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IMPACT OF DIFFERENT LEVELS OF FERTILIZER ON GROWTH AND YIELD OF INDIAN MUSTARD (*Brassica juncea Coss*) UNDER IRRIGATED CONDITION OF WESTERN U.P.

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ABSTRACT
Investigation was carried out to study the impact of different levels of fertilizer on growth parameter and yield of Indian mustard under irrigated conditions of western U.P at the research farm, Janta Vedic College Baraut, Baghpat during the *rabi 2002 and 2003*. Among the different levels of treatments applied then the application of Nitrogen @ 100 kg/ha or Phosphorus @ 80 kg/ha increase growth parameters and yield than other treatments in comparison, there by resulting significant increase in growth and yield attributes *viz.* plant height, no. of branches/plant, dry matter accumulation, no. of siliquae/plant and seeds/ siliquae, seed (15.94 to16.58 q/ha) and straw yield of Indian mustard. Application of Nitrogen @ 100 kg/ha or Phosphorus @ 80 kg/ha increased the yield of Indian mustard significantly over other treatments, besides realised at B: C. ratio of 2.34 to 2.36. The highest gross returns Rs 25450 and 25555 per hectare and highest net returns of Rs 14551 and Rs 14731 per hectare was recorded with Nitrogen @ 100 kg/ha or Phosphorus @ 80 kg/ha

KEY WORDS- Indian mustard, Yield attributes Yield and Economics.

INTRODUCTION

India is the second largest producer of rape seed-mustard next only to china. It occupy a prominent place bring next in importance to groundnut both in acreage and production, supplying most to the fat requirement of about 50 percent of India population of the states of Punjab, Uttar Pradesh, Bihar, Orissa, West Bengal and Assam. There are several constraints in increasing the productivity of oil seed biotic and aboitic on farm technological and non-technological. In India, rapeseed and mustard are next important oilseed crops after groundnut. In India average yield of rapeseed and mustard is also low then other countries. Its oil also has potential in the developing biodiesel market (Economic Research Service, 1996).

Thus it offers considerable scope through improved agro-technology. In view of high pressure on land due to increase in extending this crop to the new area except with irrigation provisions in arid zones but it is very difficult to achieve. In recent years, the evolution of short duration and high yielding genotypes of mustard (*Brassica juncea*) which could be successfully fitted in various intensive cropping system of area. Application of inadequate and unbalanced quantities of nutrients to the crop also resulted in lower yield levels. Amongst all the Brassica species, mustard has been reported to highest feeder (Bhan and Singh 1974). Nitrogen and Phosphorus are the essential components of protoplasm and chlorophyll materials and there quantities are essential to maximum photosynthetic activities for the synthesis of carbohydrates in the plants and their conversion into plant lipids. Thus becomes added importance during the present oilseed crises in India, thus growth and yield behavior of newly evolved cultivar Varuna of India mustard need to be studied exploiting maximum yield potential under varying levels of nitrogen and phosphorus in this irrigated and intensive cropping systems area under subtropical agro-eco systems of western U.P

MATERIALS & METHODS

A field experiment was conducted at the research farm, Janta Vedic College Baraut, Baghpat during the *Rabi 2002 and 2003*. The soil of the experimental field was sandy loam in texture, slightly alkaline in reaction, low in organic carbon (0.48%) and available nitrogen (241 kg/ha) and was medium in available phosphorus (13.6 kg/ha) and potassium (262.4 kg/ha). Indian Mustard variety Varuna was sown in 30 cm inter row and 10 cm intra row spacing on 25th of October during both the years of experimentation using 4-6 kg seed ha^{-1}. The experiment of nine treatments comprising of unfertilizer and low fertilizer under different levels of treatments i.e. Nitrogen 0, 50, 100 and Phosphorus 0, 40, 80 kg/ha were arranged in a randomized block design with four replications.

