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GN Kishore Reddy
MSc Scholar, Department of Agronomy, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, Uttar Pradesh, India

Rajesh Singh
Assistant Professor, Department of Agronomy, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, Uttar Pradesh, India

Correspondence
GN Kishore Reddy
MSc Scholar, Department of Agronomy, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, Uttar Pradesh, India

Effect of integrated nitrogen management on the yield, quality and economics of mustard (*Brassica juncea* L.)

GN Kishore Reddy and Rajesh Singh

Abstract
A field experiment was conducted during the *rabi* season of 2017 on mustard crop (var. DHARA) at Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, SHUATS, Allahabad (U.P.).To study the effect of integrated nitrogen management on growth and yield of mustard. The experiment consisted of providing 80 kg nitrogen to mustard by supplying 50 kg nitrogen through urea and 30 kg nitrogen either through poultry manure or by farmyard manure or by vermicompost with and without *Azotobacter* seed inoculation, which was compared with 80 kg nitrogen supplied through urea alone. Hence, comprising of seven treatments, which were laid out in Randomized Block Design and replicated thrice. The result showed that application of 50 kg nitrogen through urea + 30 kg nitrogen through poultry manure+ *Azotobacter* (seed inoculation) gave higher yield attributes and quality *viz.*, seed yield (2.37 t ha $^{-1}$), stalk yield (6.62 t ha $^{-1}$), harvest index (26.35) and oil content (39.30%). The higher gross returns (₹116049 ha^{-1}), higher net returns (₹73865.64 ha^{-1}) and B:C ratio (2.75) recorded with the T_3 (50 kg nitrogen through urea + 30 kg nitrogen through poultry manure + *Azotobacter* (Seed inoculation).

Keywords: *Azotobacter*, farm yard manure, growth, nitrogen, poultry manure, vermicompost and yield

Introduction
Mustard (*Brassica juncea* L.) is the most important oilseed crop after groundnut accounting around 25 percent of total oilseed production. It is one of the important oilseed crops of Indo – Gangetic plains (Reddy S.R 2016). Oil seeds play the Important role Indian economy next to food grains in terms of Area and Production. In India mustard crop grown in about 5.76 million hectares with total production 6.82 million tonnes and average productivity of 1184 kg/ha. In Uttar Pradesh mustard occupies the area 0.59 million hectares with total production 0.60cmillion tonnes and average productivity 1015 kg/ha (DE&S 2015-16). Nutrient management is one of the most important agronomic factor that affects the Indian mustard. But application of all the needed fertilizer through chemical fertilizers had deleterious effect of soil fertility, unsustainable yields. While integration with organic manures and bio – fertilizers would be able to maintain soil fertility and sustain crop productivity. Organic manures are also enhance the activity of soil in improving the physical and nutritional system of soil and also enhances the activity of soil microflora (Hadiyal *et al.*, 2017). Nitrogen is combined, to be the most important nutrient for the crop to metabolic activity and transformation of energy, chlorophyll and protein synthesis. Application of vermicompost and farm yard manure improves soil health by improving nutrient availability, water holding capacity (WHC), soil physical properties and microbial activity.

Poultry manure contains nutrient element that can support crop production and enhance the physical chemical properties of soil and improves lateral water movement (Amanullah *et al.*, 2010). It contains higher nitrogen and phosphorous than other bulky organic manures and is a good source of production of elements rich fertilizer (Zamil *et al.*, 2004).

Bio-fertilizers have the potential to solubilize/ mobilize major nutrients such as nitrogen and phosphorus in addition to micro nutrients and thus act as nutrient flow regulator in nature. (Meena *et al.*, (2013) [6]. *Azotobacter chroococum* is a non–symbiotic nitrogen fixing agro - microbe having potential to fix combined quantities of atmospheric nitrogen in rizospere of non - legumes. *Azotobacter* synthesizes various growth hormones, antifungal substances and siderophores that favourably affect crop growth (Sunil *et al.*, 2016). Keeping this in view, the present experiment was undertaken to study the effect of integrated nitrogen management on the growth and yield of mustard.

