

Effect of sulphur and seaweed (*Kappaphycus alvarezii*) extract spray on growth and yield of groundnut

Abstract

A field experiment was conducted on groundnut during Zaid (summer) season of 2023 at Crop Research Farm Department of Agronomy. The experiment was laid out in a Randomized Block Design with 10 treatments and replicated thrice. The treatment consisted of 3 levels of sulphur (30, 40 and 50 kg/ha) and 3 levels of seaweed (*Kappaphycus alvarezii*) extract spray (5, 10 and 15%) along with recommended doses of nitrogen, phosphorus and potash and a control (20-40-20 N-P-K/ha). Application of Sulphur 50 kg/ha along seaweed (*Kappaphycus alvarezii*) extract spray 10% (treatment 8) recorded maximum plant dry weight (36.17 gm), pod per plant (27.93), seed index (39.90 gm), kernel yield (2.36 t/ha) and B:C (1.90).

Keywords: Groundnut, Sulphur, seaweed, growth, yield.

INTRODUCTION

Groundnut (*Arachis hypogea* L.) a leguminous plant that is extensively grown between 40°N and 40°S latitudes in the tropics and subtropics. It is regarded as the fourth most significant source of edible oil and the third most significant source of vegetable protein in the world because of its highly oil-rich edible seeds. In addition to being a significant oilseed crop in India, groundnuts are a significant agricultural export good. Rich in essential minerals and vitamins, 45–50% oil, and 27–33% protein, groundnuts are a great source of plant nutrients.

Groundnut is a significant annual legume that is high in protein and is cultivated in tropical and subtropical agroclimatic zones in Asia, Africa, and America. It goes by several other names, including gober and kingpin of oilseeds, manilla nut, monkey nut, pinda, earthnut, unexpected legume, and energy capsule. Within the national edible oil economy of India, groundnuts have a leading position. With an average yield of 1493 kg/ha and a production of 9.3 million tonnes, it is grown over 4.9 million hectares. Groundnuts are produced on 0.74 million hectares in Andhra Pradesh, with an average productivity of 1426 kg/ha and an annual production of 1.048 million tonnes. (IndiaStat, 2018)

“Sulphur is the fourth major nutrient and plays an important role in the nutrition of oilseed crop and as a constituent of sulphur containing amino acids cystine, cysteine and methionine. In oil seed crops it is also involved in the formation of glucosides or glucosinolates which on hydrolysis increase the oil content. The application of sulphur increased the uptake of various macro and micro nutrients in groundnut” (Patel *et al.* 2018).

“Sea weed extracts are frequently utilized as plant bio-stimulants because of the presence of various growth regulators such as cytokinin, auxins, gibberellins, and betaines, as well as macro-nutrients like Ca, K, P, and micro-nutrients like Fe, Cu, Zn, B, Mn, Co, and Mo. Liquid sea weed extract is derived from the sap of red & brown algae. Additionally, seaweed sap contains a lot of potassium and phosphorus. Within a few hours of the application when used as a foliar spray, it is immediately assimilated by crop leaves. Application of seaweed extract increased wheat production and quality by 20%, according to” (Shah *et al.* 2013). The presence of a high quantity of organic matter assists in the retention of moisture and minerals in the topsoil, making them available to roots (Sivasankari *et al.* 2006).

2. MATERIALS AND METHODS

This experiment was laid out during the *Zaid* season of 2023 at Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (U.P.). The crop research farm is situated at 25°39'42" N latitude, 81°67'56" E longitude and at an altitude of 98 m above mean sea level. The treatment consisted of 3 levels of Sulphur (30, 40 and 50 kg/ha) and 3 levels of seaweed (*Kappaphycus alvarezii*) extract spray (5, 10 and 15%) along with recommended doses of nitrogen, phosphorus and potash and a control (20-40-20 N-P-K/ha). The experiment was laid out in a Randomized Block Design with 10 treatments and replicated thrice. Data recorded on different aspects of crop, viz., growth, yield attributes were subjected to statistical analysis by analysis of variance method. (Gomez and Gomez, 1976) and economic data analysis mathematical method.

RESULT AND DISCUSSION:

Growth parameters

Plant dry weight

At 80 DAS significantly higher plant dry weight was recorded in treatment 8 with application of sulphur 50 kg/ha + Seaweed extract spray (k sap) 10% (36.17 gm). However, it was statistically at par with treatment 9 with application of sulphur 50 kg/ha + Seaweed extract spray (k sap) 15% (34.73 gm) and treatment 7 with application of sulphur 50 kg/ha + Seaweed extract spray (k sap) 5% (34.33 gm).

