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EFFECT OF AZOTOBACTER ON YIELD AND OIL CONTENT OF RAPESEED MUSTARD VARIETIES UNDER MANIPUR CONDITION

Sucharita Dutta and M. Sumarjit Singh
College of Agriculture
Central Agricultural University
Imphal - 795001

ABSTRACT

Field experiments were conducted during the *rabi* (winter seasons) of 1999-2000 and 2000-2001 at the Agronomy experimental field, Central Agricultural University, Imphal using two variables i.e. variety and Azotobacter. Result showed that plant height, leaf number/plant, number of primary and secondary branches/plant, fresh and dry weight of whole plant, number of siliqua/ plant, seeds/siliqua increased significantly with Azotobacter inoculation. Yella (local variety) gave the highest yield (7.86q/ha) but was at par with variety M-27 (7.59q/ha). Oil content was not found to be effected by Azotobacter inoculation but varietal response was found to be significant. Variety M-27 gave the highest oil yield (3.22q/ha). The highest cost benefit ratio (1:1.91) was associated with Yella inoculated with Azotobacter.

INTRODUCTION

Green revolution in India that resulted in increased agricultural production was due to high yielding and fertilizer responsive varieties. But it was accompanied by an indiscriminate use of chemical fertilizers. A strategy is, therefore, essential for integrated nutrient supply involving judicious combination of chemical fertilizers, organic manures and bio-fertilizers. Many reports about Azotobacter's beneficial effects in rapeseed and mustard have been reported from different parts of the country. But studies on this aspect are limited in North East India. An investigation was, therefore planned to study the effect of Azotobacter on yield, oil content and oil yield of rapeseed mustard.

MATERIALS AND METHODS

The field experiments were conducted at Agronomy experimental field, Central Agricultural University, Iroisemba, Imphal. The soil was clayey in texture, having a pH of 5.5, with medium to high N, P and K content. The experiment consisted of two variables i.e. varieties and Azotobacter. Five varieties (TS-29, TS-38. SKM-2, M-27 and Yella) with two levels of Azotobacter (inoculated and unionculated) were used. Treatments were laid out in Factorial Randomized Block design with four replications. Seeds were sown on 16th November and 20th November of 1999 and 2000 respectively at the rate 7 Kg/ha in rows 25cm apart and maintaining a plant to plant distance of 10cm. Azotobacter was used as seed treatment @ 200g/10-12 Kg of seed. Since the soil was acidic, slaked lime @ 1 Kg/10-12 Kg of seed was used for coating of seed treated with bio-fertilizer.

RESULTS AND DISCUSSIONS

Effect of Azotobacter on yield and yield attributes

Plant height, number of leaves/plant, number of primary and secondary branches/plant, fresh and dry weight of plants increased significantly with Azotobacter inoculation in 60 and 90 day old plants. The

favourable effect of Azotobacter on yield attributes and yield might be due to the effect of nitrogen fixed by Azotobacter. These results are in conformity with the findings of Singh and Bhargava (1994). Inoculation with Azotobacter produced significantly taller plants, increased number of leaves and other growth characters, which might have increased number of siliqua/plant and number of seeds/siliqua. Azotobacter inoculation increased seed yield significantly. It may be attributed to different processes like nitrogen fixation, production of growth regulators and protection against root pathogens (Patra et al, 1989). The oil content in seed was not influenced by Azotobacter as was reported by Sharma et al (1997). However, Azotobacter increased oil yield, which was also noted by Kumar and Kumar (1994) - Table 1.

Varietal response

Number of primary and secondary branches/plant, number of siliqua/plant and seeds/siliqua were recorded highest in variety Yella followed by M-27. In both the years, seed yield of varieties Yella and M-27 were found to be at par. Variety TS-38 gave the lowest yield. The increased number of siliqua per plant and seeds per siliqua might have resulted in increased seed yield. Highest oil content in seed was observed in M-27 and lowest in Yella. The variation in oil content might be due to the genetic make up of varieties. Similar observations were noted by Gangasaran and Giri (1984). Oil yield of M-27 was found to be highest and TS-38, recorded lowest (Table 2) oil yield.

Economics

The highest net return was obtained from Yella treated with Azotobacter with the highest cost benefit ratio (1:1:91), although the seed yield of Yella and M-27 was found statistically to be at par with each other.

From the result of two years of field experimentation it can be concluded that, under Manipur conditions, variety Yella, a local variety which is more adopted to soil and climatic conditions of Manipur and M-27 together with Azotobacter inoculation can be recommended for the profitable production of rapeseed and mustard.

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Table 1. Effect of Azotobacter inoculation on growth parameters in rapeseed and mustard varieties (90 DAS)

Treatment	Plant height (cm)	No. of leaves/ plant	No. of primary branches/plant	Fresh weight/ plant (g)	Dry weight/ plant (g)
Varieties					
TS-29	50.56	15.66	4.92	14.22	6.55
SKM-2	70.73	16.77	4.5	15.53	7.57
TS-38	67.72	17.84	4.43	15.67	7.51
M-27	77.24	18.69	5.19	17.43	7.99
Yella	83.49	22.51	5.65	18.55	8.79
CDO.05	2.87	2.06	0.27	2.67	1.15
Azotobacter					
Uninoculate	67.69	17.32	4.76	15.35	7.26
Inoculated	72.2	19.27	5.11	17.21	8.10
CD 0.05	1.82	1.31	0.17	1.68	0.72

Table 2. Effect of Azotobacter inoculation on yield and oil content in rapeseed and mustard varieties

Treatment	No. of siliqua/plant	Test weight (g)	Seed yield (q/ha)	Oil content (%)	Oil yield (q/ha)
Varieties					
TS-29	172.63	2.87	6.96	38.39	3.09
SKM-2	157.88	2.65	6.54	37.27	2.78
TS-38	167.20	2.79	5.82	35.32	2.16
M-27	182.60	2.69	7.59	40.49	3.22
Yella	226.98	2.59	7.86	33.46	2.89
CDO.05	11.56	0.22	0.59	0.31	0.37
Azotobacter					
Uninoculate	174.62	2.69	6.52	36.98	2.65
Inoculated	188.29	2.75	7.33	36.99	3.00
CD 0.05	7.3	NS	0.37	NS	0.23