INFLUENCE OF POTASSIUM LEVELS AND SPACING ON GROWTH AND YIELD OF SUMMER GROUNDNUT (*Arachis hypogaea* L.)

Abstract

Background: Groundnuts are immensely rich in potassium, calcium, phosphorus and B vitamins which offers you with a host of health benefits. Groundnuts are a great blend of healthy fats, protein and fibre that curbs your appetite, lowers the risk of heart disease and regulates blood glucose levels

Objectives: Effects of potassium levels and spacing on growth and yield of summer groundnut

Methods: With the goal of studying the effect of potassium and spacing on growth and yield of groundnut under a Randomized block design with 9 treatments (T1-T9) The experimental results revealed that 120 kg N/ha + 60 kg P/ha produced maximum plant height (49.7 cm) No. of Nodules/Plant(106) plant dry weight (22.9) No of pods (19.3) no of kernals (2.7) pod yield (3.62 ta/ha) Halum yield (4.65ta/ha).

Conclusion : The combination of 40kg potassium and 30x10 proved to be the most advantageous to farmers, resulting in, plant height (49.7 cm) No. of Nodules/Plant(106) plant dry weight (22.9) No of pods (19.3) no of kernals (2.7) pod yield (3.62 ta/ha) Halum yield (4.65ta/ha) respectively.

Key word: Potassium, Spacing, Yield

Introduction

Groundnut (Arachis hypogea L.) is an herbaceous crop of Leguminosae family. The plant has central stem upright with many branches which are different from prostate to almost erect based on the variety. Groundnut, also known as “The king of oilseeds”. In India, it is produced mostly as oilseed crop, covers an area of 40-50% and gives a production of 60 to 70%. It is first major oil seed crop among all the other oil seed harvests. In India, it covers an area of 85 lakh hectares and produced 84 lakh tones from southern states (Andhra Pradesh, Tamil Nadu, Karnataka), from western and central parts (Gujarat, Maharashtra, Madhya Pradesh), from northern states (Uttar Pradesh, Rajasthan), north western part of the subcontinent i.e., Punjab and from eastern India (Orissa). However, the maximum yield and area of 84% is covered by southern and western regions (1)

Potassium is a multifunctional versatile nutrient, indispensable for plants. Among the three major nutrients, potassium (K) has a special position as evident by its role in increasing the crop yield by adding tolerance to various biotic and abiotic stresses [2] and[3]. The potassium application improves the kernel size of the groundnut, test weight and shelling percentage. Groundnut crop well for potassium and play role in maintaining balance in enzymatic, stomatal activity (water use), transport of sugars, water and nutrient and synthesis of

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protein, photosynthesis and starch thus K application increases growth and yield attributes in groundnut [4] Planting density is one of the main factors that play an important role on growth, yield and quality of [5]reported that plant dry matter, dry weight/plant and branching were found to be maximum along with yield attributes (pod/plant, yield/plant and 1000-grain weight).

However, thin spacing lower the production of the crop plants because of the competitiveness of the crop plants for nutrients and moisture [7]. Likewise, the row alignment too influences photosynthetic competence and canopy temperature for a better light interception and greater photosynthetic efficiency, a sustained and uniform orientation as well as crop distribution is needed [8] Proper application of spacing along with suitable nutrients will help in attaining maximum productivity within India. All these points are the basis of the present study which was laid out in Zaid 2021.

