E-ISSN: 2618-0618
P-ISSN: 2618-060X

www.agronomyjournals.com
2024; 7(6): 301-302
Received: 02-03-2024
Accepted: 06-04-2024

Ivaspuram Vidhya Shree
M.Sc. Scholar, Department of Agronomy, Naini Agriculture Institute, SHUATS, Prayagraj, Uttar Pradesh, India

Karishma Singh
Ph.D. Scholar, Department of Agronomy, Naini Agriculture Institute, SHUATS, Prayagraj, Uttar Pradesh, India

Joy Dawson
Professor and head, Department of Agronomy, Naini Agriculture Institute, SHUATS, Prayagraj, Uttar Pradesh, India

D Sai Venkatesh
Department of Agronomy, Naini Agriculture Institute, SHUATS, Prayagraj, Uttar Pradesh, India

Corresponding Author:
Ivaspuram Vidhya Shree
M.Sc. Scholar, Department of Agronomy, Naini Agriculture Institute, SHUATS, Prayagraj, Uttar Pradesh, India

Effect of phosphorus and gibberellic acid on growth and yield of summer groundnut

Ivaspuram Vidhya Shree, Karishma Singh, Joy Dawson and D Sai Venkatesh

DOI: https://doi.org/10.33545/2618060X.2024.v7.i6e.848

Abstract
The field experiment, titled "Effect of Phosphorus and Gibberellic acid on Growth and Yield of Groundnut," was carried out in Zaid 2023 at the Crop Research Farm at the Department of Agronomy, SHUATS, Prayagraj (U.P.). Three doses of phosphorus (30, 40, and 50 kg/ha) and gibberellic acid (80, 100, and 120 ppm) applied as foliar sprays were evaluated in the experimental treatments, along with a control plot. The experiment was laid out in Randomised Block Design (RBD) with 10 treatments and replicated thrice. The treatment of 50 kg/ha of phosphorus and 100 ppm of gibberellic acid resulted in a considerably higher maximum plant dry weight (32.50 gm) at 80 DAS, 25.70 pods/plant, 37.13 g seed index, 2.24 t/ha kernel yield, and 2.90 B:C ratio.

Keywords: Phosphorus, gibberellic acid, growth, yield, summer groundnut

Introduction
Arachis hypogea L., commonly known as groundnut, is a leguminous plant that is extensively grown in tropical and subtropical regions between 40°N and 40°S latitudes. It is valued for its edible seeds with a high oil content, making it the world's fourth-most significant source of edible oil and third-most significant source of vegetable protein. In addition to being one of India's major oilseed crops, groundnuts are a significant agricultural export good. In addition to essential minerals and vitamins, groundnuts contain 45–50% oil and 27–33% protein, making them a great source of plant nutrition. The oil derived from groundnuts is a mixture of glycerides with a significant amount of unsaturated fatty acids, specifically linoleic (18–30%) and oleic (50–65%).
The second most important nutrient for crop development and high-quality output is phosphorus. P mostly affects the root system of plants. In comparison to non-nodulating crops, nodulating legumes have a greater need for P because of its important function in the production of nodules and atmospheric nitrogen fixing. Application of P to soil lacking in this nutrient increases groundnut production since P is essential to plants' physiological activities (Islam *et al*. 2013) [2].
Gibberellins are essential for all growth processes, including the formation and germination of seeds, the control of flowering time, the induction of leaf mitosis, rapid stem and root growth, and even the elongation of organs. Gibberellic acid induces the production of mRNA molecules, which code for particular hydrolytic enzymes, in the seed cells during the germination process. It is widely recognized that these are extremely potent hormones that naturally present in plants and regulate their development in response to the external environment. (Yamaguchi, S. 2008) [7].

Materials and Methods
The experiment was conducted in the Zaid season of 2023 at the Crop Research Farm, Department of Agronomy, Sam Higginbottom University of Agriculture, Technology, and Sciences. The experiment uses three replications and ten treatments in the Randomised Block Design. Three gibberellic acid levels—80, 100, and 120 ppm—combine with different rates of phosphorus—30, 40, and 50 kg/ha. The recommended fertilizer dosages are nitrogen (20 kg/ha), phosphorus (40 kg/ha), and potassium (60 kg/ha).

A 90 kg/ha seed rate is used, with seeds sown at a 30 cm by 10 cm spacing. The sources of N, P, and K fertilisers were chosen to be urea, SSP, and MOP, respectively. Data was calculated and analyzed using statistical techniques.

Results and Discussion

Plant Dry Weight

Phosphorus 50 kg/ha + Gibberellic acid 100 ppm (32.50 gm) had a significantly higher plant dry weight at 80 DAS, but this was statistically on par with Phosphorus 50 kg/ha + Gibberellic acid 120 ppm (31.33 g) along with Phosphorus 50 kg/ha + Gibberellic acid 80 ppm (30.17 g). Improved nodulation could lead to increased nitrogen fixation, resulting in improved vegetative growth and dry matter production. It has been shown by Mazed *et al*. (2015) [3] that plants with high concentrations of GA3 yielded higher numbers of branches per plant and total dry matter.

