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GROWTH RESPONSE OF *VIGNA UNGUICULATA* CULTIVATED ON ORGANIC MANURES AND BIOFERTILIZERS

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ABSTRACT

Vermicompostis is a method of making compost with the use of earthworms. Neem cake is a seed residue left after extraction of oil used as a biopesticide and organic nitrogen fertilizer. Azotobacter bacteria are used as nitrogen fixing biofertilizer and Phosphate solubilizing bacteria. All these organic fertilizers and biofertilizers are managed to study their effect on yield of crop *Vignaunguiculata*. Treatments are given as VC, NC, Bio,NPK and control in randomized block design. Highest DM yield was shown inVC followed by NPK, BIO, and NC and lowest in CON,

Figure : 00 References : 07 Tables : 02
KEY WORDS : Biofertilizer, Neemcake, Organic manure, Vermicompost.

Introduction

Increasing the crop yields mean intensification in the use of fertilizers and pesticides. Chemical fertilizers are an indispensible component of today's agriculture. However, growing concern about the environmental consequences of mineral nitrogen use and its future cost perspectives emphasize the need to develop new production technologies that are sustainable both economically and ecologically[3]. Organic materials hold great promise as a source of multiple nutrients and ability to improve soil characteristics[5]. Since the effect of organic nutrients on crop yield is long term and not immediate, thus farmers are reluctant to use organic fertilizers in their cropping system. Organic manure application increased the transfer elements between the solid phase and soil solution in addition to higher microbial activity[4,7]. Since 1990 the market for organic products has grown at a rapid pace, to reach $55 billion in 2009. This demand has driven a similar increase in organically managed farm and which has grown over the past decade at a compounding rate 8.9% per annum[1,2,6]. Workers found that long term addition of organic manure has the most beneficial effect on grain yield of wheat and maize.

Material and Methods

Experiment was conducted in field at Shevgaon Dist-Ahmednagar during 27 Jan 2006 to 3 April 2006. The experimental design was a randomized block design (RBD) with five treatments and three replicates.

Manures as Vermicompost and Neemcake available in local market were used to conduct the experiment at the rate 6667 kg ha^{-1}. Biofertilizer as InoraAzobacter and Inorabiophos, Vrakshamitra was used at the rate 10 $kgha^{-1}$, 10$kgha^{-1}$ and 26 kg ha^{-1} respectively.

All the manures and biofertilizers were applied to appropriate plots except chemical fertilizer (NPK) plots. The *Vigna* (*Vigna unguiculata*) Variety "PusaKomal" developed by Maharashtra state seeds corporation Ltd. MahabijBhavan, Krishinagar, Akola was sown in the research plots of size 1.5x1.5 m. at the rate of 40 kg ha^{-1}.

The fertilizers were supplied as Nitrogen (N), Phosphorus (P) and Potassium (K) through

TABLE -1 : Analysis of Total Biomass of *Vigna* (at 65 DAS)

Treat-ment	Fresh weight (FW)		DM		N		Total CP	Total RS		%		
	kg plot^{-1}	Kg ha^{-1}	%	Kg ha^{-1}	%	Kg ha^{-1}	Kg ha^{-1}	%	Kg ha^{-1}	P	K	Ca
VC	5.30	23555.53	17.74	4178.87	2.89	120.67	754.22	2.42	101.31	0.31	0.21	2.04
BIO	4.77	21185.16	18.00	3812.28	3.00	114.32	714.52	2.18	83.18	0.28	0.21	1.91
NC	3.25	14444.43	17.65	2549.72	2.67	67.97	424.78	1.82	46.36	0.28	0.20	1.81
NPK	5.42	24074.05	16.89	4065.49	2.86	116.27	726.70	2.06	83.77	0.34	0.21	1.96
CON	2.05	09111.10	16.36	1490.66	1.69	25.25	157.80	1.21	18.07	0.25	0.19	1.63
SE	0.65	2902.00	0.30	521.00	0.24	18.60	116.00	0.21	15.10	0.02	0.00	0.07
CD	1.51	6703.62	0.70	1203.51	0.55	42.97	267.96	0.48	34.88	0.04	0.01	0.16

urea, single super phosphate (SSP) and muriate of potash at the rate of 20 N, 90 P and K 30 kg ha^{-1} only for chemical fertilizer treatment plots. Entire amount of N, P_2O_5 and K_2O was applied as basal dose at the time of sowing. Irrigation of crop whenever necessary, weeding was done regularly. Use of insecticides and pesticides was completely avoided.

The green foliage was harvested during the early hours of the day at vegetative state (64 DAS) days after sowing. The fresh aerial biomass yield obtained per plot was recorded. One hundred gram fresh vegetation selected randomly and then kept in oven at 90ºC for 48 hours. The dried samples were weighted, finely milled,sieved and stored in labeled, air tight polythene bags for Nutrient analysis.

The chemical analysis were done by adopting standard analytical methods.

