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UTILIZATION OF WEED MANURES AND BIOFERTILIZER AS A NUTRIENT SOURCE TO *PHASEOLUS AUREUS* ROXB.

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ABSTRACT :

Tephrosia hamiltoni Drumm. and *Achyranthes aspera* L. are the weed plants grown during rainy season along the road sides and waste land were used to prepare manures like vermicompost, compost as well as neemcake is a residue left after extraction of oil used as nutrient source along with biofertilizer azotobacter and phosphate solubilizing bacteria and only biofertilizer double dose. Treatments given were ATVB, ATCB, NCB, BioD, NPK and control in randomized block design. Growth analysis and yield of grains were studied. Results were shown that highest yield of grains in BioD followed by ATVB, ATCB, NCB, NPK and lowest in control.

Key words: -*Weeds manures, Neemcacke, Azotobacter, Phosphate solubilizing bacteria.*

INTRODUCTION:

Several studies at the national level have been augmented with the combined use of organic manures, biofertilizers and chemical fertilizers to work out the nutritional formulas that sustains higher yield with least adverse effect on soil and environment. The maintenance of the fertility of the soil is the first condition of any permanent system of agriculture. In the ordinary processes of crop production, fertility is steadily lost; its continuous restoration by means of manuring and soil management is therefore imperative. In maintaining the fertility of the soil, the most careful attention should be paid to the utilization of waste products of agriculture itself and biofertilizers.

Many reports have shown that the interaction between biofertilizers with plant can be beneficial for plant growth and yield (Hazarika *et al,* 2000; Ratti *et al*, 2001; Kumar *et al*, 2002; Darzi *et al,* 2008; Padmapriya and Chezhiyan 2009).

Microbial inoculation of soil is required for a number of applications, such as plant growth promotion, inhibition of plant pathogens and biodegradation of toxic compounds, soil structure improvement and microbial leaching of metals (Van Veen *et al*, 1997). *Azotobacter vinelandii* produces two polymers; the extracellular polysaccharide alginate and the intracellular polyester poly-β-hydrobutyrate (PHB) (Castaneda *et al*, 2000). Alginate is important for cyst formation in *A. vinelandii* as a coating protective polysaccharide material (Nunez *et al*, 1999). It was suggested that cyst formation and colonization pattern play roles in regulating nitrogenase activity of plants (Katupitiya *et al*, 1995). Plant growth promoting bacteria are becoming the attention of agronomist and microbiologist for their positive role in plant development (Defago and Hass, 1990).

Vermicompost increases the growth rate because of water and mineral uptake such as nitrogen and phosphorus which lead to the biological yield improvement (Atiyeh *et al*, 2002; Arancon *et al*, 2004). Karmegam *et al.* (1999) evaluated germination efficiency, shoot length, roots length, nodulation, weight and yield of green gram (*Phaseolus aureus*) grown in a 3:1 mixture of

potting soil and vermicompost cow manure. Germination in vermicompost was 93 % versus 84 % germination in a control (3:1 mix of potting soil and bio digested manure slurry). Additionally, green gram biomass increased 46 % and shoot height by 28 %. Seed pod numbers increased by 35 %, pod length increased by 13 % seeds per pod by 20 % and seed yield per plant by 52 %.

The present study was emphasized on evaluation of the effectiveness of organic manures prepared from weeds, neemcake and biofertilizers mix with organic manure as well as only biofertilizer in double dose as probable alternative source of nutrients for the yield and nutrient uptake of *Phaseolus aureus* Roxb. belonging to family Leguminosae an important pulse crop and important part of our daily diet.

