International Journal of Environment and Climate Change

Volume 13, Issue 6, Page 149-157, 2023; Article no.IJECC.98485
ISSN: 2581-8627
(Past name: British Journal of Environment & Climate Change, Past ISSN: 2231–4784)

Evaluation of Varieties and Gypsum on Growth and Yield of Groundnut (*Arachis hypogaea*)

Pabbathi Praneeth Reddy [a++*] and Victor Debbarma [a#]

[a] Department of Agronomy, Naini Agriculture Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj - 211007, Uttar Pradesh, India.

Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/IJECC/2023/v13i61810

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/98485

Original Research Article

Received: 05/02/2023
Accepted: 08/04/2023
Published: 13/04/2023

ABSTRACT

A field experiment was conducted during *Zaid* 2022 at Crop Research Farm, Department of Agronomy, SHUATS, Prayagraj (U.P) to study treatments consisting of Varieties *viz.* K-1812, K-6 and K-Amaravati and three levels of Gypsum *viz*. 200, 300, 400 kg/ha. The results revealed that treatment 3 (K-1812 (Lepakshi) + Gypsum (400 kg/ha) recorded significantly higher number of nodules/plant (52.00), higher dry weight (30.96 g), crop growth rate (30.63 g/m^2/day), relative growth rate (0.0447 g/g/day), maximum number of pods/plant (39.93), maximum number of kernels/pod (2.0), Shelling percentage (72.4%), Pod yield (3.67 t/ha), higher seed yield (2.72 t/ha), higher haulm yield (4.66 t/ha) and higher harvest index (31.55%), maximum gross return (1,54,260.00 INR/ha), maximum net return (1,04,999.00 INR/ha) and maximum benefit cost ratio (2.13).

Keywords: Varieties; gypsum; growth; yield; economics.

[++] *M. Sc. Scholar;*
[#] *Assistant Professor;*
**Corresponding author: E-mail: praneethchinna32@gmail.com;*

1. INTRODUCTION

"Groundnut (*Arachis hypogaea* L.) is a leguminous plant that is widely cultivated in the tropics and subtropics. It is valued for its high-oil content and edible seeds. It is the fourth most important source of edible oil and a third most important source of vegetable protein in the world. Groundnut is not only an important oilseed crop of India but also an important agricultural export commodity" **(**ANGRAU, 2021). "It belongs to family Leguminaceae and is fourth most important source of edible oil and third most important source of vegetable protein also known as "The King of Oilseeds". Globally 50% of groundnut is used for oil extraction, 37% confectionary and 12% seed purpose". [25] According to Satish et al*.* [1], "groundnut is primarily used for extraction of oil, with an analysis of about 46.70%. It is also consumed directly because of its high food value, which is again due to its higher content of protein (22.0%), carbohydrate (10.0%) and minerals (3.0%)".

"Globally, Groundnut covers 315 lakh hectares with the production of 536 lakh tonnes with the productivity of 1701/hectare" (FAOSTAT, 2021). "With annual all-season coverage of 55.71 lakh hectares, globally, India ranks first in Groundnut area under cultivation and is the second largest producer in the world with 102 lakh tonnes with productivity of 1831 kg/hectare" [2]. "In Uttar Pradesh during 2019-20 groundnut covered an area of 93822 hectares with the production of 88.371 tonnes with the productivity of 940 kg/ hectare" (DAC, 2021).

Variety Kadiri 6 is released from the Agriculture Research Station, Kadiri Andhra Pradesh. Its parentage is JL24 x AH 316. It was released in the year 2002. The Crop duration 100-105 (*kharif*) 110-115 (*rabi*). Its average Yield in quintal /ha is 20-25 (*kharif)* 40-45 (*rabi*). The Oil percentage is 48% and shelling is 74%. 100 Kernel weight (g) is 35-40g. The salient features are early variety, high yielding, spanish bunch, attractive kernel, and synchronous maturity.

Variety Kadiri Amaravati is released from the Agriculture Research Station, Kadiri Andhra Pradesh. Its parentage is Kadiri 6 x NCAc2242. It was released in the year 2016. The Crop duration 115-120 (kharif) 120-12 (rabi). Average Yield quintal /ha. 20-25 (kharif) 40-45 (rabi). Oi2l percent 50%. Shelling percent 70%. 100 Kernel weight (g) 48g. The Salient features are High yielding, medium duration, spanish bunch with attractive pods like kadiri-6. Resistant to sucking pests like thrips, hoppers, mite and leaf eating insects, spodoptera & helicoverpa, resistant to PSND & PBND.

