

## RESPONSE OF RICE (*ORYZA SATIVA* L.) TO *AZOTOBACTER* INOCULATION

SEED and soil application of *Azotobacter* has been assuming importance for higher crop production. *Azotobacter* inoculation is known to accelerate plant growth by synthesising the physiologically active substances like vitamin B-12, thiamine, riboflavin, pyridoxine, biotin *etc.*, (Mishustin and Shilnikova, 1971) and under certain ecological situations it is known to fix atmospheric nitrogen and make it available for plant growth. It is also known to improve seed germination and produce healthy root system (Lazarev, 1964). An increase in paddy yield to an extent of 17.7 to 59.0 per cent due to Azotobacterization has been obtained (Shende, 1972). It is not known if species of *Azotobacter* exhibit high specificity of different crops and varieties. The present study was undertaken to examine the effects of seed inoculation with different *Azotobacter* strains isolated from rhizospheres of different crops and cultivars of rice on the yield of rice variety 'Suhasini' (B.G. 79 × I.R. 8).

An experiment consisting of eight treatments including un-inoculated control and three replications was laid out with randomised block design (R.B.D.) at Central Campus of Mahatma Phule Krishi Vidya-peeth, Rahuri, Ahmednagar district (Maharashtra State). The isolates of *Azotobacter* were obtained from the rhizosphere soils of rice varieties *viz.*, 'Suhasini' and 'Krishnasal' and were designated as P<sub>1</sub> and P<sub>2</sub> respectively. A culture of *Azotobacter* for rice designated as P<sub>3</sub> was obtained from Agricultural Bacteriologist, Poona; while the cultures for other crops *viz.*, 'Jowar' (*Sorghum vulgare*), 'Bajra' (*Pennisetum typhodes*) and wheat (*Triticum durum*) were designated as P<sub>4</sub>, P<sub>5</sub> and P<sub>6</sub> respectively. A mixture of P<sub>1</sub> + P<sub>2</sub> + P<sub>3</sub> cultures was designated as P<sub>7</sub>. Sound, healthy seeds of high yielding, dwarf variety 'Suhasini' were first treated with Agrosan, G. N. at the rate of 2 g/kg of seed and subsequently treated with different *Azotobacter* cultures and dried in shade. Treated seeds were dibbled in square design of 60 × 60 cm in the plots measuring 3.6 × 3.6 m. The crop was manured as per recommendations *viz.*, 120 kg/N, 75 kg P<sub>2</sub>O<sub>5</sub> and 50 kg K/ha. The 2/3rd nitrogen was applied at the

time of dibbling and the remaining 1/3rd at tillering stage. The crop was irrigated and other cultural operations were carried out as and when necessary.

At final stage, ten randomly numbered plants from each plot were cut at ground level, dried and their dry weight was recorded. Remaining plants from each plot were harvested separately for their grain yield.

From the results (Table I), it is seen that appreciable amount of increase in yield of paddy grains

TABLE I

*Effect of seed inoculation with different Azotobacter isolates on grain yield and dry matter of rice*

Treatments	Yield in kg/ha @	Percentage increase over control	Dry matter weight in g/plant @ (Av. of 10 plants)
P <sub>1</sub>	3,167	77.13	2.94
P <sub>2</sub>	2,496	39.17	2.20
P <sub>3</sub>	2,689	49.82	2.38
P <sub>4</sub>	2,637	47.49	2.49
P <sub>5</sub>	2,748	53.27	2.35
P <sub>6</sub>	2,515	40.63	2.54
P <sub>7</sub>	2,562	43.27	2.80
Control	1,788	—	2.08
'F' value	N.S.	—	N.S.
S.E.	177.42	—	0.21

Note: @ = Average of three replications  
N.S. = Non-significant

was noticed due to bacterization with *Azotobacter*. The maximum yield of 3,167 kg/ha (77.13 per cent increase) was obtained in treatment P<sub>1</sub> *i.e.*, due to application of *Azotobacter* isolate from 'Suhasini' rhizosphere. It was followed by isolate P<sub>5</sub> (2,748 kg/ha) from Bajra which gave 53.27 per cent increase in yield. The trend in increase in yield over the control was followed by other isolates *viz.*, P<sub>3</sub>, P<sub>4</sub>, P<sub>7</sub>, P<sub>6</sub> and P<sub>2</sub>. The lowest yield 1,788 kg/ha of paddy was recorded in control. Similarly, increase in dry matter was also observed in all treatments. due to bacterization with *Azotobacter*. The maximum dry

matter of 2.94 g/plant was recorded in treatment P<sub>1</sub> and it was followed by P<sub>7</sub>, P<sub>6</sub>, P<sub>4</sub>, P<sub>3</sub>, P<sub>5</sub> and P<sub>2</sub>.

Increase in paddy yield ranging from 17.7 to 59 per cent due to bacterization with *Azotobacter* has been reported (Shende, 1972). The present work does indicate that use of *Azotobacter* culture isolated from rhizosphere of the same variety is much more effective than other isolates. *Azotobacter* cultures from rhizosphere of other paddy varieties or even other crops like Jowar, Bajra and Wheat have no adverse effect on the yield but have given higher yields than uninoculated control.

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