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Original Research Article

Influence of Microbial Fertilizers on Yield of Indian Mustard (*Brassica juncea* L.)

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A B S T R A C T

Field trials were carried out during 2000-2001 and 2001-2002 on the farmer's field in Bareilly district (Rice-wheat cropping system) to study the performance of microbial fertilizers in Indian mustard in relation to nitrogen fertilization. Three microbial fertilizers viz. *Azotobacter*, *Azospirrillum* and Phyllospheric bacteria were tested along with control at four rates of nitrogen fertilization (0, 40, 80 and 120 kg N/ha) in a factorial R.B.D. The effect of microbial fertilizers was found to be non-significant but the seed yield increased by 8.8% in 2000-2001 and 07% in 2001-2002 over control with the *Azotobacter* seed inoculation at 120 kg. N ha. The enhancement in seed yield was attributed with the increased in number of branches, number of siliquae and seed yield per plant over control. Considered the low cost involved, the seed inoculation with *Azotobacter* can, therefore, be made for sustained production of Indian mustard. The experiment further was repeated in 20011-12 for seed and oil quality. Application of fertilizers to mustard crop had adverse effect on oil content. The *Azotobacter* and azospirillum had no marked change in Fatty acids composition. However, erucic acid was found to be minimum with microbial application. Minimum and maximum with the euric acid level is important to identifying to grow low erucic acid mustard production by farmers for high quality mustard oil.

Keywords

Microbial fertilizers, yield, mustard, oilseeds, oil content

Introduction

India is one of the largest oilseeds producers country that covers one fifth of the entire area under oil seed crops. India also produce one fifth oil seeds production of the world. In India cereals are grown at first priority commodity. Oilseeds ranks second in choice of crop production. Oil seeds occupy about 13.5% of the gross cropped area in the country. It accounts for 5% of gross national product and 10% of the value of all agricultural products (Rai *et al.*, 2002). Among the seven edible oilseeds cultivated in India, rape-seed –mustard contributes 28% in the total oilseeds production. India is the fifth largest oilseed economy in the world. Rapeseed-mustard oilseeds production ranks second after groundnut 2.7% in the India's oilseed economy. The mustard growing areas in India are experiencing the vast diversity in the climatic conditions. Different species of rapeseed mustard are grown in some parts of the country. Under in regional resources, cultivation of rapeseed mustard become less remunerative to the farmers. This results short fall in demand and supply of mustard in India. Oil is imported from other countries.

Therefore, specific nutrient management to improve upon existing yield levels at farmer's field. The present study were conducted to establish the effect of different microbes on yield and oil quality. The per hectare productivity of mustard is less than 15 q/ha, which can be enhanced through use of improved varieties and agronomic practices. PusaKarishma (LES-39) was released in 2005 by State Variety Release Committee (SVRC, Delhi). It is recommended for National Captial Region of Delhi.

Materials and Methods

The trials were conducted during 2001-02 and 20011-12 on farmer's filed in adopted villages by IVRI(ICAR), Izatnagar. After harvest of Rice crop cultivation of mustard is suitable for new crop rotation over the Rice-Wheat common crop rotation in the ruhelkhand region. Indian mustard cultivar pusaKarishma is first single zero variety. Seed rate 4.0kg/ha, row to row 30 cms and plant to plant 10 cms was applied as cultivation practices. Crops were sown in second fortnight of October. Irrigation were applied at 35-50 DAS. Half quantity of nitrogen and full quantity of other fertilizers as busal dose and remaining nitrogen after first irrigation. Treatment were T_1-0, T_2-40, T_3-80 and T_4-120 kg N/ha in RBD design with three replications on farmers fields in adopted villages of Bareilly district of Uttar Pradesh. Crop was harvested at 150 days after sowing.

Results and Discussion

Data collected and analyzed. Results from trails are shown through table and graph.

Azotobacter is generally grow in rhizosphere of the crop plants and in uncultivated soils. This is associated with number of crop plants such as rice, maize, bajra, vegetables and plantation crops. They drive food from the organic matter present in the soil and root exudates and fix atmospheric N (M aryenko, 1964). These nitrogen fixing bacteria important for ecology and agriculture. There is a great significant of *Azotobacter chroococum* in plant nutrition and its contribution to soil fertility. Growth substances, or plant hormones, are natural substances that are produced by micro-organisms and plants alike. They have stimulating or inhibitory effects on certain physiological-biochemical process in plants micro-organism.

Plant height (167 cm). DM (44.g), number of branches/plant (6.8), yield attributes viz : number of siliqua/plant (291), test weight (4.5 g) at 100 DS were recorded higher in treatment with application of Azotobacter as compared to control.

