Original Research Article

Effect of Nitrogen and Zinc levels on growth and yield of Black gram

(*Vigna mungo L.*)

Abstract

Abstract to review the return performance of N and zinc on growth, yield and yield attributes of black gram (Vigna mungo L.) A field experiment was distributed throughout zaid season of 2021 at crop analysis farm of SHUATS, Prayagraj. To review relating to the impact of nitrogen and zinc levels on growth and yield of Black gram. The experiment was laid out in randomized block design (RBD) with 9 treatments each replicated thrice on the premise of one year experimentation. in view of this experiment 3 nitrogen levels, i.e.N1 - (15 kg/ha), N2 – (20 kg/ha) and N3 – (25kg/ha) and zinc levels, i.e., Zn1 – (0.25 %), Zn2 – (0.5 %), Zn3 – (0.75 %) .The results obtained with the treatments by the application of N 25 kg/ha+ Zn 0.5% was recorded significantly highest plant height (41.50cm), number of nodules per plant (25.50), number of branches per plant (7.65) , plant dry weight (9.61 g/plant), pods per plant (37.55), seeds per pod (6.83), test weight (39.23g), grain yield (937kg/ha), stover yield (2418kg/ha). maximum net return (Rs42008.92/ha) and B:C ratio (2.22) as compared to different treatments.

Keywords: Soil, nitrogen ,zinc, yield, economics.

INTRODUCTION

India is that the biggest producer of pulses, accounting for roughly 25 per cent of the worldwide share. On account within their important role in nutritional protection and soil ameliorative properties, pulses had been integral a part of property agriculture because of the actual fact ages. They trap atmospheric N in the root nodules and preserve the soil effective and healthy. Among various pulses, black gram or urd (Vigna mungo L.) belonging to family leguminous is of immense significance because it contains, 60% carbohydrates, 24% protein, 1.3% fat and is the richest several of the diverse pulses in phosphorus being 5-10 times richer than others (**Tomar *et al.*, 2011)**. The mixture of Daal-chawal (pulse-rice) or Daal-roti (pulse-wheat bread) is a necessary ingredient in the common Indian diet. In India, it is cultivated in a exceedingly| place of 1.38 Mha with an annual production of 1.46 MT but the productivity of the crop is best 459 kg/ha **(Singh *et al.*, 2015)** nitrogen fertilizer performs an essential function in enhancing soil fertility and growing crop productivity. nitrogen fertilizer will increase grain yield and biomass

in crop. It contributes 18-34% increase in soil residual N. Sole residue incorporation or in mixture with N fertilizer have tremendous effect on plant growth and production in addition on soil physico-chemical properties. nitrogen is an essential nutrient that needed by plants. It will increase growth and improvement of all residing tissues and protein content in pulses(**Rahman *et al.*, 2007)** The maximum poor micronutrient in Indian soils is Zn, in fact, zinc is appeared because the1/3mos tcritical restricting nutrient in crop producing once nitrogen phosphorus and Zn is involved in auxin formation, activation of dehydrogenase enzymes; stabilization of ribosomal fractions **Hafeez *et al.*. (2013).** The improved in yield is probably because of tremendous impact of zinc on yield attributes as it plays an essential role in metabolism (**Shanti *et al*., 2008** and **Ahmed *et al.*, 2013)**

