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Effect of direction of sowing and phosphorus levels on growth and yield attributes of Toria (*Brassica campestris* L.)

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Abstract

A field experiment was conducted during *Rabi* season 2024 at Crop Research Farm, Department of Agronomy, SHUATS, Prayagraj (U.P) on Toria. The soil of experimental plot was sandy loam in texture, low in organic carbon (0.72%), nearly neutral in soil Ph (7.2), Nitrogen (178.48 kg/ha), Phosphorous (27.80 kg/ha), Potassium (233.24 kg/ha). The Treatment consist of Direction of sowing (North - South, East - West, Control (NW - SE)) and Phosphorus (50, 60, 70 kg/ha) levels. The experiment was carried out in a randomized block design with ten treatments and were replicated thrice. The results revealed that significantly higher plant height (167.50cm), Number of Branches/plant (15.87), dry weight (31.10 g/plant), number of Siliqua/plant (222.40), number of seeds/Siliqua (19.40), were obtained in the treatment T5 (East - West + 60 kg/ha P) in Toria crop.

Keywords: Toria, direction, growth, yield attributes

Introduction

Toria (*Brassica campestris* L. var. Toria) belongs to Cruciferae family is major oilseed crop in India. It occupies a prominent place Toria being next to groundnut in both area and production in meeting the fat requirement in India. The origin of toria is eastern Afghanistan and adjoining parts of India and Pakistan. Toria is also known as sarson, rai or raya, lahi. Toria is tropical as well as temperate crop and required cool and dry weather for their proper growth. In India, it is grown in rabi season from September-October to February-March. India is the fourth largest oilseed economy in the world. Among the seven edible oilseeds cultivated in India, rapeseed-mustard contributes 28.6% in total oilseeds production and ranks second after groundnut sharing 27.8% in Indian oilseed economy. It is estimated that 58 million tons of oilseeds will be required by the year 2020, wherein the share of rapeseed-mustard will be around 24.2 million tons. Crop can be raised well under both irrigated and rainfed condition. Brown sarson (*Brassica rapa* var. sarson) has two ecotypes lotni and toria. Toria (*Brassica campestris*) on other hand is cultivated in limited areas of foot hill condition of North East India.

The Toria crop is sown irrespective of row direction. It is mainly sown by broadcast method and the plants are unable to capture the radiant energy fully and thus, cannot make the best use of light. To intercept the solar energy whole day, bidirectional method of sowing has given the best results than Uni (E-W) and Uni (N-S) direction of sowings. The direction of sowing and the crop phenotype affect the yield of Indian mustard crop. The changes in biomass production of Indian mustard in different directions of sowing are due to the changes of actual evapotranspiration (AET), water use efficiency (WUE), and radiation interception differently in different direction of sowing. Jha studied the impact of sowing direction of the Indian mustard on the interception of the solar radiation.

Phosphorus (P) is the second major essential nutrient element for crop growth and good quality yield. The most obvious effect of P is on the plant root system. It promotes flowering, setting of siliqua and it increase the size of siliqua and yield. Phosphorus is critical in plant metabolism which plays an important role in cellular energy transfer, respiration, photosynthesis. It improves seed size, stimulates proper seed filling and increases oil content. Due to the important role

played by P in the physiological processes of plants, application of P to soil deficient in this nutrient leads to increase in yield.

Materials and Methods

The experiment was conducted during the *Rabi* season 2024, 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° 30' 42''N latitude, 81° 60' 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 conducted in Randomized Block Design with 10 treatments each replicated thrice. The plot size of each treatment was 3m x 3m. The factors are Direction of sowing (North - South, East - West, control (NW - SE)) and Phosphorus (50 kg/ha, 60 kg/ha, 70 kg/ha). Toria variety *PT - 303* was selected for sowing. Seeds were sown in line manually. Seeds were covered with the soil immediately after sowing. The Toria crop was sown on 01 oct 2024. Harvesting was done by taking 1m² area from each plot. And from it five plants were randomly selected for recording growth and yield parameters. The observations were recorded for plant height, Number of Branches/plant, dry weight, number of siliquae/plant, number of seeds/silique, test weight, seed yield and stover yield. The data was subjected to statistical analysis by analysis of variance method.

Results and Discussion

Plant Height

At 80 DAS, maximum plant height (167.5 cm) was observed in treatment T5 (East - West + Phosphorus 60 kg/ha). However, treatment T2 (North - South + Phosphorus 60 kg/ha) was found to be statistically at par with treatment T5.

Number of Branches/plants

At 80 DAS, maximum number of branches (15.87) was observed in treatment T5 (East - West + Phosphorus 60 kg/ha). However, treatment T7 (control (NW - SE) + Phosphorus 50 kg/ha) was found to be statistically at par with treatment T5.

Plant Dry weight

At 80 DAS, highest plant dry weight (31.10 g/plant) was observed in treatment T5 (East - West + Phosphorus 60 kg/ha). However, treatment T2 (North - South + Phosphorus 60 kg/ha) and treatment T9 (Control (NW - SE) + Phosphorus 70 kg/ha) were found to be statistically at par with treatment T5.