Azotobacter chroococum, in crop production has its significance in plant nutrition. It contribute to soil fertility as microbial inoculants. It enhance production growth substances. It affects plant markedly enhance crop production. Being soil bacteria, *Azotobacter* germs synthesizes auxion, cytocykinins and G.A.-like substances. There growth materials are primary substances regulate higher growth. Originated hormones, substances from root surface in association of higher plant affects, plant growth. For its better results suitable association of plant genotype and specifie *Azotobacter* strain is essential (2013) (Gupta and Singh, 2003). The germ Azospirillum first species was isolated by Beijermck (1925) from N-poor sandy soils in Netherlands. This bacterium was faster isolated from soil (Schroder, 1932). As a phyllospheri bacterium of tropical plants (Beckong, 1982).

Table.1 Effect of microbial and N application on mustard seed and oil yield

Treatment	Year 2001-02		Year 20011-12	
	Seed yield q/ha	Oil%	Erucic Acid %	Oil yield q/ha
T_1– 0	12.6	38.1	1.9	4.80
T_2-40	17.2	38.0	1.8	6.53
T_3-80	21.6	37.8	1.9	8.16
T_4-100	24.2	37.6	1.7	9.09
T_5-120	25.3	37.8	1.8	9.56
$CD_{0.05}$	1.39	2.46	-	2.27

Fig.1 Effect of microbial and N application on mustard seed and oil yield (q/ha)

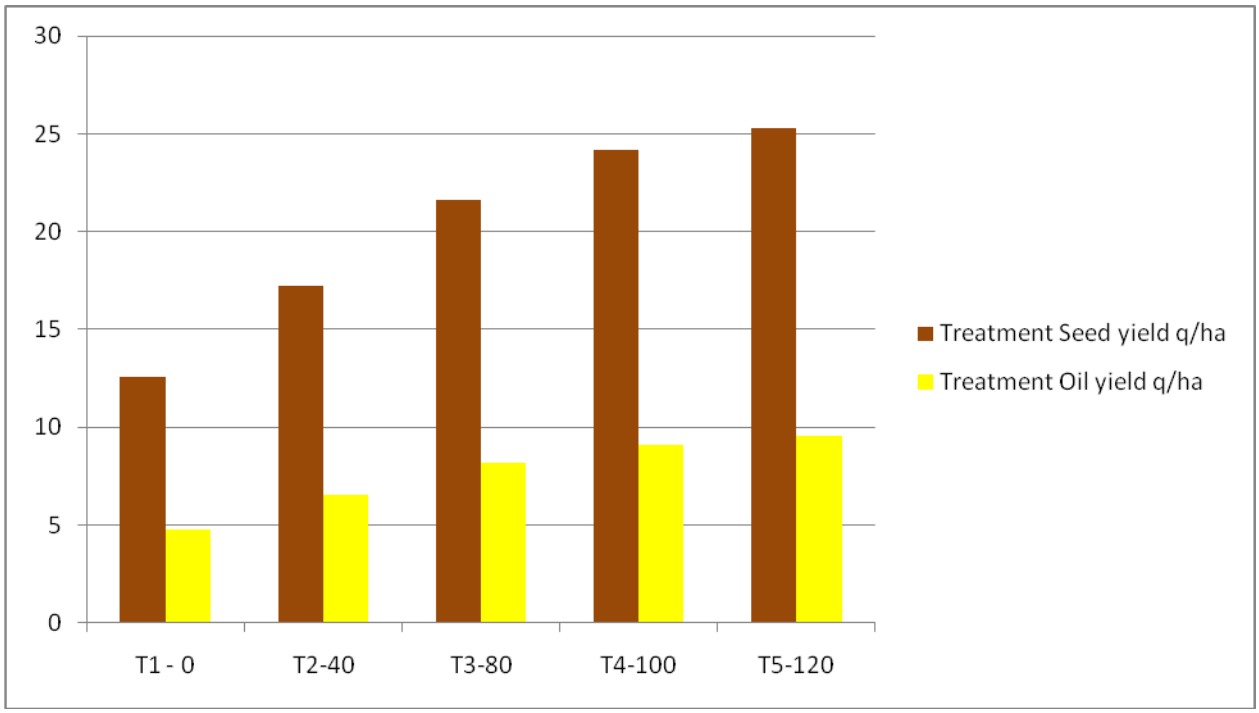

Fig.2 On farm trials on Farmers' Field

Since than, Azospirillum has been isolated from roots of numerous wild and cultivated grasses, cereals, legumes and soils. Effect of Azospiriillium inoculates on plants : Inoculation of plants with azosperillumcan result in a significant change in various plant growth parameter, which may or may not affect crop yield. (Gupta and Singh, 2002). The above ground plant responses to Azospirillum inoculation-cereals or Non-cereals species were reported-increases total plant dry weight, in amount of N in plant and grains, and in total number of spiles, increased grain height, greater plant height and leaf size and higher germination rates. (FAO Report, 1987).

Effects of N application

Seed yield increased with the increase in N application from 0 to 120 kg/ha. Maximum yield 25.3 q/ha was recorded in treatment-5 (Microbes + 120 kg N/ha)

Oil content and eurcic acid percent

Oil content, yield and eurcic % was adversely affected with increase in N application in 2009-10. However, total yield was recorded higher with higher doses of nitrogen.

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