

Impact of Biofertilizers on Crop Seeds

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Abstract— A laboratory experiments were conducted during the year of 2012-2014 at Annamalai University of cuddalore district under irrigated conditions to formulate site –specific nutrient management and efficiency of treatments known by comparing with rice, sunflower and black gram seeds. And the treatments includes control, 10%, 5%, 2.5% and 1% vermicompost, 10%, 5%, 2.5% and 1% phosphobacteria, 10%, 5%, 2.5% and 1% azospirillum. And the above treatments are applied to all the three seeds ie, rice, sunflower, black gram. The numbers of seeds used for the experiment are 50 seeds of paddy, 20 seeds of black gram and 10 seeds of sunflower. Highest values for plant biomass root and shoot length was noticed in 10 % all the treatments.

Keywords— *Sunflower, Nutrient management, plant biomass, root and shoot length.*

I. INTRODUCTION

Nutrients play an important role in crop growth and development. Among the nutrients, N is one of the major nutrients that enhance the metabolic processes that based on protein, leads to increases in vegetative, reproductive growth and yield of the crop. Phosphorus solubilizing bacteria possess the ability to bring insoluble phosphorus in the soil into soluble forms by secreting organic acids such as formic, acetic, propionic, glycolic, fumaric and succinic acids. And vermicompost is an established organic soil amendment produced by a non-thermophilic process in which the organic matter is broken down through interactions between earth worm and microorganisms under aerobic condition. vermicompost have been demonstrated to be valuable soil amendment that offer a balanced nutritional release pattern to plants. Providing nutrients such as available nitrogen, soluble potassium, exchangeable calcium, magnesium and phosphorus that can be taken readily by the plants (Edward, 1998 and Edwards and Fletcher, 1988). Application of vermicompost along with chemical fertilizers increase the uptake of N, P, K nutrients when compared to chemical fertilizers alone (Bhadoria and Prakash, 2003). Chaudhary *et al.* (2004) reported that apart from nutrients supply and availability, vermicompost also improves the fertilizer use efficiency by increasing the nutrient uptake of plants. Vermicomposting is a biodegradation system which stabilizes sludge and reduces its pathogenicity. Application of high analysis NPK fertilizers and very limited use of FYM cause micronutrient depletion in soils, which appears to have special role in influencing the test weight and seed filling (Tufail *et al.*, 1990). Azospirillum reported that *Azospirillum* inoculation of increased the nitrogen uptake by sunflower (Anand, 1994). Sivakumar (1994) also stated that seed soaking in GA₃ 45 ppm + *Azospirillum* increased the nitrogen uptake by sunflower. Nandhagopal *et al.* (2003) reported that inoculation of *Azospirillum* assisted in N fixation and contributed for the improved nutrient uptake of sunflower.

II. MATERIALS AND METHODS

A laboratory experiments were conducted during 2013-2014 at Annamalai university, Cuddalore located in Western Agro climatic zone of Tamilnadu to find out the impact of bio fertilizers on different crop seeds. The weather of Annamalai nagar is moderately warm with hot summer months. The mean maximum temperature is 32.2C while the mean minimum temperature is 21.5 °C with a mean relative humidity of 88 per cent. The mean annual rainfall is 1500mm of which 1000mm is received during North –East monsoon, 400 mm during South-West monsoon and 100mm as summer showers.

A laboratory experiment was under taken with varying concentrations of aqueous solutions of biofertilizers i.e., 10%, 5%, 2.5%, 1% solutions of vermicompost, *azospirillum* and phosphobacteria respectively were prepared. Seeds of paddy, blackgram and sunflower were placed in filter paper, spread in petriplates @ 50 paddy seeds, 20 black gram seeds and 10 sunflower seeds per plate over a moist filter paper dipped in water held in the cover plates kept at the bottom. Observations regarding germination count (cumulative upto 3 DAS) on 7th day were recorded and inhibition or stimulation of germination compared to control was expressed in percentage (%).

