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RESEARCH PAPER

Effect of plant spacings on the yield and yield attributes of groundnut varieties

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Abstract : The experiment was laid out in Factorial Randomized Block Desigh (FRBD) with eight treatments replicated thrice. The treatments consisted of 30 x 15, 20 x 15, 35 x 15 and 35 x 20 cm plants spacing and two varieties Kaushal (Bunch type), Chitra (Spreading type). The results showed that plant spacing of 35x20 cm gave higher yield, lowest yield was recorded in plant spacing of 20x15cm. The growth and yield attributes of groundnut were significantly reduced when the crop was provided with less spacing, groundnut required wider plant spacing (35 x 20 cm) to express its maximum yield potentiality.

Key Words : Groundnut, Spacing, Varieties, Spreading, Bunch, Yield

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INTRODUCTION

Groundnut is one of the world's most popular crops cultivated throughout the tropical and sub-tropical areas where annual precipitation is between 1000-1200 mm for optimum growth of the crop. Leading world producers of the crop are China, India, Nigeria, USA and Senegal. Among the vegetable sources, groundnut can play an important role as it contains the highest amount of oil (48% in seed) with the highest yield compared to other oil seed crops. (Khaleque, 1986). Several research reports established the fact that the proper row and plant spacing determined the yield of a particular variety in a specific agro-ecological environment (Patel *et al.*, 1985). Plant density is highly associated with yield potential and optimum plant density per unit area is an important non monetary input to decide the maximum groundnut level. Considering all these facts, the present study was undertaken to find out the influence of plant spacing on the growth and yield of different groundnut varieties.

MATERIAL AND METHODS

Field experiment was conducted during *Kharif* season of 2010 at Central Research Farm, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad. The soil of the experimental site was sandy loam with pH (7.7) and medium in organic carbon (0.4%). The initial status of available N, P_2O_5 and K_2O of the experimental site was 220.0, 18.8 and 250.0 kg ha^{-1}, respectively. The experiment was laid out in a Factorial Randomized Block Design (FRBD) with eight treatments replicated thrice. The treatments consisted of 30 x 15, 20 x 15, 35 x 15 and 35 x 20 cm plants spacing and two varieties Kaushal (Bunch type), Chitra (Spreading type). The treatments were Kaushal + 30 x 15 cm (T_1), Kaushal + 20 x 15 cm (T_2), Kaushal + 35 x 15 cm (T_3), Kaushal + 35 x 20 cm (T_4), Chitra + 30 x 15 cm (T_5), Chitra + 20 x 15 cm (T_6), Chitra + 35 x 15 cm (T_7), Chitra + 35 x 20 cm (T_8). Observations were recorded for various growth attributes.

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RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Yield attributes:

The yield attributes like number of pods/plant, pod yield (q/ha), haulm yield (q/ha), shelling (%) were significantly influenced by various treatments (Table 1). Maximum no of pods /plant (22.27) were recorded with treatment (Chitra + 35 x 15cms). Minimum no of pods /plant (14.40) was recorded in (Chitra + 20 x 15cms). Lower plant density increased pod yield per plant, but decreased pod yield per unit area. In terms of pod yield per unit area, the optimum spacing was 35 x 15 cm and 35 x 20 cm, respectively. Increasing plant density tended to decrease crop growth rate per plant, pod growth rate per plant and to increase leaf area index and crop growth rate per unit area (Jyothi *et al*., 2004).

Table 1 : No. of pods/plant, pod yield (q/ha) and shelling (%) as influenced by spacing and variety

Treatments	No. of pods/ plant	Pod yield (q/ha)	Haulm yield (q/ha)	Shelling (%)
T_1	18.40	20.26	14.07	43.18
T_2	20.80	24.15	16.75	41.36
T_3	15.47	23.94	16.87	41.91
T_4	15.40	18.70	13.18	38.62
T_5	18.20	24.37	16.68	44.03
T_6	14.40	19.92	13.89	44.77
T_7	22.27	22.60	15.56	47.41
T_8	21.40	25.00	16.49	45.01
F-test	NS	NS	NS	NS
S.E. (±)	0.960	1.439	0.836	2.752
C.D. (P=0.05)	2.059	3.087	1.794	5.904

NS=Non-significant

Higher pod yield (25.00 q/ha) was recorded with treatment (Chitra + 35x20 cm). Lowest pod yield (18.70 q/ ha) was recorded with treatment (Kaushal + 35x20 cm). Closer spacing of 30 x 10 cm recorded significantly higher pod yield of 2576, 2530 and 2192 kg ha^{-1} with a BCR of 1.80, 2.50, and 1.60, respectively during *Rabi* seasons of all the three years. (Chandrasekaran *et al.,* 2007). Groundnut pod yield was 1.1, 1.2 and 2.1 t/ha in cv. J-11, JL-24 and Dh-29, respectively. Yield was highest with 30 x 15 or 30 x 20 cm spacing, depending on cultivar. Increasing plant density tended to decrease crop growth rate per plant, pod growth rate per plant and to increase leaf area index and crop growth rate per unit area. Increasing plant density decreased harvest index, Plant density also affected the proportion of yield on main stems and different branches (Mishra *et al.,* 1998).

