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## To study the influence of nitrogen and sulphur doses on yield attributes of mustard crop (*Brassica juncea* L.)

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### Abstract

The field experiment on the topic “To study the influence of Nitrogen doses on yield attributes of Mustard crop (*Brassica juncea* L.)” was conducted in eastern U.P. in Pilikothi research farm Tilak dhari P.G. College Jaunpur in Rabi season 2023-24 from November to march. The soil of experiment field is well drained sandy loam soil with low organic content and average in nitrogen, phosphorous and potash content. The soil of the field is slightly alkaline nature and the electrical conductivity of the soil is 0.580dsm<sup>-1</sup>. The variety of mustard used is VIGOUR-2311. This experiment is conducted with three levels of nitrogen (0, 60, 120 kg ha<sup>-1</sup>) and three levels of sulphur (0, 30, 40 kg ha<sup>-1</sup>) in Factorial Randomized Block Design (FRBD). The yield attributes (number of siliqua plant<sup>-1</sup>, number of seed siliqua<sup>-1</sup>, length of siliqua and test weight) is increasing from 0 to 120 kg ha<sup>-1</sup> of nitrogen doses and from 0 to 40 kg ha<sup>-1</sup> of sulphur doses. The highest values in all attributes are got on the application of 120 kg N ha<sup>-1</sup> and 40 kg S ha<sup>-1</sup>.

**Keywords:** Nitrogen, sulphur, mustard, yield attributes

### Introduction

Mustard (*Brassica spp.*) is a major oilseed crop cultivated worldwide, contributing significantly to edible oil production. Oil content and quality are vital determinants of its economic value. India is one of the largest mustard growing countries in the world, occupying the first position in area and third position in production after China and Canada. Rapeseed and mustard is the third important oilseed crop in the world after Soybean (*Glycine max*) and Palm (*Elaies guineensis*). Among the seven edible oil seeds cultivated in India, rapeseed mustard (*Brassica spp.*) contributes 28.6% in the total production of oil seed crops. Mustard is an important Rabi crop of Rajasthan, Gujarat, M.P., Uttarakhand, Uttar Pradesh, Bihar, West Bengal and Assam. In India, cultivation of mustard is done over an area or about 8.8 million hectares with production and productivity of 11.35 million tonnes and 1151 Kg ha<sup>-1</sup>, respectively (Anonymous). In India, Rajasthan ranks first both in area and production and Gujarat state has the highest productivity of mustard. In U.P., Mustard is grown on 1.08 million hectare with production of 1.62 million tonnes and productivity of 1497 Kg ha<sup>-1</sup> (Indian Stat 2022-23). Nitrogen is a crucial macronutrient for oilseed crops, directly influencing the synthesis of amino acids, taking direct role in plant height increment. Despite its importance, nitrogen deficiency in soils has become a widespread issue, limiting the productivity and quality of mustard crops. This study aims to evaluate the effect of different doses of nitrogen on the yield attributes of mustard crop providing insights into optimizing nutrient management for enhanced productivity and quality.

### Materials and Methods

The field experiment was conducted in eastern U.P. in Pilikothi research farm Tilak Dhari P.G. College Jaunpur Uttar Pradesh in Rabi season 2023-24 from November to March. The soil of experiment field is well drained sandy loam soil with low organic content. The soil of the field is slightly alkaline (pH 8.5) nature and the electrical conductivity of the soil is 0.580dsm<sup>-1</sup>. The available nutrient in the field is nitrogen- 51.75, phosphorous- 4.5 and potash- 100.8 kilogram per hectare. The mustard variety used in the experiment is VIGOUR-2311.

This is a highly grown hybrid variety of the duration 110-120 days. The fertilizer used for nitrogen is Urea (46% N) and for sulphur is Sulphur bentonite (90% sulphur). The doses of nitrogen used in the experiment are 0, 60, 120 kg ha<sup>-1</sup> and the doses of sulphur 0, 30, 40 kg ha<sup>-1</sup> in factorial randomized block design within 3 replications. The total number of plot used is 27. The Phosphorous and Potassium are applied at the rate of 40 kg ha<sup>-1</sup> and 40 kg ha<sup>-1</sup> respectively with the help of Single super phosphate (16% P<sub>2</sub>O<sub>5</sub>) and Muriate of potash (60% K<sub>2</sub>O) respectively. The complete dose of Phosphorus and Potash are given at the time of sowing (Basal dose). The application of sulphur is done at the time of sowing (Basal dose) according to treatment doses. The application of Nitrogen are as, half dose of nitrogen are applied at the time of sowing (basal dose) and the remaining half dose are applied at the time of first irrigation according to their appropriate treatments. The data of yield attributes (number of siliqua plant<sup>-1</sup>, number of seed siliqua<sup>-1</sup> and length of siliqua) are demonstrated just before harvesting of crop manually. The test weight is calculated by taking weight of 1000 seeds after harvesting of crop. The treatment number and their combinations are following-

- N<sub>1</sub>: 0 kg ha<sup>-1</sup> Nitrogen (Control)
- N<sub>2</sub>: 60 kg ha<sup>-1</sup> Nitrogen
- N<sub>3</sub>: 120 kg ha<sup>-1</sup> Nitrogen
- S<sub>1</sub>: 0 kg ha<sup>-1</sup> Sulphur (Control)
- S<sub>2</sub>: 30 kg ha<sup>-1</sup> Sulphur
- S<sub>3</sub>: 40 kg ha<sup>-1</sup> Sulphur

### Results and Discussion

The yield attributes in mustard seeds of variety VIGOUR-2311 (table-1) increased consistently with the incremental application of nitrogen up to 120 kg ha<sup>-1</sup>. Beyond this level, the increase in yield attributes was marginal, indicating a plateau effect.