The accumulation of total carbohydrate, total protein and total lipid content also increased due to the SLF treatment. Ganapathy Selvam, K. Sivakumar (2014)

Number of pods/plant:

At harvest significantly higher number of pods per plant was recorded in treatment 8 with application of sulphur 50 kg/ha + seaweed extract spray (k sap) 10% (27.93), However it is statistically at par with treatment 9 with application of sulphur 50 kg/ha + seaweed extract spray (k sap) 15% (25.70) and treatment 7 with application of sulphur 50 kg/ha + seaweed extract spray (k sap) 15% (24.23).

It might be due to better for root growth, cell multiplication, elongation and cell expansion in the plant body by higher dose of Sulphur application, which ultimately increased the seed yield **Pawan et al. (2024)**.

Seed Index

At harvest the higher seed index was observed in treatment 8 with application of sulphur 50 kg/ha + seaweed extract spray (k sap) 10% (39.90), However it is statistically at par with treatment 9 with application of sulphur 50 kg/ha + seaweed extract spray (k sap) 5% (39.73) and treatment 7 with application of sulphur 50 kg/ha + seaweed extract spray (k sap) 15% (38.80).

“It might be due to better for root growth, cell multiplication, elongation and cell expansion in the plant body by higher dose of Sulphur application, which ultimately increased the seed yield” **Rajanarasimha et al., (2021)**.

Kernel yield (t/ha)

At harvest the higher kernel yield was observed in treatment 8 with application of sulphur 50 kg/ha + seaweed extract spray (k sap) 10% (2.36 t/ha), However it is statistically at par with treatment 9 with application of sulphur 50 kg/ha + seaweed extract spray (k sap) 15% (2.18 t/ha) and treatment 7 with application of sulphur 50 kg/ha + seaweed extract spray (k sap) 5% (2.13 t/ha).

Kumawat and Dawson (2022) observed that the highest grain yield was recorded with applications of 20% seaweed extract, followed by 15% seaweed extract that resulted in 79% and 82% increases respectively compared to the control.

B:C Ratio

B:C ratio of growing groundnut as influenced by sulphur and seaweed extract spray (k sap) has been exhibited. Higher B:C ratio was found in treatment 8 with application of sulphur 50 kg/ha + seaweed extract spray (k sap) 10% (1.90).

CONCLUSION:

Based on the above findings it can be concluded that groundnut with the treatment 8 with application of Sulphur 50 kg/ha along with the application of seaweed extract spray (k sap) 15% recorded highest dry weight, no. of pods/plant, seed index, kernel yield and B:C ratio.

Table1. Response of Sulphur and Seaweed (*Kappaphycus alvarezii*) extract spray on growth, yield attributes and yield of groundnut

S.No.	Treatment Combinations	Plant dry weight (g)	No. of pods /plant	Seed Index (g)	Kernel yield (t/ha)	B:C ratio
1.	Sulphur 30 kg/ha + Seaweed extract spray (k sap) 5%	29.90	21.20	35.80	1.81	1.35
2.	Sulphur 30 kg/ha + Seaweed extract spray (k sap) 10%	30.70	20.10	34.80	1.78	1.27
3.	Sulphur 30 kg/ha + Seaweed extract spray (k sap) 15%	31.47	22.43	36.83	1.79	1.23
4.	Sulphur 40 kg/ha + Seaweed extract spray (k sap) 5%	30.50	22.76	35.20	1.87	1.38
5.	Sulphur 40 kg/ha + Seaweed extract spray (k sap) 10%	32.63	21.86	36.16	1.94	1.44
6.	Sulphur 40 kg/ha + Seaweed extract spray (k sap) 15%	33.50	22.70	37.10	1.88	1.30
7.	Sulphur 50 kg/ha + Seaweed extract spray (k sap) 5%	34.33	24.23	39.73	2.13	1.67
8.	Sulphur 50 kg/ha + Seaweed extract spray (k sap) 10%	36.17	27.93	39.90	2.36	1.90
9.	Sulphur 50 kg/ha + Seaweed extract spray (k sap) 15%	34.73	25.70	38.86	2.18	1.62
10.	Control RDF (20-40-60 kg/ha)	27.00	20.00	33.86	1.78	1.12
	F- Test	S	S	S	S	-
	SEm(±)	0.94	1.50	1.31	0.15	-
	CD (p=0.05)	2.79	4.47	3.91	0.46	-

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