Higher haulm yield (16.87 q/ha) was recorded with treatment (Kaushal + 35x15). Lowest haulm yield (13.18 q/ ha) was recorded with treatment (Kaushal + 35x20 cm). The haulm yield and biological yield were recorded maximum under 22.5 cm x 8 cm planting geometry. Application of 40 kg N/ha significantly improved the studied growth characters, yield attributes and yield (Meena *et al*., 2011). Increasing plant density tended to decrease crop growth rate per plant, pod growth rate per plant and to increase leaf area index and crop growth rate per unit area. Increasing plant density decreased harvest index, Plant density also affected the proportion of yield on main stems and different branches (Mishra *et al*., 1998).

Table 2 : Effect of spacing and varieties on no. of pods/plant and pod yield (q/ha)

Factors	No. of pods / plant	Pod yield (q/ha)
Spacing		
30 x 15	19.60	22.21
20 x 15	15.43	21.32
35 x 15	16.30	22.14
35 x 20	21.83	23.80
F-test	S	NS
S.E. (±)	0.480	0.719
C.D. (P=0.05)	1.029	1.543
Varieties		
Kaushal	18.58	22.79
Chitra	18.00	21.94
F-test	S	NS
S.E. (±)	0.192	0.288
C.D. (P=0.05)	0.412	0.617
Interaction (S x V)		
F-test	S	S
S.E. (±)	0.960	1.439
C.D. (P=0.05)	2.059	3.087

NS=Non-significant

Highest shelling % (47.41) was recorded with treatment (Chitra + 35x15cms). Lowest shelling % (38.62) was recorded with V_1S_4 treatment (Kaushal + 35x20cms). Increasing plant density tended to decrease crop growth rate per plant, pod growth rate per plant and to increase leaf area index and crop growth rate per unit area. Increasing plant density decreased harvest index, Plant density also affected the proportion of yield on main stems and different branches (Mishra *et al.,* 1998).

Effect of interaction between spacing and varieties on no. of pods /plant and pod yield (q/ha):

The statistical analysis of data revealed that there was a significant effect due to interaction between spacing and varieties on number of pods /plant and pod yield (q/ha).

Maximum number of pods /plant (22.27) were

Table 3 : Effect of spacing and varieties on haulm yield (q/ha) and shelling (%)

Factors	Haulm yield (q/ha)	Shelling (%)
Spacing		
30 x 15	12.67	42.27
20 x 15	12.67	40.27
35 x 15	12.50	44.40
35 x 20	12.67	46.21
F-test	NS	NS
S.E. (±)	1.848	1.376
C.D. (P=0.05)	3.963	2.952
Varieties		
Kaushal	12.50	44.13
Chitra	12.25	42.44
F-test	NS	NS
S.E. (±)	0.739	0.550
C.D. (P=0.05)	1.585	1.181
Interaction (S x V)		
F-test	NS	NS
S.E. (±)	3.695	2.752
C.D. (P=0.05)	7.927	5.904

NS=Non-significant

recorded with treatment (Chitra + 35 x 15cms). Minimum number of pods /plant (14.40) were recorded in (Chitra + 20 x 15cms). Lower plant density increased pod yield per plant, but decreased pod yield per unit area. In terms of pod yield per unit area, the optimum spacing for TNS 9 and NC.Acc.550 was 35 x 15 cm and 45 x 22 cm, respectively. Increasing plant density tended to decrease crop growth rate per plant, pod growth rate per plant and to increase leaf area index and crop growth rate per unit area Tarimo *et al.* (1999). Higher pod yield (25.00 q/ha) was recorded with treatment (Chitra + 35x20 cms). Lowest pod yield (18.70q/ha) was recorded with treatment (Kaushal + 35x20 cms). Closer spacing of 30 x 10 cm recorded significantly higher pod yield of 2576, 2530 and 2192 kg ha^{-1} with a BCR of 1.80, 2.50, and 1.60, respectively during *Rabi* seasons of all the three years (Chandrasekaran *et al.*, 2007).

Effect of interaction between spacing and varieties on haulm yield (q/ha) and shelling (%):

The statistical analysis of data revealed that there was no significant effect due to interaction between spacing and varieties on haulm yield and shelling (%).

Higher haulm yield (16.87 q/ha) was recorded with V_1S_3 treatment (Kaushal + 35x15). Lowest haulm yield (13.18 q/ha) was recorded with V_1S_4 treatment (Kaushal + 35x20 cms), but there is no significant difference between spacing and varieties. Highest shelling % (47.41) was recorded with V_2S_3 treatment (Chitra + 35x15cms). Lowest shelling % (38.62) was recorded with V_1S_4 treatment (Kaushal + 35x20cms), but there is no significant difference between spacing and varieties. The haulm yield and biological yield were recorded maximum under 22.5 cm x 8 cm planting geometry. Application of 40 kg N/ha significantly improved the studied growth characters, yield attributes and yield. Meena *et al.* (2011)

Conclusion:

On the basis of above findings, it may be concluded that groundnut crop with 35x20 cm spacing was found significantly better than other, which increased the number of pods per plant and pod yield. Among the varieties and interaction there is no significant difference.

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