International Scholars Journals

Global Journal of Food and Agricultural Sciences ISSN 2756-3448 Vol. 12 (1), pp. 001-007, July, 2025. Available online at www.internationalscholarsjournals.org © International Scholars Journals

Full Length Research Paper

YIELD AND ECONOMICS OF MUSTARD AS INFLUENCED BY DIFFERENT LEVELS OF BORON AND ZINC (*BRASSICA CAMPESTRIS* L.)

Ashwini A

Faculty, Dept of Horticulture,

Bharatiya Engineering Science & Technology Innovation University, Andhra Pradesh, India.

Accepted 09 July 2025

Abstract

An experimental field trial was conducted during the *Rabi* season, 2020 in Crop Research Farm (CRF), Agronomy Department, Naini Agriculture Institute, SHUATS, Prayagraj, Uttar Pradesh, entitled "Effect of boron and zinc levels on growth and yield of yellow mustard (*Brassica campestris* L.)". The trial was laid out in Randomized Block Design having nine treatments and three replications. Two factor i.e. boron and zinc having two levels, boron (1&2 kg/ha) and zinc (5&10 kg/ha) consisted along with RDF as NPK and S each at 80:40:40:40 kg/ha respectively. The results revealed that the maximum number of siliqua per plant (86.07), no. of seed per siliqua (40.27), test weight (3.85 g), seed yield (1.95 t/ha), stover yield (2.96) and harvest index (39.70%) was obtained in the treatment T2 (RDF + 1 kg B/ha). The maximum total cost of cultivation (27931.00 Rs/ha) obtained in the treatment T9 (RDF + 2 kg B/ha + 10 kg Z/ha). The maximum gross return (96560.00 Rs/ha) obtained in the treatment T2 (RDF + 1kg B/ha). The maximum net return (69739.00 Rs/ha) and B: C ratio (2.6) obtained in the treatment T2 (RDF + 1 kg B/ha) respectively.

Keywords: Boron and zinc levels, sulphur, yellow mustard

Introduction

India ranks the 4th in the world oilseed producing economy and contributes about 10 percent of the world oilseed production. Even though the area under oilseed crops in India is 20.8 percent of the world, its production is only about 10 percent of global production. This is the because of the low productivity of oilseed crops and the year to year changes of production in India. Rapeseed-mustard in India contributes to about 28 percent of the total oilseed production ranking second among the cultivated edible oilseeds and sharing about 27 percent in the India's oilseed economy. In India rapeseed-mustard has an area, production and yield of about 5 million hectare (Mha), 6 million tones (Mt) and 10 quintal per hectare respectively [3]. Rapeseed-mustard is grown on 6.58 lakh ha area in Uttar Pradesh with the production of 0.76 mt and productivity of 1155 kg/ha, [2].

Mustard is a crop which needs the major secondary and micro-nutrients in requisite amount for higher production. Mustard is very responsive to micro-nutrients boron and zinc, which are an important source for their growth and development. Number of factors including soil pH, soil texture, carbon content, organic matters, soil moisture, soil temperature, oxide content and clay mineralogy affects the availability of boron to plant [4]. Deficiency of boron is considered as the second most important micro-nutrient constrained in crops in the world after that of zinc [1]. Boron is an important micro-nutrient which helps in the development and separation of the sucrose in plants. Boron also helps in plant growth and the intake of nitrogen in soil and also balances the calcium deficiency to a greater extent. It also helps in the development of roots, flower and the pollen grain formation. In respect to protein content in mustard boron application produces the best quality seed [10]. The deficiency of boron in mustard may cause infertility leading to less pods formation and less seeds per pod and lower seed yield [13].

Zinc is an important constituent of several enzymes which regulates various metabolic processes in the plants and also influences the formation of several growth hormones like IAA in plants. Zinc helps in the formation of seeds, the settings of pods and the synthesis of oil in mustard seed. It also increases the biological yield of mustard [11]. Zinc controls the plant growth Harmon IAA promoting the starch formation, seed maturation, and production [9].

The greatest yields are obtained with the application of zinc as basal to the soil. Normally it is applied along with the sowing of seed.

Zinc deficiency could appear with low amount of Zn in the soil or due to the low temperature requiring at the crop growth. With high phosphorus contents of the crop in soils after seeding deficiency of zinc can also appear. Zinc sulphate also increases the spread of leaves, initiates silking to test weight, early maturation and improves the uptake of phosphate and also regulates the plant growth.