Variety Kadiri Lepakshi (K 1812) is released from the Agriculture Research Station, Kadiri Andhra Pradesh. Its parentage is (ICGV 92069 / ICGV 93184) x ICGV 98300). The year of release 2020 The crop duration *kharif* (112). Average Yield quintal/ha is 35 (*kharif*). The oil percent 51%. Shelling percent is 70%. 100 Kernel weight (g) 40g. The Salient features are Very high yielding, profuse bearing spanish variety with high oil and high protein. Multiple resistant for drought, pests and diseases. Stable yields (15-20 q/ha) even under severe drought.

"The primary nutrients calcium and varieties also plays an important role in enhancing production and productivity of groundnut. Varieties is very crucial for the formation of varieties containing amino acids and oil synthesis and it also improves both yield and quality of crops. Calcium nutrient is also considered a yield limiting factor for groundnut production. Calcium absorbed by the roots is not translocated to the developing pod whereas calcium required for pod formation is absorbed directly from soil solution" (Yadav et al. 2014). "Groundnut plants need high level of calcium during pod filling stage to obtain better yield of quality kernels and its deficiency directs to unfilled pods" [3] "Gypsum is readily available source of calcium as well as varieties for crops and varieties is necessary for improving the oil content in groundnut" [4] "Application of gypsum improves soil structure which favours effective pegging in groundnut" [5]. "Varieties and calcium are applied together are considered to be very important in the pod zone for the developments of pegs" [6].

Selection of improper variety leads to reduction in yields, reduction in the quality of the produce, attack of pests and diseases, environmental deformities if the variety does not suite the particular climate, soil borne diseases, genetic abnormalities and many other side effects at the time of crop production and also that might influence the next crop.

Similarly, due to sulphur deficiency in groundnut leaves turn pale; young as well as middle leaves show chlorosis; under severe conditions leaves become papery. As it is used in the formation of amino acids, proteins, and oils, the contents of

plant protein and oil content in seeds, chlorophyll contents and also nodulation significantly decreases in the absence of sulphur.

The calcium deficiency also leads to restricted kernel development resulting in poor pod filling. Such pods are called as “pops”. Air fills the pods in the absence of proper kernel development.

Through this research right variety for groundnut crop production is aimed to be found among the selected varieties and also through correct dose of gypsum sulphur and calcium requirement is aimed to fulfil. That is because sulphur is responsible for chlorophyll formation, promotes nodulation in legumes, helps develop and activate certain enzymes and vitamins, and is a structural component of two of the 21 amino acids that form protein, plays a vital role in the development of seed and improving oil quality. Calcium requirement can be fulfilled which is a very major nutrient in groundnut that helps in good filled pods, oil contents improvement, strong shell and overall quality of the crop. Along with that supplying sulphur and calcium through gypsum specially helps in fulfilling the nutrient requirement and also majorly in improving the soil structure which favours effective pegging in groundnut.

Therefore, a study was envisaged to find out the “Evaluation of varieties and gypsum levels on growth and yield of groundnut (*Arachis hypogaea* L.)”

2. MATERIALS AND METHODS

A field experiment was conducted during *Zaid* 2022 at Crop Research Farm, Department of Agronomy, SHUATS, Prayagraj (U.P), India which is located at 25.40˚ N latitude, 81.85 ˚ E longitude, and 98 m altitude above the mean sea level (MSL). “The soil of experimental plot was sandy loam in texture, nearly neutral in soil reaction (pH 7.1), low in organic carbon (0.28 %), available N (225 kg/ha), available P (19.50 kg/ha) and available K (92 kg/ha). Nutrient sources were Urea, Single Super Phosphate, Murate of Potash and Gypsum to fulfil the requirement of Nitrogen, Phosphorus, Potassium, Calcium and Sulphur respectively” [7].

