The Pharma Innovation Journal 2022; 11(4): 454-456

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(4): 454-456

www.thepharmajournal.com
Received: 05-02-2022
Accepted: 10-03-2022

Pankaj Kumar Mishra
M.Sc. Scholar, Department of Agronomy, Naini Agricultural Institute, SHUATS, Prayagraj, Allahabad, Uttar Pradesh, India

Rajesh Singh
Assistant Professor, Department of Agronomy, Naini Agricultural Institute, SHUATS, Prayagraj, Allahabad, Uttar Pradesh, India

Thakur Indu
Ph.D. Scholar, Department of Agronomy, Naini Agricultural Institute, SHUATS, Prayagraj, Allahabad, Uttar Pradesh, India

Corresponding Author:Pankaj Kumar Mishra
M.Sc. Scholar, Department of Agronomy, Naini Agricultural Institute, SHUATS, Prayagraj, Allahabad, Uttar Pradesh, India

Effect of Nitrogen and Zinc levels on Growth and Yield of Mustard (*Brassica juncea* L.)

Pankaj Kumar Mishra, Rajesh Singh and Thakur Indu

Abstract
A field experiment was conducted during *Rabi* season (2021-2022) at Crop Research Farm, Department of Agronomy, SHUATS, Prayagraj (Allahabad) (U.P.). The soil of experimental plot was sandy loam in texture, nearly neutral in soil reaction (pH 7.1), low in organic carbon (0.28%), available N (225 kg/ha.), available P (19.50 kg/ha.) and available K (213.7 kg/ha.). The treatments consisted of 3 levels of Nitrogen N_1 (60 kg/ha.), N_2 (80 kg/ha.), N_3 (100 kg/ha.) and 3 levels of Zinc (Zn_1-5 kg/ha.), (Zn_2-10 kg/ha.) and (Zn_3-15 kg/ha.). The experiment was laid out in Randomized Block Design with 9 treatments and replicated thrice. The results revealed that the application of Nitrogen 100 kg/ha. + Zinc 15 kg/ha. recorded maximum plant height (188.10 cm), Number of branches/plant (10.90), plant dry weight (26.38 g/plant), siliqua length (5.20 cm), number of siliquae per plant (398.90), number of seeds per siliqua (24.40), test weight (3.53 g), grain yield (1.89 t/ha.), straw yield (3.11 t/ha) and harvest index was found to be non-significant. Maximum Gross returns (103650.00 INR/ha.), Net returns (70264.08 INR/ha.) and B:C ratio (2.10) were also recorded with the treatment with the application of Nitrogen 100 kg/ha. + Zinc 15 kg/ha.

Keywords: Nitrogen, growth, yield, zinc, rabi

Introduction
Mustard crop is important for the Indian economy, since India imports large quantities of edible oil despite having the largest area of cultivated oilseeds in the world. Oilseeds play an important role in Indian Agriculture and industries. Besides, immense value in our diet, oils and fats are used in cosmetics, soaps, lubricants, paints and varnish industries and their medicinal and therapeutic value. The requirement of vegetable oils and fats will be much higher in coming years in view of ever-increasing population (Kumar *et al.*, 2016) [1]. Nitrogen is vital for crops because it is a major constituent of chlorophyll, the compound by which plants use sunlight energy to produce sugars from water and carbon dioxide that is photosynthesis. It is correspondingly a major factor of amino acids, the building blocks of proteins. Lacking proteins, plants wither and die. The main nutrients are required for plant growth are nitrogen (N), phosphorus (P), and potassium (K) and the use of nitrogen fertilizer outcomes in improved crop production costs and atmospheric pollution. Numerous plant particles such as amino acids, chlorophyll, nucleic acids, ATP and phytohormones, that contains nitrogen as a basic part, are required to complete the biological processes, involving carbon and nitrogen metabolisms, photosynthesis and protein production. Nitrogen application is more important than the other major important fertilizers/nutrients for successful crop production. Therefore, the plant with lack of zinc is poor in amount of protein (Singh *et al*., 2007) [3]. Rengel (2001) [4] showed that zinc fertilizer application causes root and shoot growth during the growing season and therefore, lead to increased seed yield. Zinc also has the role in photosynthesis and nitrogen metabolism and it helps in regulating the auxin concentration in plant. It promotes flower setting and help in proper development of fruits. It also helps in carbohydrates transformation and sulphur metabolism. The grain and straw yield were also significantly increased by the application of zinc. The favourable influence of applied zinc on these growth parameters, yield attributes and yield may be ascribed to catalytic or stimulatory effect of zinc on most of the physiological and metabolic processes of the plant. It also helps in chlorophyll formation and plays an important role in nitrogen metabolism. Thus, the application of zinc in a soil deficient in its content, improved the overall growth and development of plant.