Materials and methods

The experiment trial was carried out at the Crop Research Farm, Agronomy Department, Naini Agriculture Institute, SHUATS, Prayagraj, Uttar Pradesh, during the *Rabi* season 2020. It is located above the mean sea level (MSL) at 25’39”42”N latitude, 81’67”56”E longitude which is situated on the right side of the Yamuna river at 98 m altitude.

The soil in it is a sandy loam soil having pH 7.1, organic carbon 0.48 percent and available NPK (102.0, 20.5, and 285.0 kg/ha) respectively. The plot was designed in randomized block design having three replications and two factors which are boron (1&2 kg/ha) and zinc levels (5&10 kg/ha) respectively. Nitrogen was applied in two split does each @40 kg/ha and as of phosphorus, potassium and sulphur it was applied in full dose each @40 kg/ha basal while sowing. The plot consist nine treatment combinations in all. The net size of the subplot is 3 m * 3m. Agronomic practices like thinning, eradication of weeds, hoeing and irrigation were done timely. Yellow mustard variety ‘NRCYS-05-02’ was sown at a spacing of 30*10 cm.

Results and Discussion Yield

The yield characters namely silique per plant, seeds per siliqua, test weight, seed yield, stover yield and harvest index of mustard under boron and zinc levels has been tabulated in table 1. The highest no of siliqua per plant 86.07 was recorded in the treatment T_2 (RDF +1 kg B/ha). Application of boron increases the siliqua formation of mustard plant [5]. Also the maximum number of seeds per siliqua (40.27) was obtained with T_2 (RDF + 1 kg B/ha). No of seeds per siliqua imparts the potential yield recovery in mustard crops. No significant effect was found in case of 1000-grain weight. With different levels of boron significant variations was found in Grain and Stover yield production. The maximum seed yield (1.95 t/ha) was obtained with T_2 (RDF + 1.0 kg B/ha). However, T3 (RDF + 2 kg B/ha), T5 (RDF + 10 kg Zn/ha), T8 (RDF + 2 kg B/ha + 5 kg Zn/ha) and T9 (RDF + 2 kg B/ha + 10 Kg Zn/ha) were statistically at par with T_2 (RDF + 1 kg B/ha). The maximum yield of mustard was found with the application of boron @1.0 to 1.5 kg/ha [8]. The maximum Stover yield was (2.96 t/ha) recorded in the treatment T_2 (RDF + 1 kg B/ha). However, T3 (RDF + 2 kg B/ha), T5 (RDF + 10 kg Zn/ha), T8 (RDF +

2 kg B/ha + 5 kg Zn/ha) and T9 (RDF + 2 kg B/ha + 10 Kg Zn/ha) are statistically at par with T_2 (RDF + 1 kg B/ha). The application of 1 kg B/ha resulted the highest Stover yield than the other boron controlled treatment producing the lowest Stover yield [6].

Table 1: Yield attributing traits of mustard with different levels of boron and zinc (*Brassica campestris* L.)

Treatments	Siliqua per plant (No.)	Seeds per siliqua (No.)	Test weight (g)	Seed yield (t/ha)	Stover yield (t/ha)	Harvest index (%)
T1 : RDF	68.60	35.53	3.61	1.28	2.73	31.85
T2 : RDF + 1 kg B/ha	86.07	40.27	3.85	1.95	2.96	39.70
T3 : RDF + 2 kg B/ha	71.27	39.07	3.70	1.74	2.91	37.13
T4 : RDF + 5 kg Zn/ha	72.07	35.40	3.74	1.38	2.74	33.46
T5 : RDF + 10 kg Zn/ha	63.60	36.33	3.71	1.60	2.83	36.09
T6 : RDF + 1 kg B/ha + 5 kg Zn/ha	76.93	32.53	3.75	1.46	2.77	34.34
T7 : RDF + 1 kg B/ha + 10 kg Zn/ha	80.27	35.73	3.70	1.44	2.76	34.22
T8 : RDF + 2 kg B/ha + 5 kg Zn/ha	74.87	35.87	3.82	1.84	2.93	38.49
T9 : RDF + 2 kg B/ha + 10 kg Zn/ha	65.53	36.20	3.76	1.75	2.92	37.20
f test	**-**	**-**	**-**	**S**	**S**	**-**
SEm±	8.93	1.71	0.05	0.13	0.06	1.83
CD (P = 0.05)	-	-	-	0.40	0.17	-

Table 2: Economic of mustard as influenced by different levels of boron and zinc.