2.1 Experimental Design

The experiment was laid out in Randomized Block Design (RBD) with nine treatments replicated thrice. The treatments consisted Varieties *viz.* K-1812, K-6 and K-Amaravati and three levels of Gypsum *viz*. 200, 300, 400 kg/ha. The treatment combinations are T1- Kadiri-1812(Lepakshi) + Gypsum (200 kg/ha), T2-Kadiri-1812 (Lepakshi) + Gypsum(300 kg/ha), T3-Kadiri-1812 (Lepakshi) + Gypsum (400 kg/ha), T4-Kadiri-6 + Gypsum (200 kg/ha), T5-Kadiri-6 + Gypsum (300 kg/ha), T6-Kadiri-6 + Gypsum (400 kg/ha), T7- Kadiri Amaravati + Gypsum(200 kg/ha), T8- Kadiri Amaravati + Gypsum (300 kg/ha) and T9-Kadiri Amaravati + Gypsum (400 kg/ha). “RDF of 25:60:40 NPK kg/ha was used in all treatments as basal dose, also Gypsum was applied by the side of the plants on 45th day and it is incorporated into the soil by earthing up immediately. Seeds were dibbled manually at the seed rate of 100 kg/ha. The growth parameters and yield, production was recorded at harvest from randomly selected plants in each plot. These parameters were statistically analyzed using analysis of variance (ANOVA) as applicable to Randomized Block Design. The data was computed and analysed by following statistical method” of Gomez and Gomez [8].

Chart 1. Treatment combinations

1) K-1812 (Lepakshi) + Gypsum at 200 kg/ha
2) K-1812 (Lepakshi) + Gypsum at 300 kg/ha
3) K-1812 (Lepakshi) + Gypsum at 400 kg/ha
4) K-6 + Gypsum at 200 kg/ha
5) K-6 + Gypsum at 300 kg/ha
6) K-6 + Gypsum at 400 kg/ha
7) K-Amaravati + Gypsum at 200 kg/ha
8) K-Amaravati + Gypsum at 300 kg/ha
9) K-Amaravati + Gypsum at 400 kg/ha

3. RESULTS AND DISCUSSION

3.1 Plant Height (cm)

The significantly taller plant height (39.16 cm) at 60 DAS was recoded in treatment 3 with K-1812 (Lepakshi) + Gypsum (400 kg/ha). However, treatment 5 [Kadiri-6 + Gypsum (300 kg/ha)] was statistically at par with the treatment 6 [Kadiri-6 + Gypsum (400 kg/ha)] (Table 1).

“Plant height increased with the increasing with dose of gypsum from 0 to 400 kg/ha” [9]. The increase in plant height might be due to the increased supply of sulphur through gypsum and associated nutrients might have helped in rapid cell multiplication and higher chlorophyll content, thereby accelerating photosynthesis rate in

plants that in turn increase a canopy, plant height at the successive growth stages. These results are in agreement with the finding of Ramya et al. [10]. Among the 3 varieties the highest plant height observed in kadiri-6. The result was similar with the [11]. Among three growth habits erect type showed highest mean plant height (39.76cm) followed by Decumbent-2 growth habit (36.18cm), decumbent-3 (36.64cm). This was corroborated with (Priya et al. 2016) they reported that K6 (erect) recorded highest Plant height (44.3cm).

3.2 Number of Nodules per Plant

The significantly higher number of nodules/plant (140.00) at 60 DAS were recorded with the treatment 3 with K-1812 (Lepakshi) + Gypsum (400 kg/ha). However, treatment 2 [K-1812 (Lepakshi) + Gypsum (300 kg/ha)] was statistically at par with the treatment 3 [K-1812 (Lepakshi) + Gypsum (400 kg/ha)] (Table 1). "Significant and Maximum number of nodules/plant observed with the application of gypsum might be due to plant feeds nutrients to the growing seed instead of the nodule during pod formation and filling, legume nodules lose their ability to fix nitrogen" [10]. **"**another reason where nodules get **s**ulphur addition through gypsum is a main responsible factor for root nodules formation and calcium created a congenial soil environment for root growth and nodules development" [12].

3.3 Plant Dry Weight (g)

The significantly maximum dry weight (12.58 g) was recorded with treatment 3 with K-1812 (Lepakshi) + Gypsum (400 kg/ha). However, treatment 9 [K- Amaravati + Gypsum (400 kg/ha)] was statistically at par with the treatment 3 [K-1812 (Lepakshi) + Gypsum (400 kg/ha)].

Significantly higher plant dry weight was with Kadiri Lepakshi may be due to production of branches/plant and increased assimilation of nutrients which increased the leaf biomass compared to other varieties similar results were reported by Akram et al. [13]. **"**further increase in dry weight might be due to the application of gypsum, which results in the highest growth of groundnut, highest growth of groundnut might be due to increased availability and uptake of macro and micronutrients and improving soil conditions for water and nutrient supply required for better plant growth and dry matter accumulation" [10].