Materials and Methods

The experiment was carried out during summer season of 2021 at CRF (Crop Research Farm), Department of Agronomy, Naini Agricultural Institute, SHUATS, Prayagraj (UP). The farm is geographically situated at 25° 24' N latitude and 81° 51' Longitude. The experiment was carried out in Randomized Block Design (RBD) with nine treatments which are replicated thrice. The experiment consist of nine. 20 kg K_2O/ha + 20 cm x 10 cm, (T1) 20 K_2O/ha + 30 cm x 10 cm (T2) , 20 K_2O/ha + 40 cm x 10 cm (T3) , K_2O/ha + 20 cm x 10 cm, (T4) K_2O/ha + 30 cm x 10 cm (T5) , K_2O/ha a + 40 cm x 10 cm (T6), 40 K_2O/ha + 20 cm x 10 cm, (T7) 40 K_2O/ha + 30 cm x 10 cm, (T8) 40 K_2O/ha + 40 cm x 10 cm (T9 The mean (maximum and minimum) temperature was 37.98^oC and 24.21^oC respectively, mean (maximum and minimum) relative humidity was 82.16 percent and 45.26 percent during the crop growing season. The experimental soil was sandy loam in texture, nearly neutral in soil reaction (pH 7.1), low in organic carbon (0.32)edium in available N (70 Kg/ha),p (12.50 Kg/ha) and k (216.10 Kg/ha). Fertilizers were applied in the form of urea, single super phosphate and murate of potash, respectively. The Shelling was done manually, seeds were winnowed and cleaned and seed weight per net lot was recorded on hectare basis and expressed in kg /ha. The observation regarding yield were recorded after harvesting of crop.The recording with references of Gomez KA, Gomez AA[6]

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Results and Discussions

Growth attribute

Plant height

At Harvest recorded that significantly maximum plant height (61.20cm) was recorded with application of 40 Kg k/ha+ 30 x 10 cm. However, treatment with application of 30 Kg k/ha+ 30 x 10 cm (59.40 cm), and 40 Kg k/ha+ 40 x 10 cm (58.60 cm) were statistically at par with 40 Kg k/ha+ 30 x 10 cm compared to other treatments. Appling of spacing 30 x10cm give less competition for the plants so nutrient uptake will me more so plant height will be increases similar finding are seen in [7]

Number of nodules.

At harvest recorded that significantly maximum number of nodules (65.21) recorded with application of 40 Kg k/ha + 30 x 10 cm which was significantly superior over rest of the treatments. However, treatment with application of 30 Kg k/ha + 30 x 10 cm (62.94) is statically at par with 40 Kg k/ha + 30 x 10 cm as compared to other treatments.
The rhizobium inoculation along with fertilizer application including MOP significantly increased the number nodules and nodule dry weight compared with uninoculated control in mungbean cultivars. **[2]**

Plant dry weight

At harvest recorded that significantly maximum plant dry weight (31.93) was observed with application of 40 Kg k/ha+ 30 x 10 cm. However, treatment with application of 30Kg k/ha+ 30 x 10 cm (32.38), 30Kg k/ha+ 40 x 10 cm (32.26) and 40 Kg k/ha+ 40 x 10 cm (32.48) were statistically on par with 40 Kg k/ha + 30 x 10 cm compared to other treatments. By less competition there will good in take of food and so photosynthesis done will and the dry weight of the plant will be increases.[8] by applying potassium ADP and energy in tissues will be increases so it also increases the photosynthetic rate [2]

Yield attributes

Number of pods/plant.
Number of pods/plants recorded maximum was obtained with application of 40Kg k/ha+ 30 x 10 cm (19.30). However, treatment with application of 30Kg k/ha+ 30 x 10 cm (19.00) and 40Kg k/ha+ 40 x 10 cm (18.80) were statistically on par with application of 40Kg k/ha+ 30 x 10 cm compared to other treatments. when there is good growth by spacing and potassium the no of pods per plant will be increases [2] and [8]

Number of kernels/pod
Number of kernels/plants recorded maximum was obtained with application of 40Kg k/ha+ 30 x 10 cm (2.00). However, treatment with application of 30Kg k/ha+ 30 x 10 cm (2.00) and 40Kg k/ha+ 40 x 10 cm (2.00) were statistically on par with application of 40Kg k/ha+ 30 x 10 cm compared to other treatments.similar finding was recorded in the [8]

