

Relative efficacy of different organic manures on the pond soil quality

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ABSTRACT

Organic fertilization is a very cheap and effective method of increasing practically all nutrient components in the fish pond ecosystem by directly supplying nutrients to algae, bacteria and planktonic animals and to some extent to fish also. Even today, fish culture is mainly based on natural fish production through organic fertilization. Present experiment was conducted to see the effect of manures on the quality of the pond soil. Results showed that application of vermicompost increased the level of organic carbon, nitrogen and phosphorous to a maximum extent than other manures.

Key words : Organic manuring, Vermicompost, Raw cow dung, Poultry manuring, Pond soil quality.

INTRODUCTION

India generates annually 25 million tones of solid wastes, 325 million tones of agricultural residues, 210 million tones of cattle manures, and 3.3 million tones of poultry manures. Proper utilization of these wastes can give many benefits and reduce its accumulation on land thereby reducing health hazards and thus, improving environmental quality which also includes the quality of human life, apart from quality of water, soil, air etc. So its use in aquaculture is no doubt a wise utilization and management of the generated waste.

In the present experiment cow dung and poultry manure, vermicompost were used on weekly basis and fry was reared in the ponds and the comparative effect of these manures on pond soils was studied.

MATERIALS AND METHODS

The experiment was conducted at fish seed farm, Department of fisheries, College of Agriculture, Indira Gandhi Krishi Vishwavidyalya, Raipur. Experiment was conducted in seasonal ponds which were small and shallow, rectangular in shape of average area 750m² and an average depth of 1.25m.

The pond soil is locally named as dorsa belonging to the order alfisol and is classified as mixed hypodermic acidic heplusalt. The texture of soil is silty clay. Before and after implementation of the experiment physical and chemical properties of pond soil were determined. Five samples of each pond were randomly taken from different areas with the soil auger and soil quality of each pond soil. Soil analysis was done for determination of organic carbon, nitrogen, phosphorous, potassium, pH by following methods of soil analysis (Black, 1965) and soil texture of experimental soil was determined by International pipette

method (Black, 1965).

In the present experiment weekly manuring with raw cow dung (RCD), vermicompost (VC) and poultry manure (PM) was done. Basal dose were applied prior to the stocking of fry @ 700 kg/ha then split doses of 300, 175, 87.5 kg/ha were applied in second, third and fourth week by broadcasting method. The fourth week dose was then continued up to the end of experiment. Early fry was stocked @ 1 lakh fry/ha.

RESULTS AND DISCUSSION

Results showed that application of poultry manure changed the soil quality from silty clay to clay silt soil (Table 1). Marked differences were observed in chemical properties of soil by the application of vermicompost (VC) as it increased the organic carbon percentage from 0.28% to 0.57%, available nitrogen from 159.94 kg/ha to 178.75 kg/ha and phosphorous from 11.08 kg/ha to 114.09 kg/ha. On other hand treatment with poultry manure (PM) decreased the nitrogen level from 323.08 kg/ha to 181.88 kg/ha and potassium from 583.29 kg/ha to 308.45 kg/ha from the pond soil although the organic carbon percentage increased but not up to the high productive range (Table 2).

This may be due to the fact that vermicompost treatment provided the pond soil a conducive environment with pH 7.4 - 8.5, DO 6.6 - 8.6 ppm and alkalinity 65 - 100 ppm by which soil conditioning took place and released maximum nutrients which were locked in the soil as unavailable nutrients became available to the pond soil. On the other hand the available nutrients present in the pond soil of poultry manure treatment was utilized by plankton available in the pond water and soil of the pond became deficient of nitrogen and phosphorous. It is well

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Table 1 : Physical properties of experimental pond soil before and after treatment

Sr. No.	Treatments	Period	Sand(%)	Silt (%)	Clay (%)	Class	Method
1.	Cowdung (RCD)	Before	16	44	40	Silty Clay	International
		After	16	42	42	Silty Clay	
2.	Vermicompost (VC)	Before	32	35	33	Silty Clay	Pipette
		After	20	40	40	Silty Clay	Method
3.	Poultry manure (PM)	Before	28	37	34	Silty Clay	(Black,1965)
		After	22	34	44	Clay Silt	

Table 2 : Chemical properties of experimental pond soil before and after treatment

Sr. No.	Treatments	Period	pH	Organic carbon (%)	Available nitrogen kg/ha	Available phosphorous kg/ha	Available potassium kg/ha
1.	Cowdung (RCD)	Before	7 (N)	0.40*	112.890*	72.02***	451.58***
		After	6.7(A)	0.50**	153.668**	77.68***	272.16***
2.	Vermicompost (VC)	Before	7.4(N)	0.28*	159.940**	11.08*	545.66***
		After	8.5(Al)	0.57**	178.752**	114.09***	308.45***
3.	Poultry manure (PM)	Before	7.5(N)	0.43*	323.080***	46.31**	583.29***
		After	8.9(Al)	0.47*	181.880**	69.28***	308.45***

(N) – Neutral

*

Low productive

(A) – Acidic

**

Medium productive

(Al) – Alkalinity

High productive

known that organic manure is less in poultry manure (Sinha and Shrivastava, 1989) and so its treatment could not increase the organic carbon percentage of pond soil. Any marked difference was not observed in the status of pond soil by the application of raw cow dung.

Better growth and maximum survival contributed to highest yield 4330.04 kg/ha by vermicompost (VC), followed by poultry manure (PM) with 2167.28 kg/ha. Poor yield was obtained with treatment of raw cow dung (RCD) *i.e.* 1515.79 kg/ha. Singh and Sharma (1999) reported higher fish production of rohu (2663.50 kg/ha) in ponds manured with poultry excreta and pig dung (2219.00 kg/ha) than cow dung (798.00 kg/ha). Dhawan and Singh (2000) also obtained higher fish production (1360.65 kg/ha) in poultry manure and poultry droppings (1360.35 kg/ha) than cow dung (820.00 kg/ha).

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Received : January, 2009; Accepted : March, 2009