3.4 Crop Growth Rate (g/m^2/day) and Relative Growth Rate (g/g/day)

Between 60-80 DAS Relative Growth Rate was recorded significantly highest (0.0447 g/g/day) in treatment 3 with K-1812 (Lepakshi) + Gypsum (400 kg/ha). However, treatment 9 [K- Amaravati + Gypsum (400 kg/ha)], treatment 8 [K- Amaravati + Gypsum (300 kg/ha)], treatment 7 [K- Amaravati + Gypsum (200 kg/ha)], treatment 6 [K-6 + Gypsum (400 kg/ha)] and treatment 5 [K-6 + Gypsum (300 kg/ha)] were statistically at par with the treatment 3 [K- 1812 (Lepakshi) + Gypsum (400 kg/ha)] (Table 1). The significant and higher relative growth rate was observed with the application of gypsum (400kg/ha) which might be due to improved nutritional environment at cellular level and leaf chlorophyll content appears to have increased the photosynthetic rate. Thus, it is obvious that the improved growth and development of the plants and might be due to enhanced metabolic activities and photosynthetic rate resulting in improvement in the accumulation of dry matter at the successive growth stages further increase in the relative growth rate. Similar result were found with Reddy et al. [14].

3.5 Yield Attributes

3.5.1 Number of pods per plant

Treatment 3 [(K-1812 (Lepakshi) + Gypsum (400 kg/ha)] was recorded significantly higher No. of pods per plant (39.93). However, treatments 2 [(K-1812 (Lepakshi) + Gypsum (300 kg/ha)] was statistically at par with the treatment 3 [(K-1812 (Lepakshi) + Gypsum (400 kg/ha)] (Table 2). Higher number of pods/plant was observed with the application of gypsum (400 kg/ha) might be due to its vital role in energy storage and transformation, carbohydrate metabolism and activation of enzymes also increase the photosynthetic activity of the plant. Similar results were reported by Banu et al. [15].

3.5.2 Number of kernels per pod

Treatment 3 [(K-1812 (Lepakshi) + Gypsum (400 kg/ha)] was recorded highest No. of kernels per pod (2.00), though there was no significant difference amongst the treatments.

3.6 Seed Index (g)

Treatment 6 [Kadiri-6 + Gypsum (400 kg/ha)] recorded significantly highest Seed Index

(40.33). However, treatment 5 [(K-6 + Gypsum (300 kg/ha)] was statistically at par with the treatment 6[(K-6 + Gypsum (400 kg/ha)] (Table 2).The significant and higher seed index observed in kadiri-6 might be due to the difference between the varieties originated from their genetic background [11].

3.7 Shelling (%)

Treatment 3 [(K-1812 (Lepakshi) + Gypsum (400 kg/ha)] was recorded significantly higher shelling (72.40%). However, treatment 2 [(K-1812 (Lepakshi) + Gypsum (300 kg/ha)] was statistically at par with the treatment 3 [(K-1812 (Lepakshi) + Gypsum (400 kg/ha)] (Table 2).

Significant and higher shelling percentage was recorded in K-1812 might be due to the difference between the varieties for the shelling percent originated from their genetic background [16]. Further, increase in shelling percentage with the application of gypsum might be due to it appeared at early flowering reduces the number of empty pods similar results were reported by Adhikari et al. [9].

3.8 Yield

3.8.1 Pod yield (t/ha)

Treatment 3 [(K-1812 (Lepakshi) + Gypsum (400 kg/ha)] recorded significantly higher Pod Yield (3.60 t/ha). However, the treatment 2 [(K-1812 (Lepakshi) + Gypsum (300 kg/ha)] and treatment 1 [K-1812 (Lepakshi) + Gypsum (200 kg/ha)] were statistically at par with the treatment 3 [K-1812 (Lepakshi) + Gypsum (400 kg/ha)] (Table 2). Significant and higher pod yield obtained in Kadiri Lepakshi(K-1812) might be due to its higher yielding potential up to (4.2 t/ha) compared to other varieties Akram et al. [13]. Further increase in pod yield with the application of gypsum might be due to the availability of Sulphur and calcium to crops during the grand growth phase leads to better growth and development of pods. Calcium plays a vital role in the reproductive development of the groundnut crop, the similar result was reported by Ramya et al. [10].