Materials and Methods

A field experiment was conducted during the *rabi* season of 2017 on mustard crop (var. Dhara) at Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, SHUATS, Allahabad (U.P.), which is located at $25^0$24 ˈ41.27" N latitude, $81^0$51'3.42" E longitude and 98 m altitude above mean sea level. The soil of experimental field was sandy loam having *p*H of 7.2, with 0.35% of organic carbon, available P is 18.2 kg/ha, available K is 241.8 kg/ha. The experiment consisted of providing 80 kg nitrogen to mustard by supplying 50 kg nitrogen through urea and 30 kg nitrogen either through poultry manure or by farmyard manure or by vermicompost with and without *Azotobacter* seed inoculation, which was compared with 80 kg nitrogen supplied through urea alone. Hence, comprising of seven treatments, which were. Laid out in Randomized Block Design and replicated thrice. Mustard (var. Dhara) was sown 5th of November in 2017. Phosphorus and Potassium was applied as basal in full dose while, nitrogen was applied half dose as a basal at the time of sowing and remain half was applied at the span of flowering. Organic manures like farm yard manure, poultry manure and vermicompost were applied before sowing in furrows as per treatments as basal. The seeds was sown with seed rate of 7 kg/ha. The seeds were inoculated by *azotobacter spp* as per treatment. The seeds were dried in shade and sown with depth 3 to 4 cm, with inter row spacing 45 cm. Required plant population was maintained by thinning out at 20 DAS. The crop matured in 110 days and was harvested 1st week of March. After harvesting, the data on yield attributes and quality *viz*., seed yield (t ha $^{-1}$), stalk yield (t ha $^{-1}$), harvest index (%) and oil content (%) statistically analyzed and critical difference were calculated.

Table 1: Effect of integrated nitrogen management on yield attributes and quality of mustard

Treatment	Seed yield (t ha^{-1})	Stalk yield (t ha^{-1})	Harvest index (%)	Oil content (%)
T_1: 80 kg N through urea (control)	2.28	6.38	26.33	38.52
T_2:50 kg N (U) + 30 kg N (VC) + *Azotobacter* (SI)	2.32	6.60	25.99	39.28
T_3:50 kg N (U) + 30 kg N (PM) + *Azotobacter* (SI)	2.37	6.62	26.35	39.30
T_4:50 kg N (U) + 30 kg N (FYM) + *Azotobacter* (SI)	2.04	6.45	24.01	37.20
T_5:50 kg N (U) +30 kg N (VC)	2.02	6.62	23.41	37.32
T_6:50 kg N (U) + 30 kg N (PM)	2.01	6.60	23.36	37.07
T_7:50 kg N (U) + 30 kg N (FYM)	1.99	6.16	24.44	36.80
F test	S	S	S	S
SED (±)	0.03	0.09	0.43	0.28
CD (P=0.05)	0.07	0.20	0.94	0.60

*SI–Seed inoculation, U- UREA, VC- vermicompost, fym- farm yard manure, pm-poultry manure

Table 2: Economics of different treatment combination in integrated nitrogen management of mustard

Treatment	Cost of cultivation (₹ ha^{-1})	Gross return (₹ ha^{-1})	Net return (₹ ha^{-1})	B:C ratio
T_1: 80 kg N through urea (control)	39300.39	107,188	67887.61	2.72
T_2:50 kg N (U) + 30 kg N (VC) + *Azotobacter* (SI)	55456.36	108,795	53338.64	1.96
T_3:50 kg N (U) + 30 kg N (PM) + *Azotobacter* (SI)	42183.36	116,049	73865.64	2.75
T_4:50 kg N (U) + 30 kg N (FYM) + *Azotobacter* (SI)	57456.36	107,167	49710.64	1.86
T_5:50 kg N (U) +30 kg N (VC)	55443.86	106,708	51264.14	1.92
T_6:50 kg N (U) + 30 kg N (PM)	42170.86	104,000	61829.14	2.46
T_7:50 kg N (U) + 30 kg N (FYM)	57443.86	96,979	39535.14	1.68

*SI-Seed Inoculation, U- Urea, VC- Vermicompost, FYM- Farm Yard Manure, PM-Poultry Manure
Mustard @ ₹4000 q ha^{-1} and Stover @ ₹200 q ha^{-1}, based on MSP of 2017-2018