Number of Siliquae/plants

The data shown that there was a significant effect among treatments. However, highest number of silique/plant (222.40) was observed in treatment T5 (East - West + Phosphorus 60 kg/ha). However, treatment T3 (North - South + Phosphorus 70 kg/ha), treatment T8 (Control (NW - SE) + Phosphorus 60 kg/ha) and treatment T2 (North - South + Phosphorus 60 kg/ha) were found to be statistically at par with treatment T5.

Number of Seeds /silique

The data shown that there was a significant effect among treatments. However, highest number of seeds/silique (19.40) was observed in treatment T5 (East - West + Phosphorus 60 kg/ha). However, treatment T6 (East - West + Phosphorus 70 kg/ha) and treatment T1 (North - South + Phosphorus 50 kg/ha) were found to be statistically at par with treatment T5.

Discussion

Plants have a natural tendency to grow towards light sources. plant stand at maturity, plant height, siliquae/plant, seeds/silique and 1,000-seed weight, due to better light interception leading to prolonged photosynthetic activity in former as compared to earlier (Bhan *et al.*). Planting direction, particularly East-West orientation, can significantly impact plant dry weight by influencing light interception and overall biomass accumulation, leading to higher dry matter yields compared to North-South orientations. plant dry matter was increased by increasing the inter-row spacing. Interaction between row direction and row spacing was significant for dry matter weight of plant at all the stages of crop growth (Shehsavari *et al.*). Phosphorus plays a crucial role in plant growth, including plant height, and its deficiency can lead to stunted growth and reduced plant height. Adequate phosphorus promotes healthy root and shoot growth, leading to taller and stronger plants. Root development, stalk and stem strength, flower and seed formation, crop maturity and production, crop quality, and resistance to plant diseases are the attributes associated with phosphorus nutrition (Servani *et al.*). Phosphorus helps in in plant growth and development, with adequate P supply leading to increased plant dry weight, particularly through enhanced photosynthesis and biomass accumulation. Studies have shown that phosphorus fertilization significantly increases shoot dry weight, grain yield, and other growth parameters. Dry-matter accumulation increased with each successive increment of phosphorus as well as with sulphur at all the stages (Narang *et al.*).

Table 1: Effect of Direction of sowing and Phosphorus levels on growth and yield attributes of Toria

S No	Treatment combinations	Plant height	Plant dry weight	Number of Branches/plant	Number of Siliquae/plant	Number of seeds/silique
1.	North-South + 50 kg/ha P	154.26	25.18	13.53	205.47	18.53
2.	North-South + 60 kg/ha P	163.93	25.93	14.33	216.53	18.40
3.	North-South + 70 kg/ha P	162.97	30.41	13.60	219.40	18.20
4.	East-West+ 50kg/ha P	159.35	25.82	14.00	216.20	18.00
5.	East-West + 60 kg/ha P	167.50	31.10	15.87	222.40	19.40
6.	East-West + 70 kg/ha P	160.87	27.68	14.47	207.87	19.07
7.	Control (NW - SE) + 50 kg/ha	159.82	26.08	15.07	199.13	18.13
8.	Control (NW - SE) + 60 kg/ha	157.63	27.60	14.40	217.20	17.73
9.	Control (NW - SE) + 70 kg/ha	163.51	30.28	13.53	197.33	18.40
10.	Control (N:P: K - 60:30:30 kg/ha)	155.95	27.59	14.87	196.20	17.47
	S. Em (±)	2.05	1.02	0.39	3.05	0.35
	CD (p = 0.05)	6.10	3.05	1.18	9.06	1.04

Conclusion

It is concluded that East-West Directional sowing along with application of Phosphorus (60 kg/ha) was observed higher growth and yield attributes in Toria.

References

1. Chauhan A, Chauhan A, *et al.* Influence of row direction and spacing on growth, yield and oil content of Toria (*Brassica campestris*). 2012;719-20.
2. Basumotary A, Ojha NJ, Begum M. Growth and yield of rapeseed (*Brassica campestris* var. *Toria*) influenced by NPK and sulphur under rainfed condition. 2020;121-5.
3. Deka P, *et al.* Seed yield and nutrient uptake in late sown Toria (*Brassica campestris* var. *Toria*) as influenced by different irrigation and fertilizer levels. Agric Sci Dig. 2018;38(2):127-30.
4. Devi K, *et al.* Growth Attributes and Their Interaction in Toria (*Brassica campestris*) as Influenced by Various Levels of Phosphorus and Sulphur in Mid Hill Zone of Himachal Pradesh. Int J Plant Soil Sci. 2022;34(24):588-93.
5. Goyal P. Influence of different levels and combinations of sulphur nutrition on growth, yield and economics of Toria (*Brassica campestris* L.). 2023.
6. Rana KS, Rana DS, Gautam RC. Influence of phosphorus, sulphur and boron on growth, yield, nutrient uptake and economics of Indian mustard (*Brassica juncea*) under rainfed conditions. Indian J Agron. 2005;50(4):314-6.