MATERIALS & METHODS

The present examination was done for the period of Zaid season 2021, at the Crop research Farm [CRF], Department of Agronomy, Naini Agricultural Institute, SAM Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Prayagraj (U.P.) that's situated at 250 30' 42''N latitude, 810 60' 56" E line of longitude and 98 m altitude higher than the mean sea level. throughout Zaid season 2021 on sandy loam soil, having nearly neutral in soil reaction (pH 7.7), organic carbon (0.44), obtainable N (171.48 kg/ha K), available phosphorus (27 kg/ha) and available potassium (291.2 kg/ha). The climate of the region is semi- arid subtropical. Treatments comprised of T1– 15kg/ha N + 0.25% Zn, T2 – 15kg/ha N + 0.50 % Zn, T3 – 15kg/ha N + 0.75% Zn, T4 – 20kg/ha N + 0.25% Zn, T5 - 20kg/ha N + 0.50 % Zn, T6 – 20 kg/ha N + 0.75% Zn, T7 – 25kg/ha N + 0.25% Zn, T8– 25kg/ha N + 0.50 % Zn and T9 – 25kg/ha N + 0.75% Zn. These were replicated thrice in randomized Block Design. The recommended dose of fertilizer is 20-40-20kg/ha NPK.Recommended dose of fertilizer was applied at the time of sowing within the form of Urea, DAP and MOP.

Chemical analysis of soil

Composite soil samples are collected before layout of the experiment to work out the initial soil properties. The soil samples are collected from 0-15 cm depth and were dried beneath shade, powdery with wood pestle and mortar, passed through 2 millimeter sieve and were analyzed for organic carbon by fast volumetric analysis technique by Nelson (1975). obtainable nitrogen was estimated by alkaline permanganate method by Subbiah and Asija (1956), available phosphorus by Olsen's method as printed by Jackson (1967), available potassium was determined by using

the flame photometer normal ammonium acetate solution and estimating by using flame photometer (ELICO Model) as outlined by Jackson (1973) and available ZnSO4 was estimated by Atomic Absorption photometer technique as outlined by Lindsay and Norvell (1978).

Statistical analysis

The data recorded were completely different characteristics were subjected to statistical analysis by adopting Fishers the method of analysis of variance (ANOVA) as represented by Gomez and Gomez (2010). critical difference (CD) values were calculated the 'F' test was found vital at 5% level.

Results and Discussion

Plant height (cm)

There was an increasing in crop age plant height was progressively increased with the advancement throughout the experimentation. The analysis on plant height was considerably higher altogether the various growth intervals with the levels of nitrogen and zinc. At harvest, maximum plant height (41.50 cm) was recorded with application of N 25 kg/ha+ zinc 0.5% that was significantly superior over all other treatments and statistically at par with treatment of N 20 kg/ha+ Zn 0.5% (40.82 cm).It may be due to the field experiment to analyze the result of nitrogen and carbon on the growth and yield performance of mungbean (Vigna radiata L. wilczek). He found that the plant height of mungbean cv. Mubarik was found to be increased with nitrogen at 40 kg ha-1. **Hamid (1988).**

Number of branches per plant

There was a gradual increase within the number of branches /plants from 30 to 60 DAS differed significantly as influenced by nitrogen and Zinc. At harvest, most number of branches per plant (7.65) was recorded with application of N 25 kg/ha+ zinc 0.5% which was significantly superior over all different treatments and statistically at par with treatment of N 20 kg/ha+ Zn 0.5% (7.50)It might be because of the conducted experiment to work out the impact of varied levels of nitrogen (0, 25 and 50 kg ha-1) and phosphorus (0, 50, 75, and 100 kg ha-1) on the yield and quality of mungbean cv. NM-98. Growth (number of branches per plant and number of root nodules per plant) and yield components were considerably affected by varied levels of nitrogen and phosphorus. A fertilizer combination of 25 kg N + 75 kg ha-1 resulted with maximum seed yield (1112.96 kg ha-1). **malik *et al.* (2003)**

Number of nodules per plant

There was steady increase in root nodules from 15 to 45 DAS and 45 to at harvest root nodules decrease. At harvest, maximum number of nodules/plant (25.50) was recorded with application of N 25 kg/ha+ zinc 0.5% that was considerably superior over all alternative treatments and statistically at par with treatment of N 20 kg/ha+ Zn 0.5% (24.95). it might be due to the impact

of nitrogen (0, 20, 40 and 60 kg ha-1) and P (0, 25, 50 and 75 kg ha-1) on the growth and seed yield of mungbean. They observed that the number of nodules per plant was increased with the increasing rates of N up to 40 kg ha-1 followed by a decrease with additional increase in N. **Srinivas *et al.*, (2002).**