RESULTS & DISCUSSION

Plant growth and yield attributes

The different levels of treatments measures exhibited significant variation in respect of growth parameters. Nitrogen @ 100 kg/ha (Table 1) produced taller plant closely followed by Phosphorus @ 80 kg/ha as compared

to unfertilizer treatment. The superiority of Nitrogen @ 100 kg/ha and Phosphorus @ 80 kg/ha at harvest stage in term of shoot height might have accrued to increase. Similarly maximum number of branches per plant in Indian mustard crop was recorded with Nitrogen @ 100 kg/ha or Phosphorus @ 80 kg/ha (7.92 to 7.94). Dry matter production is the resultants of growth characters viz. plant height, number of branches/plant and leaf area index, the highest dry matter accumulation, no. of siliqaue/plant, wt. of siliqaue/plant, no. of seeds/siliqaue, seed wt. /plant, 1000 seed weight and seed yield of Indian mustard crop with Nitrogen @ 100 kg/ha or Phosphorus @ 80 kg/ha (Table 2). This indicates that 100% N requirement of crop plants was substituted. The increase in growth parameter of Indian mustard was attributed to the beneficial effect. The results are in accordance with the findings of Chauhan *et. al* 1995 and Kumar *et. al.* 1997.

TABLE 1: Impact of different levels of fertilizer on growth and yield attributes of Indian mustard at harvest stages *{Pooled Data of Two Years}.*

Treatments	Plant height	No. of branches/ plant	No. of siliquae/ plant	Wt. of siliquae/ plant (g)	Dry matter accumulation	No. of seeds/ siliquae	Seed wt./ plant (g)
Nitrogen 0 kg/ha	158.92	7.12	335.82	49.81	82.45	14.28	23.29
Nitrogen 50 kg/ha	173.26	7.56	392.77	59.22	92.87	14.82	29.62
Nitrogen 100 kg/ha	178.34	7.94	430.42	65.43	105.82	14.98	32.34
Phosphorus 0 kg/ha	163.24	7.08	231.61	49.18	80.74	14.26	23.17
Phosphorus 40 kg/ha	174.44	7.62	436.26	58.76	90.72	14.81	28.78
Phosphorus 80 kg/ha	172.84	7.92	491.14	66.52	109.68	15.01	33.30
S Em ±	0.55	0.14	2.30	2.05	2.37	0.21	0.91
CD (P=0.05)	1.58	0.42	6.65	5.93	6.86	N.S	2.63

TABLE 2: Impact of different levels of fertilizer on yield and yield attributes of Indian mustard at harvest stages *{Pooled Data of Two Years}.*

Treatments	1000 seed wt. (g)	Seed yield (q/ha)	Straw yield (q/ha)	Stick yield (q/ha)	Biomass (q/ha)
Nitrogen 0 kg/ha	4.59	11.95	12.66	30.69	55.30
Nitrogen 50 kg/ha	4.64	14.76	13.84	37.26	65.86
Nitrogen 100 kg/ha	4.76	15.94	15.23	38.74	69.91
Phosphorus 0 kg/ha	4.56	11.68	12.58	30.43	54.69
Phosphorus 40 kg/ha	4.69	14.39	13.67	36.48	64.54
Phosphorus 80 kg/ha	4.74	16.58	15.48	39.78	71.84
S Em ±	0.046	0.41	0.37	0.46	1.38
CD (P=0.05)	N.S	1.18	1.08	1.34	3.99

Yield

The data on seed yield of Indian mustard are presented in (Table 2). In general all the treatments showed significant increase in seed yield over the control. Maximum seeds yield was recorded with Nitrogen @ 100 kg/ha (15.94 q/ha) and Phosphorus @ 80 kg/ha (16.58 q/ha) had significant as comparable to other treatments (Fig. 1). The increase in yield in these treatments might be due to the positive effect on yield attributing factors such as no. of branches/plant, dry matter accumulation, no. of siliqaue/plant, wt. of siliqaue/plant, no. of seeds/siliqaue, seed wt. /plant and 1000 seed weight of Indian mustard. Similarly the different treatments produced significant higher straw and stick with Nitrogen @ 100 kg/ha (15.23 and 38.74 q/ha) or Phosphorus @ 80 kg/ha (15.48 and 39.78 q/ha) as compared to other treatments by Singh *et. al* 1995.

Economics

The application of Nitrogen @ 100 kg/ha and Phosphorus @ 80 kg/ha were showed higher gross return, net return and B. C. ratio than other treatments. The highest gross returns Rs 25450 and 25555 per hectare and highest net returns of Rs 14551 and Rs 14731 per hectare was recorded with Nitrogen @ 100 kg/ha or Phosphorus @ 80 kg/ha and the highest B. C. ratio of 2.34 to 2.36 was recorded with Nitrogen @ 100 kg/ha or Phosphorus @ 80 kg/ha (Fig. 2). This show that Indian mustard is more responsive towards the inputs use and under good management and it can give even higher returns (Table 3). It may be concluded that the application Nitrogen @ 100 kg/ha and Phosphorus @ 80 kg/ha recording higher productivity and profitability of Indian mustard

