) and 30cm × 7.5cm (T_3). This might be due to the higher plant density or closer spacing that has explored competition between the plants for light and eventually resulted in better plant height. Similar trend was observed by Gunri *et al.,* (2010). However, the numbers of branches per plant of summer groundnut were not influenced significantly by different spacing. Significantly higher mean leaf area and dry matter accumulation was observed in spacing 30cm×15cm (T_5) and was at par with spacing 22.5cm × 10cm (T_2) and 30cm ×10cm (T_4). The wider spacing might have provided the enough space for the crop to express its full vegetative potential that have reflected in achieving the better leaf area and finally resulted in more dry matter accumulation. These findings are parallel with earlier findings reported by Reddy and Giri (1989), Gunri *et al.,* (2010) and Mamunur (2014).

Effect of spacing on yield attributes

The data furnished in Table 2 exhibited that significantly higher number of pods per plant and weight of pods per plant were harvested in spacing 30 cm ×15 cm which was comparable with spacing 20 cm × 20 cm and 30 cm × 10 cm. This might be due to the beneficial effect of adequate space available in the above crop geometry for better development of pods and less competition for water and nutrients which had helped to increase the number of developed pods per plant. These findings are in line with the earlier findings reported by Reddy and Giri (1989). However, different spacing of summer groundnut in context to shelling percentage and hundred kernel weight were non-significant.

Effect of spacing on yield and economics

The spacing 30 cm × 7.5 cm recorded significantly higher dry pod yield and was at par with spacing 22.5 cm ×10 cm and 30 cm ×10 cm (Table 3). Though the per plant yield of these spacing were less, however the per hectare dry pod yield was more due to accommodation of more number of plants per hectare. These results were in close conformity with the earlier findings reported by Raju *et al.,* (1985).

Similarly the spacing 30cm×7.5cm recorded significantly higher gross monetary returns and net monetary returns over rest of the spacing (Table 3). The higher dry pod yield in spacing 30cm × 7.5cm might have helped to achieve higher gross monetary returns and net monetary returns. Similar trend was reported by Basak *et al.,* (1995). Higher benefit cost ratio of summer groundnut was obtained in spacing 30 cm ×7.5 cm while lower benefit cost ratio was noted in spacing 20cm×20cm (Table 3). These findings are in line with the earlier findings reported by Zagade *et al.*, (2007).

Table.1 Growth attributes of summer groundnut as influenced by different spacing

Treatments	Plant height (cm)	No. of branches	Leaf area per plant (dm^2)	Dry matter (g/plant)
T_1 (20 cm × 20 cm)	22.3	8.10	13.91	20.95
T_2 (22.5 cm×10 cm)	27.1	8.15	14.30	21.20
T_3 (30 cm × 7.5 cm)	24.2	8.05	13.20	20.35
T_4 (30 cm × 10 cm)	25.1	8.25	14.50	22.70
T_5 (30 cm × 15 cm)	21.9	8.65	15.65	24.50
SE±	1.0	0.17	0.44	0.75
CD at 5 %	2.9	NS	1.37	2.25
GM	24.1	8.24	14.31	21.94

Table.2 Yield attributes of summer groundnut as influenced by different spacing

Treatments	Number of pod $plant^{-1}$	Weight of pod $plant^{-1}$ (g)	Shelling %	100 kernel weight (g)
T_1 (20 cm × 20 cm)	27.50	16.50	71.50	40.63
T_2 (22.5 cm×10 cm)	21.00	12.00	70.83	39.61
T_3 (30 cm × 7.5 cm)	22.00	13.00	69.25	40.50
T_4 (30 cm × 10 cm)	28.00	18.00	72.23	41.13
T_5 (30 cm × 15 cm)	30.00	19.75	72.40	42.00
SE±	0.72	0.62	2.45	1.41
CD at 5 %	2.22	1.91	NS	NS
GM	19.60	15.85	71.24	40.77

Table.3 Yield and economics of summer groundnut as influenced by different spacing

Treatments	Dry pod yield (kg ha^{-1})	GMR ($Rs.ha^{-1}$)	NMR ($Rs.ha^{-1}$)	B:C Ratio
T_1 (20 cm × 20 cm)	3512	154606	86188	2.26
T_2 (22.5 cm×10 cm)	4267	189067	114441	2.53
T_3 (30 cm × 7.5 cm)	4622	204348	129722	2.74
T_4 (30 cm × 10 cm)	4220	188334	117255	2.65
T_5 (30 cm × 15 cm)	3600	157254	89722	2.33
SE±	143	9922	1325	-
CD at 5 %	440	30577	4082	-
GM	4054	178722	107466	2.50

References

Basak, N.C., M.K. Choudhari and F.U. Mia 1995. Effect of spacing on growth and economics of groundnut. *Legume Res*. 18(1): 45-49.

Gunri, S.K., Nath R and Saha D 2015. Performance of groundnut under different plant geometry and fertility levels in new alluvial zone of West Bengal. *Karnataka J. Agric. Sci*., 21(1): (102-103).

Mamunur R., 2014. Performance of groundnut under different plant population and weed management. *M.Sc. Thesis* Submitted to the Faculty of Agriculture, Sher-e-Bangla Agricultural University, Dhaka.

Nalawade, S.K. and S.D. More. 1993. Effect of land configuration on yield and nutrient content by groundnut cultivars in medium black soils. *J. Maharashtra agric. Univ*. 18(3):498-499.

Raju, M.S.; S. Satyanarayana; S.N. Reddy and B.B. Reddy 1985. Response of groundnut var. robot-33-1 to phosphorous application under varying plant population levels. *J. Oilseeds Rs*. 2:291-294.

Reddy, C.R. and S.R. Reddy 2003. Scheduling irrigation for peanuts with drip irrigation. *J. Agric. Water Manage*. 23: 1-9.

Reddy, N.R. and G. Giri 1989. Response of groundnut verities to plant density and phosphorus. *Indian J. Agron.* 34(4): 515-516.

Zagade, M.V., Chavan S.A., Thorat S.T., Shaikh M.S.I. and Bhagat. S.B. 2007. Effect of irrigation levels, polythene mulch and plant populations on yield and economics of *rabi* groundnut. *J. Maharashtra. agric. Univ*. 32(2): 198-201.