Materials and Methods

The experiment was conducted during *Rabi* season of 2021-2022. The experiment was conducted in Randomized Block Design consisting of nine treatment combinations with three replications and was laid out with the different treatments allocated randomly in each replication. The soil of the experimental field was sandy loam in texture, slightly alkaline reaction (pH 7.1) with low level of organic carbon (0.28%), available N (225 Kg/ha.), P (19.50 kg/ha.) and higher level of K (213.7 kg/ha.). The treatment combinations are T_1 -Nitrogen 60 kg/ha. + Zinc 5 kg/ha., T_2 - Nitrogen 60 kg/ha. + Zinc 10 kg/ha., T_3 - Nitrogen 60 kg/ha. + Zinc 15 kg/ha., T_4 -Nitrogen 80 kg/ha. + Zinc 5 kg/ha., T_5 -Nitrogen 80 kg/ha. + Zinc 10 kg/ha., T_6 -Nitrogen 80 kg/ha. + Zinc 15 kg/ha., T_7 -Nitrogen 100 kg/ha. + Zinc 5 kg/ha., T_8 -Nitrogen 100 kg/ha. + Zinc 10 kg/ha., T_9 - Nitrogen 100 kg/ha. + Zinc 15 kg/ha. The observations were recorded on different growth parameters at harvest *viz*. plant height (cm), number of branches per plant, plant dry weight, Number of siliqua per plant, number of seeds per siliqua, test weight, grain yield and stover yield.

Result and Discussion

Growth Attributes: At harvest, maximum plant height (188.10 cm) was recorded with application Nitrogen 100 kg/ha. + Zinc 15 kg/ha. which was significantly superior over all other treatments and treatment with application of Nitrogen 100 kg/ha. + Zinc 10 kg/ha. (183.50 cm) is statistically at par with treatment application of Nitrogen 100 kg/ha. + Zinc 15 kg/ha. At the time of harvest, the highest branches per plant was observed in the Nitrogen 100 kg/ha. + Zinc 15 kg/ha. (10.90) which was significantly higher over rest of the treatments and treatment with application of Nitrogen 100 kg/ha. + Zinc 10 kg/ha. (10.80) which were statistically at par with application of Nitrogen 100 kg/ha. + Zinc 15 kg/ha. At the time of harvest the maximum plant dry weight (26.38 g) was recorded with application Nitrogen 100 kg/ha. + Zinc 15 kg/ha. which was significantly superior over all other treatments and treatment with application of Nitrogen 100 kg/ha. + Zinc 10 kg/ha.(25.30 g) is statistically at par with treatment application of Nitrogen 100 kg/ha. + Zinc 15 kg/ha. (Dawson *et al*. 2009).

Table 1: Effect of Nitrogen and Zinc levels on Growth Attributes of Mustard at Harvest

Treatments	Plant Height (cm)	Number of Branches per plant	Plant Dry Weight (g/plant)
Nitrogen 60 kg/ha. + Zinc 5 kg/ha.	175.40	9.30	21.77
Nitrogen 60 kg/ha. + Zinc 10 kg/ha.	176.20	9.40	23.00
Nitrogen 60 kg/ha. + Zinc 15 kg/ha.	178.10	9.70	23.69
Nitrogen 80 kg/ha. + Zinc 5 kg/ha.	177.30	9.70	23.53
Nitrogen 80 kg/ha. + Zinc 10 kg/ha.	181.30	10.20	24.80
Nitrogen 80 kg/ha. + Zinc 15 kg/ha.	181.60	10.30	25.00
Nitrogen 100 kg/ha. + Zinc 5 kg/ha.	179.60	9.90	23.82
Nitrogen 100 kg/ha + Zinc 10 kg/ha.	183.50	10.80	25.30
Nitrogen 100 kg/ha. + Zinc 15 kg/ha.	188.10	10.90	26.38
S.Em(±)	0.98	0.08	0.38
CD (p=0.05)	2.93	0.24	1.14

Yield attributes

Treatment with application of Nitrogen 100 kg/ha. + Zinc 15 kg/ha. was recorded maximum number of siliquae per plant (398.90) which was significantly superior over all other and treatment with application of Nitrogen 100 kg/ha. + Zinc 10 kg/ha. (375.40) which was statistically at par with the treatment with application of Nitrogen 100 kg/ha. + Zinc 15 kg/ha. Treatment with application of Nitrogen 100 kg/ha. + Zinc 15 kg/ha. was recorded maximum number of seeds per siliqua (24.40) which was significantly superior over all other treatment and treatment with application of Nitrogen 100 kg/ha. + Zinc 10 kg/ha. (22.30) which was statistically at par with the treatment with application of Nitrogen 100 kg/ha. + Zinc 15 kg/ha. Treatment with application of Nitrogen 100 kg/ha. + Zinc 15 kg/ha. was recorded maximum length of siliqua (5.20) which was significantly superior over all other treatment and treatment with application of Nitrogen 100 kg/ha. + Zinc 10 kg/ha. (5.10) which was statistically at par with the treatment with application of Nitrogen 100 kg/ha. + Zinc 15 kg/ha. Treatment with application of Nitrogen 100 kg/ha. + Zinc 15 kg/ha. was recorded maximum test weight (3.53 g) which was significantly superior over all other and treatment with application of Nitrogen 100 kg/ha. + Zinc 10 kg/ha. (3.29 g) which was statistically at par with the treatment with application of Nitrogen 100 kg/ha. + Zinc 15 kg/ha. Treatment with application of Nitrogen 100 kg/ha. + Zinc 15 kg/ha. was recorded maximum seed yield (1.89 t/ha.) which was significantly superior over all other and treatment with application of Nitrogen 100 kg/ha. + Zinc 10 kg/ha. (1.79 t/ha.) and Nitrogen 80 kg/ha. + Zinc 15 kg/ha. (1.75 t/ha.) which was statistically at par with the treatment with application of Nitrogen 100 kg/ha. + Zinc 15 kg/ha. Treatment with application of Nitrogen 100 kg/ha. + Zinc 15 kg/ha. was recorded maximum test stover yield (3.11 t/ha.) which was significantly superior over all other and treatment with application of Nitrogen 100 kg/ha. + Zinc 10 kg/ha. (3.06 t/ha.) which was statistically at par with the treatment with application of Nitrogen 100 kg/ha. + Zinc 15 kg/ha. Treatment with application of Nitrogen 80 kg/ha. + Zinc 10 kg/ha. was recorded maximum harvest index (38.63%) and minimum with application of Nitrogen 100 kg/ha. + Zinc 15 kg/ha. (36.83%). There was no significance difference between different treatment combinations. (Mayur *et al.* 2004) [8].