TABLE 3: Relative economics of Nitrogen and Phosphorus levels in Indian mustard

Treatments	*{Pooled Data of Two Years}*			
	Cost of cultivation	Gross return (Rs/ha)	Net Return (Rs/ha)	B: C ratio
Nitrogen 0 kg/ha	9312	13196	3884	1.42
Nitrogen 50 kg/ha	11499	20486	8987	1.78
Nitrogen 100 kg/ha	10899	25450	14551	2.34
Phosphorus 0 kg/ha	11433	16667	5234	1.46
Phosphorus 40 kg/ha	11471	20242	8771	1.76
Phosphorus 80 kg/ha	10824	25555	14731	2.36

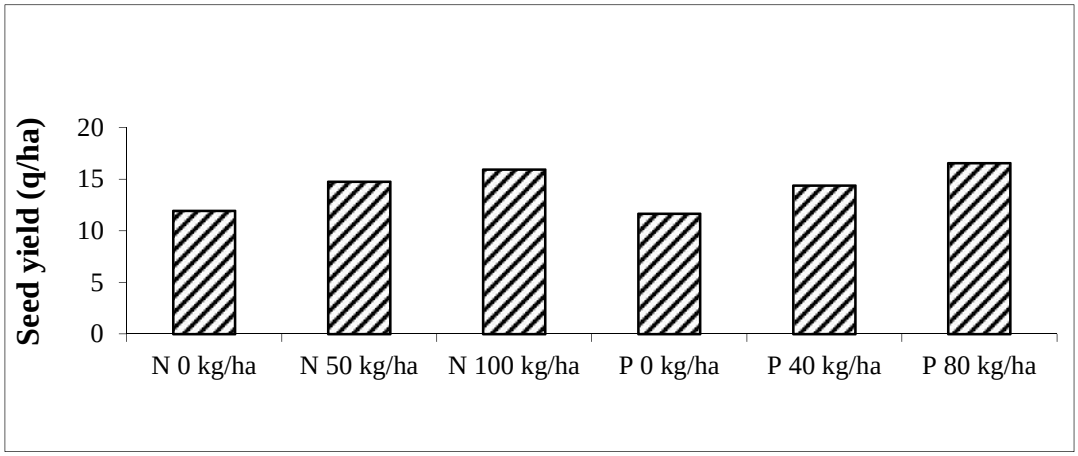

FIGURE 1. Impact of different levels of fertilizer on yield of Indian mustard at harvest stages

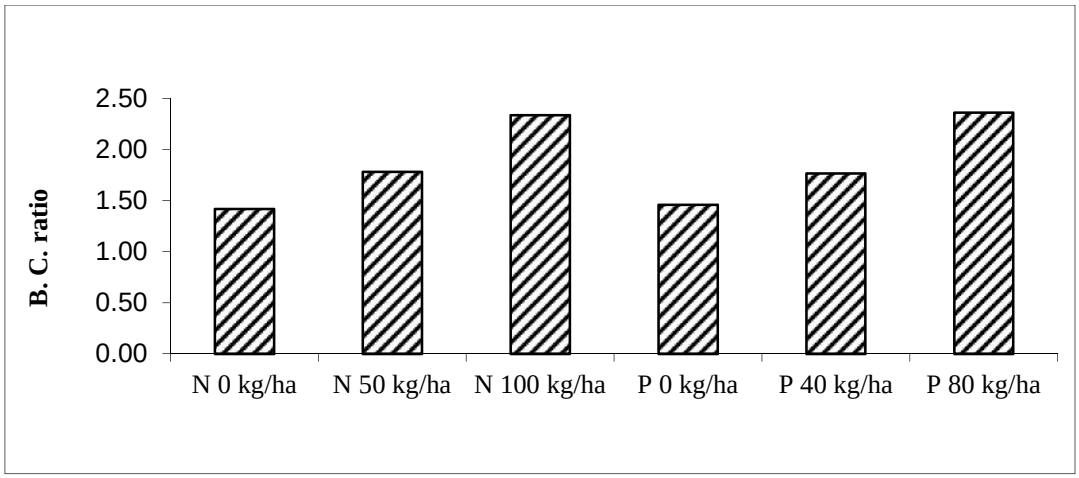

FIGURE 2. Relative B. C. Ratio of nitrogen and phosphorus levels in indian mustard

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