### Effect of Nitrogen

The number of siliqua plant<sup>-1</sup> increased as the dose of Nitrogen increased up to 120 kg ha<sup>-1</sup>. The highest number of siliqua plant<sup>-1</sup> (308.06) was recorded with application of 120 kg Nitrogen ha<sup>-1</sup> and being at par with 60.0 kg Nitrogen ha<sup>-1</sup> and 00 kg Nitrogen ha<sup>-1</sup> (282.94, 274.97).

Number of seed siliqua<sup>-1</sup> increased as the dose of Nitrogen increased up to 120 kg ha<sup>-1</sup>. The number of seeds siliqua<sup>-1</sup> of mustard was maximum with application of 120 kg Nitrogen ha<sup>-1</sup> (13.68) and being at par with 60.0 kg Nitrogen ha<sup>-1</sup> (11.24).

Length of siliqua increased as the dose of Nitrogen increased up to 120 kg ha<sup>-1</sup>. Length of siliqua of mustard was maximum with application of 120 kg Nitrogen ha<sup>-1</sup> (8.23 cm) and being at par with 60.0 kg Nitrogen ha<sup>-1</sup> (7.00 cm).

Test weight increased up to 120 kg Nitrogen ha<sup>-1</sup>, while the other levels of Nitrogen did not cause significant influence on test weight of mustard.

### Effect of sulphur

The number of siliqua plant<sup>-1</sup> increased as the dose of sulphur increased up to 40 kg ha<sup>-1</sup>. The highest number of siliqua plant<sup>-1</sup> (319.78) was recorded with application of 40 kg Sulphur ha<sup>-1</sup> being at par with 30 kg Sulphur ha<sup>-1</sup> (287.66) and 00 kg Sulphur ha<sup>-1</sup> (247.42).

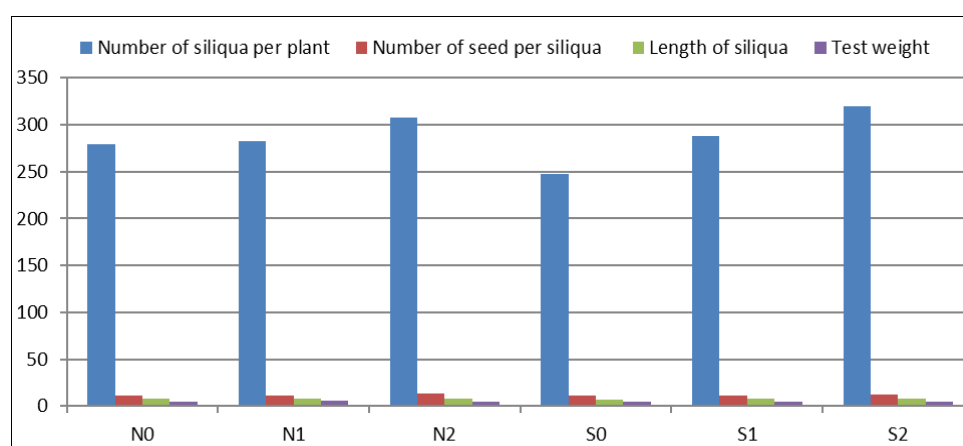
Number of seed siliqua<sup>-1</sup> increased as the dose of sulphur increased up to 40 kg ha<sup>-1</sup>. The number of seeds siliqua<sup>-1</sup> of mustard was maximum with application of 40 kg Sulphur ha<sup>-1</sup> (12.32) and being at par with 30 kg Sulphur ha<sup>-1</sup> (11.30).

Length of siliqua increased as the dose of sulphur increased up to 40 kg ha<sup>-1</sup>. Length of siliqua of mustard was maximum with application of 40 kg Sulphur ha<sup>-1</sup> (8.08 cm) and being at par with 30 kg Sulphur ha<sup>-1</sup> (7.88 cm).

Test weight of mustard increased up to 40 kg sulphur ha<sup>-1</sup>. The levels of sulphur did not cause significant influence on test weight of mustard.

**Table 1:** The yield attributes in mustard seeds of variety VIGOUR-2311

Symbol	Treatments	Yield attributes			
		Number of siliqua plant <sup>-1</sup>	Number of seed siliqua <sup>-1</sup>	Length of siliqua (cm)	Test weight (g)
<b>A. Nitrogen level</b>					
N <sub>1</sub>	0 kg N ha <sup>-1</sup>	278.97	11.70	7.50	4.74
N <sub>2</sub>	60 kg N ha <sup>-1</sup>	282.94	11.24	7.83	5.30
N <sub>3</sub>	120 kg N ha <sup>-1</sup>	308.06	13.68	8.23	4.95
S.Em±		4.979	0.213	0.139	0.078
CD at 5%		12.158	0.605	0.394	0.221
<b>B. Sulphur level</b>					
S <sub>1</sub>	0 kg S ha <sup>-1</sup>	247.42	11.08	6.78	4.26
S <sub>2</sub>	30 Kg S ha <sup>-1</sup>	287.66	11.30	7.88	4.85
S <sub>3</sub>	40 kg S ha <sup>-1</sup>	319.78	12.32	8.08	5.21
S.Em±		4.853	0.274	0.153	0.178
CD at 5%		12.158	0.605	0.394	0.321



## Conclusion

After all this we reached on our final conclusion that the yield attributes of mustard are being relatively higher on the application of 120 kg ha<sup>-1</sup> of nitrogen and 40 kg ha<sup>-1</sup> of sulphur of treatment symbol N<sub>2</sub> and S<sub>2</sub>.

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