Table 2: Effect of Nitrogen and Zinc levels on Yield Attributes and Yield of Mustard

Treatments	No. of Siliquae per plant	No. of Seeds per Siliqua	Length of Siliqua	Test Weight (g)	Seed Yield (t/ha.)	Stover Yield (t/ha.)	Harvest Index (%)
Nitrogen 60 kg/ha. + Zinc 5 kg/ha.	289.80	17.90	4.40	2.52	1.41	2.39	36.98
Nitrogen 60 kg/ha. + Zinc 10 kg/ha.	312.70	18.70	4.70	2.69	1.51	2.43	38.25
Nitrogen 60 kg/ha. + Zinc 15 kg/ha.	330.20	19.40	4.80	2.74	1.59	2.64	37.62
Nitrogen 80 kg/ha. + Zinc 5 kg/ha.	320.20	18.90	4.70	2.68	1.54	2.57	37.49
Nitrogen 80 kg/ha. + Zinc 10 kg/ha.	348.50	20.20	4.80	2.91	1.71	2.75	38.63
Nitrogen 80 kg/ha. + Zinc 15 kg/ha.	365.00	21.70	4.90	3.04	1.75	2.87	37.93
Nitrogen 100 kg/ha. + Zinc 5 kg/ha.	341.00	19.70	4.80	2.88	1.66	2.70	38.16
Nitrogen 100 kg/ha + Zinc 10 kg/ha.	375.40	22.30	5.10	3.29	1.79	3.06	37.06
Nitrogen 100 kg/ha. + Zinc 15 kg/ha.	398.90	24.40	5.20	3.53	1.89	3.11	36.83
S.Em (±)	7.85	0.71	0.08	0.12	0.05	0.05	1.08
CD (5%)	23.54	2.13	0.25	0.35	0.15	0.17	-----

Conclusion

On the basis of one season experimentation application of Nitrogen 100 kg/ha. + Zinc 15 kg/ha. was found more productive (1.89 t/ha.).

The conclusions drawn are based on one experimentation data only which requires further confirmation and recommendation.

References

1. Kumar V, Singh G, Shrivastava AK, Singh VK, Singh RK, Kumar A. Effect of integrated nutrient management on growth and yield attributes of Indian mustard. Indian Journal of Ecology. 2016;43(1):440-443.
2. Patil PA. Effect of zinc application on yield characters and dry matter of stover. Madras Agricultural Journal. 2006;57(6):473-475.
3. Singh D, Mann A. Effect of zinc application on pod yield of groundnut. Indian Journal of Agronomy. 2007;37(3):615-616.
4. Zdenko Rengel. Genotypic differences in Micronutrient use efficiency in crops. Communications in Soil Science and Plant Analysis. 2001;32(7):1163-1186.
5. Dawson YK, Kishanrao ZK, Dixit PM, Khatkar R. Effect of Nitrogen Phosphorus and Sulphur fertilization on growth and yield of Mustard (*Brassica juncea* L.). International Journal of Agricultural Sciences. 2009;5(2):396-398.
6. Khan U, Chaubey AK, Srivastava PC, Gangwar MS. Effect of Zinc application on yield attributes, yield, Zn nutritional and oil content of Mustard. Fertilizer News. 2003;48(7):23-26, 29-30.
7. Maurya KL, Singh MV, Pandey BP, Singh SK. Effect of Nitrogen and Varieties on growth and yield of Mustard. Haryana Journal of Agronomy. 2004;20(1/2):132-134.
8. Meena MC, Patel KP, Rathod DD. Effect of Zn and Fe enriched FYM on Mustard yield and micronutrient availability in loamy sand soil (Typic Haplustept) of Anand. Journal of the Indian Society of Soil Science. 2006;54(4):495-499.