Plant dry weight (cm)

The Plant dry weight of Black gram recorded at 15, 30, 45 DAS and at harvest differed considerably as influenced by nitrogen and zinc. At harvest, maximum plant dry weight (9.61 g/plant) was recorded with application of N 25 kg/ha + zinc 0.5% that was significantly superior over all other treatments and statistically at par with treatment of N 20 kg/ha+ Zn 0.5% (9.34 g/plant). it might be due to the treatments, Increase in fresh and dry weight due to N, S, and their interaction may be attributed to low soil status of obtainable N and S and due to the stimulating effect of applied nitrogen and Sulphur in the synthesis of chloroplast, leading to increased photosynthesis which might have led to a rise in fresh and dry weight. Similar findings have also been reported by **Das, (1982) and Khanna and Gupta (2005).**

Seed yield (kg/ha)

Treatment with application of N 25 kg/ha + zinc 0.5% was recorded maximum seed yield (937 kg/ha) that was considerably superior over all other treatments and statistically at par with treatment of N 20 kg/ha + Zn 0.5% (917 kg/ha).It may be due to the response of black gram to nitrogen fertilizer. Higher yield attributes and yield were noticed with the combined foliar spray of secondary nutrients and zinc which could be attributed due to added advantage of zinc to secondary nutrients resulting in optimum availability of nutrients for luxurious crop growth and efficient partitioning of assimilates from source to sink **(Prasanna *et al.*, 2013) Choudhary *et al*. (2014)** found higher seed yield with foliar spray of S and Zn.

Straw yield (kg/ha)

Treatment with application of N 25 kg/ha+ zn 0.5% was recorded maximum straw yield (2418 kg/ha) that was considerably superior over all other treatments and statistically at par with treatment of N 20 kg/ha+ Zn 0.5% (2219 kg/ha).

Table 1 Effect of nitrogen and zinc on growth attributes, yield and economics of Black gram

Treatments	Growth attributes				Yield		Economics	
	Plant height (cm)	Branches per plant	Nodules per plant	Dry weight (g/plant)	Grainyield (kg/ha)	Stoveryield (kg/ha)	Net return (INR/ha)	B:C ratio
N 15kg/ha+Zn 0.25%	36.67	6.62	21.17	7.36	736	1736	29204.39	1.56
N 15kg/ha+Zn 0.5%	40.10	7.48	23.06	8.47	852	2008	36614.39	1.95
N 15kg/ha+Zn 0.75%	33.73	6.52	18.32	7.31	559	1559	17439.39	0.92
N 20kg/ha+Zn 0.25%	37.89	6.74	22.07	7.47	766	1833	31089.14	1.66
N 20kg/ha+Zn 0.5%	40.82	7.50	24.95	9.34	917	2269	40774.14	2.16
N 20kg/ha+Zn 0.75%	35.03	6.58	18.99	7.67	632	1766	22119.14	1.16
N 25kg/ha+Zn 0.25%	39.01	6.51	22.06	7.59	811	1921	33948.92	1.80
N 25kg/ha+Zn 0.5%	41.50	7.65	25.50	9.61	937	2418	42008.92	2.22
N 25kg/ha+Zn 0.75%	36.50	6.73	19.49	7.42	683	1850	25368.92	1.33
SEm(±)	0.352	0.198	0.329	0.213	9.629	66.786		
CD (p=0.05)	1.048	0.589	0.980	0.634	28.611	198.43		

CONCLUSION

It is concluded that the treatment T_8N 25 kg/ha+ Zn 0.5% was found to be the best that recorded highest plant height, number of branches, number of nodules, seed yield, stover yield. It also fetched the maximum gross return, net return and benefit cost ratio.

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