

EFFECT OF AZOSPIRILLUM INOCULATION ON SEEDLING VIGOUR IN RICE

Azospirillum is a common root and soil inhabiting nitrogen fixing bacterium in the tropics. In India, *Azospirillum* has been isolated from the roots of several plants (Lakshmi *et al.*, 1977 and Kavinandan *et al.*, 1978). It has been shown at the Central Rice Research Institute, Cuttack that occurrence of *Azospirillum* is widespread in roots of several cultivars of rice and weeds associated with rice plant (Rao, 1988). The ability to improve plant growth through processes other than nitrogen fixation should also be taken into account while assessing the potentials of *Azospirillum* as a biofertilizer. Earlier reports indicate that *Azospirillum* secretes phytohormones in pure culture (Tien *et al.*, 1979 and Govindan and Purushothaman, 1984). Initial growth response of *Azospirillum* inoculation might be due more to the secretion of growth promoting substances than to biological nitrogen fixation (Purushothaman *et al.*, 1987).

The present study was taken up at the Rice Research Station, Moncompu, Kerala to evaluate the effect of *Azospirillum* isolates on seed germination and root and shoot growth in rice. Four cultures of *Azospirillum* isolated from the roots of rice plants in different locations of Alappuzha district were used in the study. Seeds of Jyothi variety of rice were surface sterilised in 0.1 % mercuric chloride for a few minutes followed by several washings in sterile water. Seeds were then soaked overnight in 72 h old cultures of the four isolates in semi-solid malate medium at the rate of 100 seeds per treatment. Seeds soaked in uninoculated medium and sterile water served as control. Seeds were then germinated in sterile petri-plates and germination count was taken on the third day of treatment. Twenty healthy germinated seeds under each treatment were placed in growth pouches prepared by in-

serting blotting paper strips into polythene bags, held in position by putting knots with a thread. Each seed was held by one knot touching the blotting paper. Sterile water was used to keep the paper moist. Root and shoot length were measured on the fifth day of treatment and vigour index calculated as per the methods of Abdalbaki and Anderson (1973).

$$\text{Vigour index} = \text{Germination \%} \times (\text{RL} + \text{SL})$$

where RL and SL are root and shoot length in mm.

The results indicated that among the three parameters studied viz., germination, root length and shoot length, the effect of inoculation was more pronounced on root elongation (Table 1). Maximum increase in root length over control was recorded by the isolate M2 (102%), followed by M3 (97%). Treatment with M3 recorded the maximum vigour index of 4248 (40% increase over control). Shoot elongation was enhanced by two isolates viz., M1 and M3. Seed inoculation with *Azospirillum* did not affect the germination of seeds.

The positive effect of *Azospirillum* inoculation on vigour index has been reported by Govindan and Purushothaman (1984) and Purushothaman *et al.* (1987). They also reported the presence of appreciable amounts of phytohormones in *in-vitro* culture conditions, notably indole acetic acid and gibberellic acid. Production of gibberellins and cytokinins by an *Azospirillum* strain was also reported by Tien *et al.*, (1979). The reported growth increase in the present investigation may be attributed to growth promoting substances produced by *Azospirillum* isolates.

Table 1. Effect of *Azospirillum* inoculation on seed germination and elongation of root and shoot in rice

Treatment	Germination (%)	Shoot length (mm)	Root length (mm)	% increase over control		
				Vigour index	Root length	Vigour index
Isolate M1 (Moncompu)	100	20.6	15.5	3610	34	18.8
Isolate M2 (Purakkad)	97	15.5	23.4	3773	102	24.1
Isolate M3 (Harippad)	97	21.0	22.8	4248	97	40.0
Isolate M4 (Muhamma)	98	14.1	20.7	3410	78	12.2
Uninoculated medium (control)	99	19.1	11.6	3039	-	-
Sterile water	92	12.0	13.7	2364	-	-

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