3.8.2 Seed yield (t/ha)

Treatment 3 [(K-1812 (Lepakshi) + Gypsum (400 kg/ha)] was recorded significantly higher Seed Yield (2.61 t/ha). However, treatment 2 [(K-1812 (Lepakshi) + Gypsum (300 kg/ha)] was statistically at par with the treatment 3 [(K-1812 (Lepakshi) + Gypsum (400 kg/ha)] (Table 2).

Higher seed yield was observed in K-1812 might be growth attributes recorded significantly higher values compared to other varieties, due to high light interception avoidance of mutual shading and more dry matter accumulation per unit amount of light interception which results increase in seed yield [16]. Further, increase in seed yield with the application of Gypsum that provides Calcium and mobilization of Calcium from soil to the pod in groundnut crop takes place through the gynophores so the amount of calcium transported decides the seed yield. Calcium application reduces ovule abortion and enhanced pod development, thus, resulting in increased yields. The results are similar with Banu et al. (2022) and Naiknaware et al. [17].

3.8.3 Haulm yield (t/ha)

Treatment 3 [(K-1812 (Lepakshi) + Gypsum (400 kg/ha)] was recorded significantly higher Halum Yield (4.66 t/ha). However, treatment 2 [(K-1812 (Lepakshi) + Gypsum (300 kg/ha)] was statistically at par with the treatment 3 [(K-1812 (Lepakshi) + Gypsum (400 kg/ha)] (Table 2). Higher haulm yield observed in K-1812 might be due to a greater number of plants/unit area, interaction between varieties and seed rates. Similar results were reported with Sujathamma and Naik [11]. Further increase in haulm yield with the application of gypsum might be due to utilization of large quantities of nutrients through their well-developed root system and nodules which might have resulted in plant development and straw yield. Similar results were reported by Mandal et al. [18].

3.8.4 Harvest Index (%)

Treatment 3 [(K-1812 (Lepakshi) + Gypsum (400 kg/ha)] was recorded significantly higher Harvest Index (31.55%). However, treatment 2 [(K-1812 (Lepakshi) + Gypsum (300 kg/ha)] was statistically at par with the treatment 3 [(K-1812 (Lepakshi) + Gypsum (400 kg/ha)] (Table 2). Significant and higher harvest index observed with the application of Gypsum at 400 kg/ha might be due to better nutritional environment in the root zone for growth and development. It vital role in several physiological and biochemical process which are of vital importance for the development of the plants. Similar results were reported by Reddy et al. [14].

Table 1. Effect of Varieties and Gypsum levels on growth parameters of groundnut

S No.	Treatments	60 DAS			60 DAS- 80 DAS	
		Plant Height (cm)	Number of Nodules/ Plant	Dry weight (g)	Crop Growth Rate (g/m^2/day)	Relative Growth Rate (g/g/day)
1.	K-1812 (Lepakshi) + Gypsum at 200 kg/ha	19.80	126.00	12.11	22.48	0.0374
2.	K-1812 (Lepakshi) + Gypsum at 300 kg/ha	20.40	138.00	12.26	23.57	0.0384
3.	K-1812 (Lepakshi) + Gypsum at 400 kg/ha	22.60	140.00	12.58	30.63	0.0447
4.	K-6 + Gypsum at 200 kg/ha	35.80	94.27	11.43	21.15	0.0374
5.	K-6 + Gypsum at 300 kg/ha	38.65	102.00	11.03	23.10	0.0407
6.	K-6 + Gypsum at 400 kg/ha	39.16	110.00	11.23	23.70	0.0409
7.	K-Amaravati + Gypsum at 200 kg/ha	18.60	118.00	11.98	26.15	0.0419
8.	K-Amaravati + Gypsum at 300 kg/ha	20.10	122.00	12.06	27.23	0.0428
9.	K-Amaravati + Gypsum at 400 kg/ha	21.60	128.00	12.45	29.65	0.0444
	F-test	S	S	S	NS	S
	Sem±	0.31	0.72	0.05	1.49	0.0014
	CD at 5%	0.94	2.17	0.15	4.47	0.0042

Table 2. Effect of Varieties and Gypsum levels on yield attributes and yield of groundnut.