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Pod yield (t/ha)

Pod yield, recorded maximum with application of 40Kg k/ha+ 30 x 10 cm (3.62 t/ha) significantly superior over rest of the treatments. However, treatment with application of 30 Kg k/ha+ 30 x 10 cm (3.48 t/ha) were statistically at par with application of 40Kg k/ha+ 30 x 10 cm compared to other treatments. When there free uptake nutrient by the spacing and free energy to new tissue by potassium there will good growth in the pod yield [3] and [8]

Halum yield (t/ha)

Halum yield, recorded maximum with application of 40Kg k/ha+30 x 10 cm (44.76 t/ha) significantly superior over rest of the treatments. However, treatments with application of 30Kg t/ha+ Rhizobium (43.19 t/ha) were statistically at par compared to other treatment combination.by apply ing potassium and free spacing there will lot of improvement in nutrient uptake, energy in new tissues and photosynthesis so the halum yield will be increases [3]

Table 1:

S.No	Treatments	Plant height (cm)	No. of Nodules/Plant	Plant dry weight (g/plant)
1	K 20 kg/ha + 20 X 10 cm	44.2	95.7	17.53
2	K 20 kg/ha + 30 X 10 cm	44.9	98.8	18.99
3	K 20 kg/ha + 40 X 10 cm	46.2	103.3	20.21
4	K 30 kg/ha + 20 X 10 cm	45.7	101.7	19.44
5	K 30 kg/ha + 30 X 10 cm	46.9	106	22.21
6	K 30 kg/ha + 40 X 10 cm	47.2	103.9	21.21
7	K 40 kg/ha + 20 X 10 cm	46.3	101.9	19.55
8	K 40 kg/ha + 30 X 10 cm	49.7	106.9	22.99
9	K 40 kg/ha + 40 X 10 cm	48.3	104.6	21.55
	F-test	S	S	S
	SE(±)	0.54	0.64	0.28
	CD (P=0.05)	1.61	1.92	0.83

Table 2: No. of pods/plant, No. of kernels/pod, Seed index (g), seed yield (kg/ha), halum yield (kg/ha), harvest index (%)

S.No	Treatments	No. Pods/plant	No.of kernals/pod	Seed index (g)	Pod yield (g)	Halum yield (g)	Harvest index (%)
1	K 20 kg/ha + 20 X 10 cm	16.9	1.4	35.18	2.82	3.79	42.60
2	K 20 kg/ha + 30 X 10 cm	17.5	1.5	35.4	2.85	3.93	41.94
3	K 20 kg/ha + 40 X 10 cm	18	1.8	38.5	3.1	4.21	42.77
4	K 30 kg/ha + 20 X 10 cm	17.5	1.5	35.98	3.03	4.04	42.88
5	K 30 kg/ha + 30 X 10 cm	19	2.3	39.95	3.51	4.56	43.28
6	K 30 kg/ha + 40 X 10 cm	18.3	1.8	39.6	3.14	4.39	41.70
7	K 40 kg/ha + 20 X 10 cm	17.9	1.5	36.9	2.99	4.13	42.00
8	K 40 kg/ha + 30 X 10 cm	19.3	2.7	41.5	3.62	4.65	43.72
9	K 40 kg/ha + 40 X 10 cm	18.8	2	39.17	3.3	4.51	43.14
	F-test	S	S	S	S	S	NS

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SE(±)	0.21	0.06	0.58	0.07	0.05	0.82
CD (P=0.05)	0.64	0.53	7.74	0.22	0.17	-

Conclusion

The combination of 40kg potassium and 30x10 proved to be the most advantageous to farmers, resulting in, plant height (49.7 cm) No. of Nodules/Plant(106) plant dry weight (22.9) No of pods (19.3) no of kernals (2.7) pod yield (3.62 ta/ha) Halum yield (4.65ta/ha) respectively. Hence we can recommend for the farmers.

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