Treatments	Cost of cultivation (₹/ha)	Gross return(₹/ha)	Net return (₹/ha)	Benefit cost Ratio (B:C ratio)
T1 : RDF	26711.00	64333.17	37622.17	1.41

T2 : RDF + 1 kg B/ha	26821.00	96560.00	69739.00	2.6
T3 : RDF + 2 kg B/ha	26931.00	86266.83	59335.83	2.2
T4 : RDF + 5 kg Zn/ha	27211.00	68980.00	41769.00	1.53
T5 : RDF + 10 kg Zn/ha	27711.00	79626.67	51915.67	1.87
T6 : RDF + 1 kg B/ha + 5 kg Zn/ha	27321.00	72690.16	45369.16	1.66
T7 : RDF + 1 kg B/ha + 10 kg Zn/ha	27821.00	71723.49	43902.49	1.58
T8 : RDF + 2 kg B/ha + 5 kg Zn/ha	27431.00	91093.49	63662.49	2.32
T9 : RDF + 2 kg B/ha + 10 kg Zn/ha	27931.00	86920.00	58989.00	2.11

Economic

Cost of cultivation, gross return, net return and the B: C ratio due to boron and zinc levels has been tabulated in table 2. The calculation was done keeping in view the market price of seeds which is @Rs4800 per quintal and Stover rate @Rs100 per quintal of mustard. Among the treatments T9 (RDF + 2 kg B/ha + 10 kg Zn/ha) recorded maximum total cost of cultivation (27931 per ha), whereas gross return was highest (96560 per ha) with treatment T_2 (RDF + 1 kg B/ha). Maximum net returns (69739 per ha) and highest B: C ratio (2.6) was also recorded with treatment T_2 (RDF + 1 kg B/ha). For net returns and B: C ratio, the application of boron was found superior to the control. The application of (RDF + 1.0 kg B/ha) significantly increased seed yield and economics over the control [12].

Conclusion

It is concluded that application of RDF (NPKS) 80:40:40:40 and boron @ 1 kg/ha recorded the maximum yield and economics of mustard. The experiment may be repeated to confirm the findings as the data in based on the study concluded in on season.

References

1. Ahmed W, Zia MH, Malhi SS, Niaz A, Saifullah. Boron deficiency in soils and crops: A review in crop plant. (A. Goyal, Ed.). 2012. DOI: 10.5772/36702.
2. Anonymous. Economics Survey of India. Economics Division Ministry of Finance, Govt. of India. 2007.
3. Anonymous. Agriculture Statistics at glance, Directorate of Ministry of Agriculture, Govt. of India. 2016.
4. Goldberg S, Scott ML, Surez DL. Predicting boron adsorption by soils chemical parameters in the constant capacitance model. Soil Sci. Soc. Am. J. 2000;64:1356-1363.
5. Gupta IC. Soil salinity and boron toxicity. Current Agril. 1980;4(1-2):1-16
6. Hossain MA, Jahiruddin M, Khatun F. Effect of boron on yield and mineral nutrition of yellow mustard (*Brassica campestris*). Bangladesh Journal of Agriculture Research. 2011.
7. Mishra RK, Sidar RS, Raj S, Sinha AK, Patel A. Study the effect of different nitrogen levels on growth and yield of mustard crop at Ambikapur (Chhattisgarh). Int. J Agric. Nutr. 2020;2(2):30-31. DOI: 10.33545/26646064.2020.v2.i2a.35
8. Islam MB, Choudhury DA, Fazlul Haque M. Response of crops to boron fertilization. National workshop on Integrated Nutrient Management for crop production and soil Fertility held at BARI, Joydebpur, Gazipur. 1998, 31-42.
9. Mandal KG, Ghosh PK, Hati KM, Bandyopadhyay, KK, Mishra A. Practical implication of nutrient into nutrient interaction to boost oilseeds productivity in India. Fertilizer News. 2002;47:13-26.
10. Sharma UC, Gangwar MS, Shruvastava PC. Effect of zinc and sulphur on nutrients uptake and yield of mustard. Journal of the Indian society of soil science 1990;38:696-701.
11. Sinha P, Jain R, Chatterjee C. Interactive Effect of zinc and boron on growth and metabolism of mustard (*Brassica juncea* L.). Communications in Soil Science and Plant Analysis 2000;31:1-2, 41-49.
12. Verma CK, Prasad K, Yadav DD. Response of boron, zinc and sulphur levels on yield, economics and nutrients uptake of Indian mustard [*Brassica juncea* L.]. Crop Research (Hisar). 2012;44(1, 2):75-78.
13. Islam MS, Anwar MN. Production technologies of oilseed crops. Recommendations

and future plans. In proceedings of workshop of transfer of Technology of Crops under Research, Extension Linkage programme. BARI, Gazipur. 1994, 20-27.