S No.	Treatments	No. of pods/ plant	No. of Kernels/Pod	Seed Index(g)	Shelling (%)	Pod yield (t/ha)	Seed yield (t/ha)	Haulm Yield (t/ha)	Harvest Index (%)
1.	K-1812 (Lepakshi) + Gypsum at 200 kg/ha	37.00	1.93	38.12	71.60	3.51	2.52	4.57	31.10
2.	K-1812 (Lepakshi) + Gypsum at 300 kg/ha	38.00	2.00	38.21	72.00	3.59	2.59	4.62	31.50
3.	K-1812 (Lepakshi) + Gypsum at 400 kg/ha	39.93	2.00	39.41	72.40	3.67	2.72	4.66	31.55
4.	K-6 + Gypsum at 200 kg/ha	22.00	1.73	39.46	70.60	3.08	2.18	4.14	30.11
5.	K-6 + Gypsum at 300 kg/ha	24.00	1.87	39.88	70.40	3.16	2.22	4.22	30.14
6.	K-6 + Gypsum at 400 kg/ha	25.00	1.93	40.33	71.20	3.24	2.31	4.30	30.59
7.	K-Amaravati + Gypsum at 200 kg/ha	25.67	1.93	36.05	69.46	3.07	2.13	4.13	29.62
8.	K-Amaravati + Gypsum at 300 kg/ha	28.00	1.93	37.10	69.40	3.10	2.15	4.16	29.63
9.	K-Amaravati + Gypsum at 400 kg/ha	30.00	1.87	37.56	68.40	3.12	2.14	4.18	29.23
	F- test	S	NS	S	S	S	S	S	S
	Sem±	0.83	0.07	0.17	0.17	0.02	0.04	0.01	0.11
	CD at 5%	2.47	--	0.50	0.52	0.18	0.16	0.04	0.32

Table 3. Effect of Economics of groundnut as influenced by Varieties and Gypsum

S No	Treatments	Total cost of cultivation	Gross Returns	Net Returns	B:C ratio
1	K-1812 (Lepakshi) + Gypsum at 200 kg/ha	47261.00	143170.00	95909.00	2.03
2	K-1812 (Lepakshi) + Gypsum at 300 kg/ha	48261.00	147070.00	98809.00	2.05
3	K-1812 (Lepakshi) + Gypsum at 400 kg/ha	49261.00	154260.00	104999.00	2.13
4	K-6 + Gypsum at 200 kg/ha	46261.00	124040.00	77779.00	1.68
5	K-6 + Gypsum at 300 kg/ha	47261.00	126320.00	79059.00	1.67
6	K-6 + Gypsum at 400 kg/ha	48261.00	131350.00	83089.00	1.72
7	K-Amaravati + Gypsum at 200 kg/ha	45261.00	121280.00	76019.00	1.68
8	K-Amaravati + Gypsum at 300 kg/ha	46261.00	122410.00	76149.00	1.65
9	K-Amaravati + Gypsum at 400 kg/ha	47261.00	121880.00	74619.00	1.58

3.9 Economics

Maximum gross return (1,54,260.00 INR/ha), maximum net return (1,04,999.00 INR/ha) and maximum benefit cost ratio (2.13) was recorded in treatment 3 [K-1812 (Lepakshi) + Gypsum (400kg/ha)] as compared to other treatments (Table 3). Higher net returns, gross returns and benefit cost ratio was obtained with application of K-1812 (Lepakshi) might be due to higher pod and haulm yields. The better growth and yield attributes might have enhanced the pod and biological yield of groundnut. Similar result was reported by Yadav et al. [19,20-25].

4. CONCLUSION

Based on my research trail, the treatment combination with the variety K-1812 (Lepakshi) along with application of Gypsum at (400kg/ha) was found to be more productive and economical. Although the findings are based on one season further research is needed to confirm the findings and their recommendation.

