

Original Research Article

Influence of Sulphur and Micronutrients on growth and yield of Mustard

(Brassica juncea L.)

AUTHORS

Abstract

A field experiment was conducted during rabi 2023-2024 at Department of Agronomy, SHUATS, Prayagraj Effect of Sulphur and Micronutrient on growth and yield of Mustard (*Brassica juncea* L.) with ten treatments combination Sulphur 10ppm + Mg 30 kg/ha, Sulphur 10ppm + B 5 kg/ha, Sulphur 10ppm + Ca 5 kg/ha, Sulphur 15ppm + Mg 30 kg/ha, Sulphur 15ppm + B 5 kg/ha, Sulphur 15ppm + Ca 5 kg/ha, Sulphur 20ppm + Mg 30 kg/ha, Sulphur 20ppm + B 5 kg/ha, Sulphur 20ppm + Ca 5 kg/ha and Control (RDF) 80:40:40 kg/ha (NPK) in randomized block design with three replications. Application of Sulphur 20ppm + B 5 kg/ha (Treatment 8) recorded maximum plant height (214.20), dry weight (g) per plant (31.61), Seed yield (t/ ha) (2.69) and stover yield (t/ha) (4.33)

Keywords : Sulphur, Micronutrients, Growth, Yield, Mustard

Introduction

Mustard is the major rabi oilseed crop of India and world. It occupies a prominent place being next to groundnut both in area and production in India. It belongs to family cruciferae. It is known by different common names Rai, Raya, Laha in India. India is the 4th largest oil seed producing economy in the world after USA, China and Brazil, which contributes about 10% of the world oilseeds production, 6-7% of the global production of

vegetable oil, and nearly 7% of protein meal. Although India has 20.8% of the world's area under oilseed crops, it accounts for about 10% of global production. This is because of low productivity of oilseed crops and year to year fluctuations in production in India. This is because of low productivity of oilseed crops and year to year fluctuations in production in India. Currently, India accounts for about 13% of world's oilseeds area, 7% of world's oilseeds output and 10% of world's edible oil consumption. Among the seven edible oilseeds cultivated in India, rapeseed-mustard contributes 28.6% in the total oilseeds production and rank second after groundnut sharing 27.8% in the India's oilseed economy **Yanthan and Singh (2021)**.

The deficiency of soil S in the agriculture soils has been reported frequently in mustard crop **Mansoori (2011)** found significant interaction between N and S on height of plant, number of pods per plant, number of seeds per pod, 1000 seed weight, seed yield and oil percentage. **Amanullahjan et al., (2002)** reported that grain yield was significantly higher at the highest levels of both the nutrients applied while oil contents decreased with increase in level of Sulphur to 90 kg/ha (43/19%) and nitrogen to level of 120 kg/ha (42%). Boron is one of the essential micronutrient required for normal growth of most of the plants. Boron plays an important role in cell differentiation and development, regulating membrane permeability, tissue differentiation, carbohydrates and protein metabolism **Sharma et al., (2020)**.

Magnesium also an important nutrient required by plant as it is a major constituent of cell wall. It is constituent of the chlorophyll molecule and an enzyme activator for a number of energy transfer reactions. It plays vital role in the process of photosynthesis and is therefore important for the life of the plant. It acts as a cofactor and activator for many enzymes and substrate transfer reactions. Even slight magnesium deficiency may affect biomass formation and plant susceptibility to environmental stresses by diminishing several biochemical and physiological processes. The foliar spraying of magnesium provides a means of addressing the increasing occurrence of magnesium deficiency in crops. Foliar nutrient application can be a good strategy to increase crop yield, helps in soil supplementation, and generate response in a short period of time (**Fageria et al., 2009**).

Materials and Methods

The experiment was conducted during the Rabi season 2023, at the Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Prayagraj (U.P.) which is located at 25° 39' 42''N latitude, 81° 67' 56'' E longitude and 98 m altitude above the mean sea level (MSL). This area is situated on the right side of the Yamuna River by the side of Prayagraj -

Rewa road about 12 km from the city. The experiment was laid out in Randomized Block Design Which consisting of ten treatments with T₁ – Sulphur 10ppm + Mg 30 kg/ha, T₂ – Sulphur 10ppm + B 5 kg/ha, T₃ – Sulphur 10ppm + Ca 5 kg/ha, T₄ - Sulphur 15ppm + Mg 30 kg/ha, T₅ - Sulphur 15ppm + B 5 kg/ha, T₆ - Sulphur 15ppm + Ca 5 kg/ha, T₇ - Sulphur 20ppm + Mg 30 kg/ha, T₈ - Sulphur 20ppm + B 5 kg/ha, T₉- Sulphur 20ppm + Ca 5 kg/ha, T₁₀ - Control (RDF 80-40-40). Data recorded on different aspects of crop, viz., growth, yield attributes were subjected to statistically analysis by analysis of variance method (**Gomez and Gomez, 1976**) and economic data analysis by mathematical method using MS Excel.