TABLE 1
IMPACT OF BIO-FERTILIZERS AT VARYING CONCENTRATIONS ON THE GERMINATION OF CROP SEEDS

FERTILIZER	CONC	PERCENTAGE OF SPROUTED SEEDS OUT OF SOWN SEEDS			SHOOT AND ROOT LENGTH AT TWO LEAF STAGE						DRY MATTER PRODUCTION (gm)		
		Paddy (50 seeds)	Black gram (20 seeds)	Sunflower (10 seeds)	Paddy (cm)		Black gram (cm)		Sunflower (cm)		Paddy (gm)	Black gram (gm)	Sunflower (gm)
					Shoot	Root	Shoot	Root	Shoot	Root			
Azospirillum	10%	100%	100%	100%	6.5	5.5	16	4.8	12	4.5	0.039	0.51	0.19
	5%	100%	95%	96%	5	4.5	15.7	4.7	11.9	3.5	0.038	0.49	0.14
	2.5%	98%	95%	70%	4.5	2.5	11	6.2	11	3.2	0.034	0.032	0.1
	1%	92%	85%	60%	4	2.3	9	4.2	9	2.5	0.02	0.01	0.1
	SEd	0.83	2.0	1.6	0.62	0.41	0.12	0.04	0.04	0.41	0.001	0.008	0.02
	CD=(p0.05)	2	5	4	1.5	1	0.3	0.1	0.1	1	0.01	0.02	0.05
Phosphobacteria	10%	100%	100%	80%	6.9	5.3	15	5	12	3.5	0.046	0.055	0.16
	5%	98%	96%	77%	6	5.2	14.5	4.5	11.8	2.5	0.028	0.053	0.14
	2.5%	96%	85%	70%	5	4.3	11.2	3	8	5.0	0.01	0.055	0.12
	1%	96%	80%	60%	4.5	4.2	6.5	2.3	6.7	2	0.02	0.035	0.09
	SEd	0.83	1.6	1.25	0.37	0.04	0.20	0.20	0.08	0.41	0.007	0.0008	0.0008
	CD=(p0.05)	2	4	3	0.9	0.1	0.5	0.5	0.2	1	0.01	0.002	0.02
Vermicompost	10%	96%	95%	82%	6	7.5	16	6	10	5.5	0.05	0.125	0.37
	5%	96%	94%	80%	5.5	6.3	13	5.5	9	4.9	0.038	0.06	0.14
	2.5%	94%	90%	70%	5.3	4.1	8	4.4	8.5	3.5	0.06	0.045	0.12
	1%	94%	85%	60%	4.5	4.0	7	2	8	3	0.02	0.04	0.37
	SEd	0.83	0.41	0.83	0.20	0.5	1.25	0.20	0.41	0.25	0.005	0.02	0.009
	CD=(p0.05)	2	1	2	0.5	1.2	3	0.5	1	0.6	0.012	0.06	0.23

III. RESULTS AND DISCUSSION

The different concentrations of bio-fertilizers compared showed varying levels of germination response of crop seeds. The magnitude of germination was increasing with increasing concentrations of bio-fertilizers and highest germination per cent was observed with increasing concentrations of bio-fertilizers i.e, 1 per cent, 2.5 per cent, 5 per cent, and 10 per cent. Hence highest performance of paddy, black gram & sunflower germination was observed to be as 100 per cent, 100 per cent and 100 per cent respectively in 10 per cent concentration of *Azospirillum* followed by 100 per cent, 100 per cent and 80 per cent with 10 per cent concentration of PSB and 96 per cent, 95 per cent, 82 per cent with 10 per cent concentration of vermicompost.

IV. CONCLUSION

The study revealed that the different concentrations of bio fertilizers compared showed varying levels of germination response of crop seeds. The magnitude of germination was increasing with increasing concentrations of bio fertilizer.

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