ACKNOWLEDGEMENT

Author expresses gratitude to advisor Dr. Victor Debbarma is thankful to the Department of Agronomy, Naini Agriculture Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj- 211007, Uttar Pradesh, India for providing field, necessary facilities and assistance in conducting this research.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Satish I, Shrivastava SK. Nutritional study of new variety of groundnut (*Arachis hypogaea* L.). Afr J Food Sci. 2011; 5(8):490-8.
2. GOI. Agricultural Statistics at a Glance, Agricultural Statistics Division. New Delhi: Directorate of Economics and Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India, https:; 2021. Available: agricoop.nic.in
3. Reddy SR. Agronomy of field crops. 2nd ed. New Delhi, India: Kalyani publisher; 2006.
4. Rao KT, Rao AU, Sekhar D. Effect of sources and levels of sulphur on groundnut. J Acad Ind Res. 2013;2(5): 268-70.
5. Agasimani CA, Bablad HB, Hosmani MM. Response to time, form and level of calcium application in groundnut (*Arachis hypogaea*). Indian J Agron. 1992; 37(3):493-5.
6. Geethalakshmi V, Loirduraj AA. Effect of gypsum application on yield and economics of groundnut (*Arachis hypogaea*). Legume Res. 1998;21(1):13-6.
7. Priya NS. Effect of biofertilizers and gypsum levels on growth and yield of groundnut (*Arachis hypogaea*). The Pharm Innov J. 2022;11(5):708-13.
8. Gomez KA, Gomez AA. Statistical procedures for agricultural research. 2nd ed. New York: John Wiley & Sons. 1984;680.
9. Adhikari J, Samantha D, Samui RC. Effect of gypsum on growth and yield of confectionery groundnut (*Arachis hypogaea* L.) varieties in summer season. Indian J Agric Sci. 2003;73(2):108-9.
10. Ramya P, Singh R. Effect of gypsum and boron on growth and yield of groundnut [*Arachis hypogaea* L.]. The Pharm Innov J. 2022;11(3):2148-51.
11. Sujatamma P, Naik BSK. Response of groundnut varieties to different seed rates. The Pharm Innov J. 2022;11(4):956-9.
12. Prabhu PC. Sulphur nutrition of rainfed groundnut in red and black soils of Tamil Nadu. J Pharmacogn Phytochem. 2019;8(3):438-40.
13. Akram SKV, Prasad PVN, Chandrasekhar K, Subbaiah PV. Growth, yield and economics of groundnut (*Arachis hypogaea* L.) cultivars as affected by levels of nitrogen the Andhra Agric. 2021;J68(2):163-7.
14. Reddy NT, Mehera B, Priya NS. Effect of zinc and sulphur on growth and yield of groundnut (*Arachis hypogaea*) and yield validation using SPSS model. The Pharm Innov J. 2022;11(4):132-6.
15. Banu R, Shroff JC, Shah SN. Effect of sources and levels of sulphur and bio-fertilizer on growth, yield and quality of summer groundnut. Int J Agric Sci. 2017;13(1):67-70. DOI: 10.15740/HAS/IJAS/13.1/67-70
16. Sreelatha P, Sudhakar P, Umamahesh V, Subramanyam D, Vasanthi RP. Variability in growth and yield attributes among

different growth habits of groundnut genotypes. Int J Curr Microbiol Appl Sci. 2019;8(6):1066-71.
DOI: 10.20546/ijcmas.2019.806.131

17. Naiknaware MD, Pawar GR, Murumkar SB. Effect of varying levels of boron and sulphur on growth, yield and quality of summer groundnut (*Arachis hypogaea* L.). Int J Trop Agric. 2015; 33(2):471-4.
18. Mandal S, Samui RC, Mondal A. Growth, yield and yield attributes of groundnut (*Arachis hypogaea* L.) cultivars as influenced by gypsum application. Legume Res. 2005;28:119-21.
19. Yadav N, Yadav SS, Yadav N, Yadav MR, Kumar R, Yadav LR. Growth and productivity of groundnut (*Arachis hypogaea* L.) under varying levels and sources of sulphur in semi-arid conditions of Rajasthan. Legume Res. 2018;41(2): 293-8.
20. Acharaya NG. Ranga; 2021. Agricultural university crop outlook report of Andhra Pradesh.
Available:https://angrau.ac.in
21. All india coordinated research projects on Groundnut [annual report]; 2017.
22. Bhagavatha Priya T, Subramanyam D, Sumathi V, Naidu MVS. Growth characters and yield of early Kharif groundnut as influenced by varieties and plant populations. IOSR JAVS. 2016;9(5):81-3.
23. Crop Production Statistics Information System; 2020.
Available:https://aps.dac.gov.in
24. Food and Agriculture Organization Corporate Statistical Database; 2020.
Available:https://www.fao.org.in
25. Yadav R, Jat LK, Shobh NY, Singh RP, Yadav PK. Effect of gypsum on growth and yield of groundnut (*Arachis hypogaea* L.) Environment and Ecology 33. 2015;2: 676-9.

© 2023 Reddy and Debbarma; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/98485