METHODOLOGY:

The experiment was conducted in the college campus of New Arts, Commerce and Science College, Shevgaon, Dist. Ahmednagar during March 2008 to May 2008. The experiment was performed in a randomized block design (RBD) with six treatment and four replicates. Weeds *Achyranthes aspera* L. and *Tephrosia hamiltoni* Drumm in 1:1 proportion were used to prepare compost and vermicompost. Weed compost, weed vermicompost and Neem cake were used to study their effectiveness along with biofertilizer (Azotobacter and phosphate solubilizing bacteria) on Phaseolus. All the manures Compost (ATCB), Vermicompost (ATVB) and Neemcake (NCB) (at the rate 9169, 8889 and 1000 kg ha^{-1}) along with biofertilizer Azotobacter and Phosphate solubilizing bacteria at the rate 25 kg ha^{-1} (recommended dose) and only Biofertilizer double dose treatment (BioD) 50 kg ha^{-1} in two split doses were applied to appropriate plots except chemical fertilizer (NPK) plots. The Mung (*Phaseolus aureus* Roxb.) Variety "Raj Biotech" Balwan R.J. Biotech, pvt Ltd. Siddharth Arcade, Station Road, Aurangabad was sown in the research plots of size 1.5 x1.5 m. at the rate of 20 kg ha^{-1}. The fertilizers were supplied at the rate of 25 kg N, 50 kg P and '0' K kg ha^{-1} (25:50:0) only for fertilizer treatment plots. Use of insecticides and pesticides was completely avoided. Growth analysis of crop was done at 31 and 56 (DAS) days after sowing. Pods were collected time to time during growing season. After separation of grains it was kept in oven for analysis of dry matter.

RESULTS AND DISCUSSION:

Table 1: The First growth analyses of *Phaseolus* were done at **31st DAS**. **Height** of the plant (cm.) was highest in ATVB (31.98) followed by BioD, ATCB, NPK, NCB and lowest in CON (22.43). The results were statistically significant in all treatments. **Circumference** was highest in ATVB (1.58) followed by BioD, ATCB, NCB, NPK and lowest in CON (0.98), statistically significant in all treatments except in NPK treatment. The **fresh weight** and **DM** of plant was highest in ATVB (7.23, 1.16) followed by ATCB, BioD, NPK, NCB and lowest in the CON (3.05, 0.45), FW was statistically not significant in NCB and NPK, DM was not significant in NCB. **Number of branches and leaves** was highest in ATCB (4.0, 4.0) followed by ATVB, BioD and NCB, NPK and lowest in CON (2.75, 2.75), number of branches and leaves not significant only in NPK. **Leaf area** was highest in ATVB (54.51) followed by BioD, ATCB, NPK, NCB and lowest in CON (22.38), statistically significant in ATVB, BioD, ATCB.

Table 2: The Second growth analyses of *Phaseolus* were done at 56th DAS. **Height** of the plant (cm.) was highest in ATVB (41.43) followed by BioD, ATCB, NCB, NPK and lowest in CON (27.30), statistically significant in all treatments. **Circumference** was highest in BioD (1.85) followed by ATCB, ATVB, NPK, NCB, and lowest in CON (1.08), statistically significant in all treatments. **Number of branches** was highest in BioD (14.00) followed by ATCB and NPK, NCB, ATVB and lowest in CON (6.75), number of branches were significant in all treatments. **Number of leaves** was highest in BioD (24.00)

followed by ATVB, NPK, ATCB and NCB and lowest in CON (12.00), number of leaves significant in all treatments. **Number of Primordia** was highest in BioD (10.25) followed by ATVB, NPK, NCB, ATCB and lowest in CON (5.75), number of Primordia significant in all treatments except ATCB. **Number of mature legumes** of plant was highest in ATVB (5.50) followed by ATCB, BioD, NCB, NPK and lowest in the CON (2.50), statistically significant in all treatments except in NPK. **Number of immature legumes** of plant was highest in ATCB (5.00) followed by NPK, BioD, ATVB, NCB and lowest in the CON (0.25), statistically significant in all treatments. **Leaf area** was highest in BioD (108.61) followed by ATVB, ATCB, NPK, NCB and lowest in CON (41.55), statistically not significant in NCB and NPK treatments. Stefan et al (2010) stated that inoculation of soybean by *Bacillus pumilus* significantly increased plant height, leaf number, leaf area, grain protein and nodulation.

