Madras Agric. J., 96 (1-6): 156-158, June 2009
https://doi.org/10.29321/MAJ.10.100463

Short Note

Effect of Phytohormone Producing Microorganisms on Physiology of Sunflower var. Morden

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An attempt was made to study the effect of inoculation of phytohormone producing microorganisms and growth regulators on physiological characters of sunflower. The study revealed that the strain Pf-3 recorded maximum germination percentage of 93 with the plant height of 17.3 cm and vigour index of 1612 followed by AZ-2 recording germination percentage of 91, plant height of 16.7 cm and vigour index of 1522. Based on these studies, the strains *P. fluorescens* (Pf-3) and *A. brasilense* (Az-2) were selected as better ones.

The beneficial effect of *Azospirillum* and the significant yield increases in plant growth and yield of various crop plants following inoculation with *Azospirillum* species, producing phytohormones was reported by Patriquin *et al*. (1983).

Oil content increased when sunflower seeds were treated with GA_3 and *Azospirillum* (Jeyapaul and Kuppusamy, 1987). Vijayakumar *et al*. (1988) found that the germination and vigour could be improved by presowing treatments with different chemicals and growth regulators like auxins, gibberellins and cytokinins. They also induced tolerance to salinity.

Increased lateral root formation and number of root hairs of sunflower seedlings, germination percentage and height of the seedlings in response to *Azospirillum* inoculation was observed by Savalgi and Savalgi (1990). The Plant Growth Promoting (PGPR) strains of *P. aeruginosa* and *P.fluorescens* were found to protect the maize from cold shock damage and significantly increased the germination of maize seeds (Hoyte *et al*., 1991).

Mohanti and Sahoo (1992) found that soaking of sesame seeds in 100 or 200 ppm GA_3 increased the germination percentage. The foliar spraying of growth regulators such as GA, IAA and NAA have been reported to increase the yield of sunflower (Kere *et al*., 1995). Ozturk *et al*. (1993) reported that *Brassica compestris* seeds when soaked in 50 or 100 ppm solution of GA_3, IAA and kinetin for two hours and then germinated under salt stress conditions and application of growth regulators significantly increased germination and was more effective with GA_3 than with kinetin or IAA.

Sivakumar (1994) reported that seed soaking in 45 ppm GA_3 + *Azospirillum* increased the germination percentage, plant height, dry matter production, capitullum diameter, number of filled seeds per capitullum and seed yield in sunflower.

Seed soaking in 20 ppm GA_3 concentration for four hours increased the germination percentage, plant height and oil content in sesame. Based on these background information, a study was conducted to evaluate the effect of inoculation of efficient strains on physiological characters of sunflower seed.

The seeds were surface sterilized with $HgCl_2$, then the seeds were treated with efficient strains. The treatment without inoculation served as control. The experiment was formulated in CRD with four replications. The growth parameters like shoot length, root length of the plant samples

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were recorded. Then the percentage of germination and the growth of the seedlings upto 14 days were considered for testing the efficiency of the strains.

The germination count of sunflower was recorded at 10 DAS and the germination per cent arrived by using the following formula

$$\text{Germination per cent} = \frac{\text{Number of seeds germinated}}{\text{Total number of seeds sown}} \times 100$$

Vigour Index was calculated as per the procedure suggested by Abdul-Baki and Anderson (1973).

Vigour index = Germination percentage x Plant height

The data were analysed as per procedure described by Panse and Sukhatme (1985) for the treatmental significance.

The influence of seed inoculation with efficient strains of Pf-1, Pf-3, Az-2, Az-5 and F1 on the seed germination, plant height and vigour index of sunflower var. Morden was studied and presented in Table 1.

Inoculation of sunflower with efficient strains increased the germination percentage, plant height and vigour index over uninoculated. Among the strains, Pf-3 recorded increased germination percentage of 93, plant height of 17.3 cm and vigour index of 1612. The next best was Az-2 which recorded germination percentage of 91, plant height of 16.7 cm and vigour index of 1522 and control recorded the least germination percentage of 73, plant height of 12.5 cm and vigour index of 917.Karthikeyan and Sundaram (1999) reported that the seed germination, shoot and root length and vigour index of soyabean was increased due to the effect of inoculation with Pf-3.

Table 1. Effect of inoculation of efficient strains on germination, plant height and vigour index of sunflower seeds var. Morden

Sl. No.	Strain	Germination (%)	Plant height (cm)	Vigour index
1.	Pf1	89.0	15.6	1394
2.	Pf3	93.0	17.3	1612
3.	Az2	91.0	16.7	1522
4.	Az5	86.0	15.0	1293
5.	F1	76.0	13.1	997
6.	Control	73.0	12.5	917
	SED	0.2	0.1	4
	CD (p=0.05)	0.3	0.2	8

In the present study, the inoculation of efficient strains on germination percentage and vigour index were observed. The strain Pf-3 recorded the highest germination percentage, plant height and vigour index due to seed inoculation with Pf-3 strain. Purushothaman *et al*. (1987) observed an increased vigour index of the seedlings due to *Azospirillum* inoculation. *Azospirillum* inoculation also increased the germination percentage, lateral root formation, number of root hairs, plant height and vigour index of sunflower (Subba Rao, 1995; Anand *et al.,* 1999).

Thus the study revealed that the strains *P. fluorescens* (Pf-3) and *A. brasilense* (Az-2) were selected as better ones for inoculation of phytohormone producing microorganisms and growth regulators on physiological characters of sunflower.

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Manuscript number : 164/08
Date of receipt : August 26, 2008
Date of acceptance : May 27, 2009