Results and Discussions

Effect on yield attributes and quality

Data pertaining to yield attributes and quality are presented in Table 1, which revealed that the integrated nitrogen management in mustard, significantly increased the yield attributes like, seed yield (2.37 t ha $^{-1}$), stalk yield (6.62 t ha $^{-1}$) and harvest index (26.35) were observed statistically significant with the treatment T_3:50 kg N (U) + 30 kg N (PM) + Azotobacter (SI). These results are close conformity with Saini *et al.*, (2017) and Lepcha *et al.*, (2015) [5]. This increasing yield attributes could be the higher availability of nutrients under poultry manure and *azotobacter* application. The increment in supply of essential nutrients to mustard, improves the availability, acquisition, mobilization and influx into the plant tissue increasing, thus improved yield components and finally the yield. These results are in close conformity with those of Singh and Sinsinwar (2006) [11] and Datta *et al.* (2009) [1]. The oil content (39.90 %) were observed statistically significant with treatment T_3:50 kg N (U) + 30 kg N (PM) + *Azotobacte*r (SI). Increase in oil content, under organic and inorganic manure application with *azatobacter* seed inoculation, can be assigned to the availability of all the essential nutrients and their continuous mineralization Meena *et al.* (2016). The balanced nutrient uptake by plant owing to organic matter probably favored the enzymatic activities responsible for oil synthesis. These results are corroborate with Kumar *et al.* (2016) [2] and Kumar *et al.* (2017) [3].

Economics

As given in Table 2, the higher gross return value (₹116,049 ha^{-1}), net return value (₹73865.64 ha^{-1}), and B:C ratio (2.75) was found in the treatment T_3:50 kg N (U) + 30 kg N (PM) + *Azotobacter* (SI). Sharma *et al*. (2017) [10] computed the economics and reported that gross return, net return, B:C ratio were higher with poultry manure application. Meena *et al*. (2013) [6] reported that seed inoculation with *azotobacter* give higher net return, B:C ratio compared to control.

Conclusion

From the above experiment, it is concluded that the seed yield (2.37t ha^{-1}), oil content(39.30%), net returns(₹73865.54 ha^{-1}) and benefit cost ratio (2.75) in mustard (var. DHARA) was found to be the best under the treatment T_3:50 kg N (U) + 30

kg N (PM) + *Azotobacter* (SI). These findings are based on one- season. So, for best results, it may need further trials.

References

1. Datta JK, Banerjee A, Saha SM, Gupta S, Mondal NK. Impact of combined exposure of chemical fertilizer, bio-fertilizer and FYM on growth, physiology and productivity of Yellow sarson (*Brassica campestries*) in old alluvial soil. Journal of Environmental Biology. 2009; 30(5):796-800.
2. Kumar S, Sandeep K, Avesh K, Singh O. Productivity, profitability and quality of Indian mustard (*Brassica juncea*) as influenced by fertilizer levels and integrated nutrient-management. Indian Journal of Agronomy. 2016; 61(2):231-236.
3. Kumar M, Singh PK, Yadav KG, Chaurasiya A, Yadav A. Effect of nitrogen and sulphur nutrition on growth and yield of Indian mustard (*Brassica juncea* L.) in western UP. Journal of Pharmacognosy and Phytochemistry. 2017; 25(1):445-448.
4. Lakhan BS, George PJ, Bhadana SS. Effect of Nitrogen Management and Biofertilizers on Growth and Yield of Rapeseed (*Brassica campestris* var. toria). Int. J Curr. Microbiol. App. Sci. 2017; 6(8):2652-2658.
5. Lepcha S, Moinuddin, Bhujel K. Influence of different organic and Inorganic sources of nitrogen on growth, yield and oil content of Indian mustard (*Brassica Juncea* L.). Journal of International Academic Research. 2015; 3(11):146-159.
6. Meena DS, Tetarwal JP, Ram Baldev. Effect of chemical and bio fertilizers on productivity, profitability and quality of Indian mustard (*Brassica juncea*) in Vertisols. Indian Journal of Agronomy. 2013; 58(1):96-99.
7. Mohammad A, Sekar S, Muthukrishnan P. Prospects and Potential Manure. Asian Journal of Plant Sciences. 2010; 9(4):172-182.
8. Keerthi P, Pannu RK, Dhaka AK, Chaudhary K. Effect of Sowing Time and Nitrogen on Growth, Yield and Nutrient Uptake by Indian Mustard (*Brassica Juncea* L.) Under Western Haryana. Chem Sci Rev Lett. 2017; 6(24):2526-2532.
9. Rajput AL. Effect of plant density, N levels and moisture conservation practices on the performance of Indian mustard (*Brassica juncea*) and available N status of soil. Indian Journal of Agronomy. 2012; 57(2):171-175.
10. Sharma RK, Sharma SK, Balyan JK. Productivity and profitability of Indian mustard under different organic nutrient management practices in Semi-arid region. Journal of Oilseed Brassica. 2017; 8(1):89-94.
11. Singh R, Singh SK. Evalution of yield and quality aspects of Indian mustard (*Brassica juncea* L.) under integreted nutrient management. Ann. Agric. Res. 2006; 27(3):220-223.