Table 3: Analyses of fresh and dry matter yield of legumes, grains and shells

FW of legumes (gm plot^{-1}and kg ha^{-1}) recorded highest in ATVB (260.48, 1158) followed by ATCB, BioD, NCB, NPK and lowest in CON (165.77, 737), statistically not significant in NPK treatments**. FW of grain** (gm plot^{-1}and kg ha^{-1}) recorded highest in BioD (163.28, 726) followed by ATVB, ATCB, NCB, NPK and lowest in CON (106.65, 474). **DM** of grains recorded highest in BioD followed by ATVB, ATCB, NCB, NPK and lowest in CON, statistically not significant in NPK treatments. **FW of shell (gm plot^{-1}and kg ha^{-1})** recorded highest in ATVB (99.21, 441) followed by ATCB, NCB, BioD, NPK and lowest in CON (59.12, 263). **DM** of shell recorded highest in ATCB followed by ATVB, NCB, BioD, NPK and lowest in CON statistically not significant in NPK treatments

CONCLUSION:

It is concluded from the present investigation that Biofertilizer double dose, weed vermicompost, weed compost and neem cake along with single recommended dose proved better to increase yield of the crop as compare to chemical fertilizer, and reducing the input cost of the farm produce along with protection of the environment and natural resources.

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Table1: Growth analyses of *Phaseolus* (at 31 DAS)

Treatment	Height	Circumference	Plant wt in gm		No. of Branches	No. of Leaves	No.of Primordia	Leaf area
	(cm)	(cm)	FW	DM				(cm2)
ATVB	31.98	1.58	7.23	1.16	3.75	3.75	1.00	54.51
ATCB	28.18	1.38	6.25	0.97	4.00	4.00	1.00	42.73
BioD	30.70	1.53	5.88	0.87	3.25	3.25	1.00	52.47
NCB	25.48	1.20	4.03	0.62	3.25	3.25	1.00	26.02
NPK	27.38	1.08	4.24	0.70	3.00	3.00	1.00	32.41
CON	22.43	0.98	3.05	0.45	2.75	2.75	1.00	22.38
S.E	1.42	0.10	0.65	0.11	0.19	0.19	0.00	05.54
C.D.	3.02	0.21	1.38	0.22	0.40	0.40	0.00	11.80

ATVB=*Achyranthes, Tephrosia* vermicompost with Biofertilizer, ATCB=*Achyranthes, Tephrosia* compost with biofertilizer, BioD=Biofertilizer double dose, NCB=Neem cake along with biofertilizer.

Table2: Growth analyses of *Phaseolus* (at 56 DAS)

Treatment	Height	Circumference	No. Of Branches	No. of Leaves	No. of Primordia	No. of legumes		Leaf area
	(cm)	(cm)				Mature	Immature	cm2
ATVB	41.43	1.78	11.50	19.50	09.00	5.50	3.50	106.93
ATCB	34.53	1.80	12.50	18.00	06.75	5.25	5.00	069.09
BioD	37.23	1.85	14.00	24.00	10.25	4.75	4.25	108.61
NCB	33.23	1.45	11.75	18.00	07.75	4.25	3.00	053.55
NPK	32.10	1.70	12.50	18.75	08.50	3.00	4.50	062.16
CON	27.30	1.08	06.75	12.00	05.75	2.50	0.25	041.55
S.E	1.95	0.12	1.01	1.57	0.66	0.50	0.70	11.40
C.D.	4.15	0.26	2.15	3.34	1.40	1.06	1.48	24.28

Table:3 Fresh weight and Dry Matter analysis of legumes, grains and shell

Treatment	Fresh wt. of legumes		Fresh wt. of grains		DM	Fresh wt. of shells		DM
	gm plot^{-1}	Kg hect^{-1}	gm plot^{-1}	Kg hect^{-1}	Kg hect^{-1}	gm plot^{-1}	Kg hect^{-1}	Kg hect^{-1}
ATVB	260.48	1158	161.27	717	681	99.21	441	318
ATCB	244.50	1087	145.44	646	609	99.07	440	319
BioD	241.97	1075	163.28	726	682	78.86	350	259
NCB	228.69	1016	136.44	606	561	92.25	410	297
NPK	185.01	0822	123.90	551	521	61.11	272	193
CON	165.77	0737	106.65	474	443	59.12	263	191
SE	15.20	67.70	08.96	39.80	38.30	07.44	33.00	24.10
CD	32.38	144.20	19.08	84.77	81.58	15.85	70.29	51.33