Observations and Results

Fresh weight kg $plot^{-1}$ and kg ha^{-1} was recorded highest in NPK (5.42, 24074.05) followed by VC (5.30, 23555.53), BIO (4.77, 21185.16), NC (3.25, 14444.43) lowest in CON (2.05, 9111.10) (Table-1). FW was statistically significant in all treatments except NC. %DM recorded highest in BIO (18.00) followed by VC (17.74), NC (17.65), NPK (16.89) and lowest in CON (16.36) and it wasstatistically not significant in NPK. Dry Matter kg ha^{-1} was recorded highest in VC (4178.87) followed by NPK (4065.49), BIO (3812.28), NC (2549.72) and lowest in CON (1490.66). DM is statistically significant in all treatments except NC. %N recorded highest in BIO (3.00) followed by VC (2.89), NPK (2.86), NC (2.67) and lowest in CON (1.69), statistically significant in all treatments. Nitrogen and Crude protein content (kg ha^{-1}) was recorded highest in VC (120.67, 754.22) followed by NPK (116.27, 726.70), BIO (114.32, 714.52), NC (67.97, 424.78) lowest in CON (25.25, 157.80). Results were statistically significant in all treatments except NC, %TRS was highest in VC (2.42) followed by Bio (2.18), NPK (2.06), NC (1.82) and lowest in CON (1.21). TRS was significant in all treatments TRS kg ha^{-1} was highest in VC (101.31) followed by NPK (83.77), BIO (83.18), NC (46.36) lowest in CON (18.07). TRS kg ha^{-1} was statistically significant in all treatments except NC. The content of % Phosphorus (P) was highest in NPK (0.34) followed by VC (0.31), Bio and Neem (0.28) and lowest in CON (0.25), values were statistically not significant in BIO and NC. %Potassium (K) was highest in VC, BIO and NPK (0.21) followed by NC (0.20) and lowest in CON (0.19) values were statistically significant in all treatments. The content of % Calcium (Ca) was highest in VC (2.04) followed by NPK (1.96), BIO (1.91), NC (1.81) treatments and lowest in CON (1.63). These results were statistically significant in all treatments.

The percent increase over control for fresh weight was found maximum in the treatment of NPK (164.23) followed in order by VC (158.54), BIO (132.52) and minimum in NC (58.54). The percent increase over control for Dry weight was found maximum in the treatment of VC (180.34) followed in order by NPK (172.73), BIO (155.74) and minimum in NC (71.05).(Fig 4).The nitrogen efficiency ratio kg ha^{-1} for fresh vegetation and DM was highest in the plots treated with VC (481.48, 89.61) followed in order by NPK (374.07, 64.37), BIO (135.56, 26.07) and lowest in NC (41.67, 8.27) (Table-1).

Nitrogen efficiency Ratio was highest in VC for fresh weight and Dry matter followed by NPK then in BIO while it was lowest in NC. Even though input nitrogen of Vermicompost was much less than NPK then also Dry matter, Nitrogen, Total Crude protein and Reducing sugar kg ha^{-1} was highest in vermicompost (Table-2). However organic manures release the nutrients slowly as compared to the chemical fertilizers and they give promising residual effects for the next crop also.

The percent increase over control of organic manures can compete with NPK for Fresh biomass production. Crop produced on NPK have shown less %DM and DM kg ha^{-1}.Therefore, even though fresh weight of NPK treatment was more but dry matter accumulation was less i.e. VC and BIO compete with NPK for Dry matter accumulation. Dry weight is more important than fresh weight for storage of fodder crop. Organic manure does not pollute the environment. Neem Cake alone and biofertilizers (recommended dose) have not played a significant role.

Conclusions

Vigna crop gives better results for Dry matter accumulation and nutrient content by applying the Vermicompost. Vermicompost have shown highest DM kg ha^{-1}, Total Reducing sugar kg ha^{-1}, N kg ha^{-1},Total crude protein kg ha^{-1}, K, Ca, production. Good quality fodder crop can help to improve the economy

TABLE-2 : Increase over Control and Nitrogen efficiency ratio

Treatment	Fresh wt kg ha^{-1}	FRESH WT		DW kg ha^{-1}	DRY WT			N Efficiency Ratio	
		Increase Over Con	% Increase Over Con		Increase over con	% Increase over con	Input N	Fresh	Dry
VC	23555.53	14444.43	158.54	4178.9	2688.21	180.34	30.00	481.48	89.61
BIO	21185.20	12074.06	132.52	3812.3	2321.62	155.74	89.07	135.56	26.07
NC	14444.40	05333.33	058.54	2549.7	1059.06	071.05	128.00	041.67	08.27
NPK	24074.10	14962.95	164.23	4065.5	2574.83	172.73	40.00	374.07	64.37
CON	9111.10	0.00	0.00	1490.7	0.00	0.00	0.00	0.00	0.00

VC-vermicompost, BIO-biofertilizer, NC –Neemcake ,NPK –inorganic fertilizer CON-Control

and health of animals.Vermicompost can be prepared on the farm, in the farm house as well as in the kitchen garden throughout the year without the obstruction of changing season. It requires small place for the pit and with the help of the farmers friend i.e. earthworms we can create a wonder manure which works with high efficiency giving best quality food and feed. These manures can reduce the dependence of farmers on chemical fertilizers and reducing their efforts and input cost of the crop plants.

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