Number of Pods/Plant

Phosphorus 50 kg/ha with Gibberellic acid 100 ppm (25.70) had a significantly higher number of pods per plant at harvest than Phosphorus 50 kg/ha with Gibberellic acid 120 ppm (24.80), Phosphorus 50 kg/ha with Gibberellic acid 80 ppm (23.53), and Phosphorus 40 kg/ha with Gibberellic acid 120 ppm (23.13). The effect of phosphatic fertilizer, which enhanced nutrient availability and improved nutrient absorption and crop development, may be the cause of the increased number of pods/plants. Vidya Sagar *et al*. (2020) [5] reported a similar finding.

Seed Index

The application of phosphorus 50 kg/ha with gibberellic acid 120 ppm (36.80), phosphorus 50 kg/ha with gibberellic acid 80 ppm (36.53), and phosphorus 40 kg/ha with gibberellic acid 120 ppm (34.10) showed the higher seed index at harvest. High seed index was observed with application of GA3 this might be due to GA3 prolonging the grain filling time as a result, it ensures long-term transport of photo assimilates into grains, increases the seed weight. This is in accordance with previous findings by Wang *et al*. (2006) [6]

Kernel Yield

The application of Phosphorus 50 kg/ha with Gibberellic acid 120 ppm (2.14 t/ha) and Phosphorus 50 kg/ha with Gibberellic acid 80 ppm (2.13 t/ha) produced a larger kernel yield at harvest, although they are statistically comparable. Increasing the use of phosphorus fertilizers boosted all yield components.

The beneficial impacts on yield and yield characteristics may be attributed to P's stimulation of nitrogen activity and nodule quantity, which in turn improved groundnut yield attributes. Vali *et al*. (2020) [4] reported a similar outcome.

B:C Ratio

B: C ratio of growing groundnut as influenced by phosphorus and Gibberellic acid has been exhibited. Higher B: C ratio was found in Phosphorus 50 kg/ha with Gibberellic acid 100 ppm (2.90).

Table 1: Effect of phosphorus and gibberellic acid on growth and yield attributes of groundnut.

Treatment Combinations	Plant dry weight (g) (80 DAS)	No. of pods/plant	Seed Index (g)	Kernel yield (t/ha)	B:C ratio
Phosphorus 30 kg/ha + Gibberellic acid 80 ppm	27.47	21.40	32.80	1.61	1.82
Phosphorus 30 kg/ha + Gibberellic acid 100 ppm	26.00	20.27	31.83	1.60	1.80
Phosphorus 30 kg/ha + Gibberellic acid 120 ppm	28.60	19.27	33.17	1.66	1.92
Phosphorus 40 kg/ha + Gibberellic acid 80 ppm	27.17	20.83	33.16	1.70	1.99
Phosphorus 40 kg/ha + Gibberellic acid 100 ppm	27.03	22.00	33.83	1.76	2.09
Phosphorus 40 kg/ha + Gibberellic acid 120 ppm	27.20	23.13	34.10	1.78	2.12
Phosphorus 50 kg/ha + Gibberellic acid 80 ppm	30.17	23.53	36.53	2.13	2.70
Phosphorus 50 kg/ha + Gibberellic acid 100 ppm	32.50	25.70	37.13	2.24	2.90
Phosphorus 50 kg/ha + Gibberellic acid 120 ppm	31.33	24.80	36.80	2.14	2.72
Control RDF (20-40-60 kg/ha)	23.23	21.07	31.86	1.51	1.69
SEm(±)	1.47	1.23	1.17	0.13	-
CD (p=0.05)	4.37	3.67	3.48	0.39	-

Conclusion

Application of Phosphorus at 50 kg/ha in combination with Gibberellic acid at 100ppm (treatment 8) recorded highest grain yield and B:C ratio.

References

1. Gobarah ME, Mohamed MH, Tawfik MM. Effect of phosphorus fertilizer and foliar spraying with zinc on growth, yield and quality of groundnut under reclaimed sandy soils. J Appl. Sci. Res. 2006;2(8):491-496.
2. Islam AM. Effect of phosphorus, calcium and boron on the growth and yield of groundnut (*Arachis hypogea* L.). International Journal of Bio-science and Biotechnology. 2013, 5(3).
3. Mazed HK, Haque MN, Irin IJ, Ashraful M, Pulok I, Abdullah AHM. Effect of seed priming on growth, yield and seed quality of chickpea (BARI chhola- 6). International Journal of Multidisciplinary Research and Development. 2015;2(7):142-47.
4. Vali GM, Singh S, Sruthi DSV, Hinduja N, Talasila V, Tiwari D. Effect of phosphorus and zinc on growth and yield of Summer groundnut (*Arachis hypogea* L.). 2020.
5. Vidya-Sagar DRMS, Dawson J, Reddy RUK. Effect of phosphorus and gypsum on growth, yield and economics of groundnut (*Arachis hypogea* L.). Int. J Curr. Microbiol. App. Sci. 2020;9:1635-1638.
6. Wang F, Cheng F, Zhang G. The relationship between grain filling and hormone content as affected by genotype and source–sink relation. Plant growth regulation. 2006;49:1-8.
7. Yamaguchi S. Gibberellin metabolism and its regulation. Annu. Rev. Plant Biol. 2008;59:225-251.