Results and Discussion

Growth parameters

There are different types of growth parameters included as Plant height (cm) and Plant dry weight (g).

Plant height (cm)

At 80 DAS, maximum plant height (214.20) was recorded with application of Sulphur 20ppm + B 5 kg/ha whereas the minimum plant height (203.00) was recorded with Control (RDF) 80:40:40 kg/ha (NPK). There was no significant difference between different treatment combinations. However, Sulphur 20ppm + Ca 5 kg/ha and Sulphur 10ppm + Ca 5 kg/ha are found statistically at par to Sulphur 20ppm + B 5 kg/ha. The interaction effect of sulphur and boron was non-significant. Similar results were reported by **Ranjan et al., (2018)** and **Lucy and Lalrinengi (2022)**.

Plant dry weight (g)

At 80 DAS, maximum dry weight (g) per plant (31.61) was recorded with application of Sulphur 20ppm + B 5 kg/ha whereas the minimum dry weight (g) per plant (23.63) was recorded with Control (RDF) 80:40:40 kg/ha (NPK). There was significant difference between different treatment combinations. However, Sulphur 20ppm + Mg 30 kg/ha and Sulphur 20ppm + Ca 5 kg/ha Are found statistically at par to Sulphur 20ppm + B 5 kg/ha (Table 1). The interaction effect of sulphur and boron was non-significant. Similar results were reported by **Ranjan et al., (2018)** and **Lucy and Lalrinengi (2022)**.

Yield Parameters

There are several types of yield parameters included as Seed yield (t/ha) and Stover yield (t/ha) (Table 1).

Seed yield (t/ha)

The highest Seed yield (t/ha) (2.69) was observed in treatment Sulphur 20ppm + B 5 kg/ha, whereas the lowest Seed yield (t/ha) (2.56) was found in treatment Control (RDF)

80:40:40 kg/ha (NPK). However, Sulphur 20ppm + Ca 5 kg/ha are found statistically at par to Sulphur 20ppm + B 5 kg/ha. There was significant difference between different treatment combinations. Significant responses were noticed due to S x B. Similar results were reported by **Bamboriya *et al.*, (2017)** and **Lucy and Lalrinengi (2022)**.

Stover yield (t/ha)

The highest stover yield ($t\ ha^{-1}$) (4.33) was observed in treatment Sulphur 20ppm + B 5 kg/ha, whereas the lowest stover yield ($t\ ha^{-1}$) (2.58) was found in treatment Control (RDF) 80:40:40 kg/ha (NPK). However, Sulphur 20ppm + Ca 5 kg/ha (4.21) are found statistically at par to Sulphur 20ppm + B 5 kg/ha. There was significant difference between different treatment combinations. Significant responses were noticed due to S x B. Similar results were reported by **Bamboriya *et al.*, (2017)** and **Lucy and Lalrinengi (2022)**.

Conclusions

The present study concluded that the effect of Sulphur and Micronutrients perform effective improvement to the growth as well as in yield of *rabi* mustard. The application of Sulphur 20ppm + B 5 kg/ha (Treatment 8) recorded maximum growth and yield of mustard.

Table 1. Influence of Sulphur and Micronutrients on growth and yield of Mustard

S. No.	Treatment combinations	Plant height	Plant dry weight	Seed Yield	Stover Yield
		(cm) (80 DAS)	(g) (80 DAS)	(t/ha)	(t/ha)
1	Sulphur 10ppm + Mg 30 kg/ha	203.00	23.65	1.77	2.81
2	Sulphur 10ppm + B 5 kg/ha	204.60	24.25	1.85	2.92
3	Sulphur 10ppm + Ca 5 kg/ha	205.40	24.41	1.92	3.07
4	Sulphur 15ppm + Mg 30 kg/ha	199.40	26.01	2.00	3.30
5	Sulphur 15ppm + B 5 kg/ha	210.87	26.66	2.06	3.66
6	Sulphur 15ppm + Ca 5 kg/ha	211.80	24.70	2.10	3.77
7	Sulphur 30ppm + Mg 30 kg/ha	214.00	25.33	2.25	3.91
8	Sulphur 30ppm + B 5 kg/ha	214.20	31.61	2.69	4.33
9	Sulphur 30ppm + Ca 5 kg/ha	204.87	30.01	2.56	4.21
10	Control (RDF)	195.73	22.3	1.45	2.58
	F-test	S	NS	S	S
	SEm(±)	3.20	1.87	0.05	0.07

CD (p=0.05)

9.50

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0.21

0.22

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