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Research article

VERMICOMPOST: QUALITY ORGANIC MANURE FOR ZOOPLANKTON PRODUCTION IN AQUACULTURE

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ABSTRACT : Purpose of the present study was to evaluate the effect of vermicompost on water quality parameters of fish pond and zooplankton production. No significant effect on the physico-chemical properties of pond water were observed though the zooplankton population was better with significant difference in rotifers population (68.38%) comparing with cow dung treated pond. Application of vermicompost as an organic manure in fish pond is not only better but also safe than the raw cow dung. This is excellent manure for nursery and rearing pond as it has a potential to produce good rotifers population.
Keywords: Physico-chemical properties, zooplankton, cow dung, rotifers, manure.

INTRODUCTION

The concept of the recycling of the animal waste as synergistic with aquaculture is a proven environmentally sustainable and economically viable technology that encompasses rational utilization of available resources and help in disposal of offensive effluent. Several aqua-culturists have reported favourable and encouraging results using organic waste for pond fertilization. Alikuhi (1957), Kapur (1981), Kapur and lal (1986), Olah *et al.* (1986), Yadav (1987), Saini (1993), Saini and Sharma (1992), Sharma and Saini (1992) emphasized the utility of organic wastes in the nursery, rearing and culture fish ponds for better fish production. Organic manure results in a pond improving microbial properties hence increase the productivity. Nutrient available in organic manure plays an important role in the biological productivity of water bodies (Boyd, 1984 and Chattopadhyay, 1982). Use of cow dung is an age old practice in aquaculture, but raw cow dung is offensive and also is potential pollutant in water sources. Over dose of raw animal waste beyond the safe concentration adversely affect the aquatic environment (Malik, 1996). Use of vermicompost eliminates such kind of negative impact in an aquaculture system. The vermicompost is a high grade fertilizer with nutrient values of 1.6 % nitrogen, 1.2 % phosphorus and 0.81 % potassium, while cow dung showed 0.76 % nitrogen, 0.32 % phosphorus and 0.56 % potassium. Vermicompost is an eco-friendly natural fertilizer prepared from biodegradable organic wastes and is free from chemical input. It decreases the cost of production when applied with integrated fish farming system. It also reduces the risk of harmful effects of chemical fertilizer. Vermicompost contain more N. P. K than raw cow dung. Vermicompost also have similar C: N ratio as compared to FYM. Application of vermicompost to fish ponds control the effects of pollution of soil and water, and gives the better healthy ecosystem in cultivable pond ensuring better survivility and growth of cultured fishes(Bhuyan, 2010). Ismail (1994) recommended a dose of mature vermicompost at the rate of 5 t/ ha to enhance production. Das (1987), Ovie and Fali (1990) and Adenji (1991) conducted experiment on zooplankton production using organic manure in aquaculture. Very little information regarding the effect of vermicompost as on organic manure for zooplankton production is available. So for the present study has been designed to determine the effect of vermicompost on zooplankton production without adversely affecting the physico-chemical properties of water.

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MATERIALS AND METHODS

The experiment was conducted at Instructional Fish Farm of College of Fisheries, GBPUA&T, Pantnagar. Two earthen ponds (P_1 and P_2) of the size 0.009 ha were selected. They were filled with the tube well water upto level of 0.8 mt. P_1 pond was maintained as the controlled unit where raw cow dung was applied @ 5 t/ ha and in P_2 pond, the experimental pond where the vermicompost was applied @ 5 t/ ha. Water quality parameters were monitored as weekly intervals following the standard methos of APHA(1995). Quantitative analysis of the plankton was done by Sedgewick- Rafter-cell counting method.

RESULTS AND DISCUSSION

It is evident from the figures (Fig. 1 & 2) that water quality was not significantly affected by vermicompost. Dissolved oxygen concentration ranged from 5.2 to 7.5 mg/l and 4.2 to 7.2 mg/l in experimental and control pond respectively. The dissolved oxygen content fluctuations were well marked and irregular throughout the study period, but there was no oxygen depletion at any time. The dissolved oxygen level fluctuation in the ponds may be due to decomposition of organic manure. English *et al.* (1989) also stated that degradation of organic material results in increase BOD and risk of oxygen depletion. A significant difference was observed in free carbon dioxide of water with higher value in cow dung treated pond (P_1). The pH of water for both the ponds remained slightly alkaline with slight fluctuation, 6.8-7.6 and 6.8-8.5 in P_1 and P_2 respectively. These results are in conformity with the reports made by Das (1987). Alkalinity of experimental pond was higher (85-150 mg/l) than control pond, which may be due to readily available nutrients.

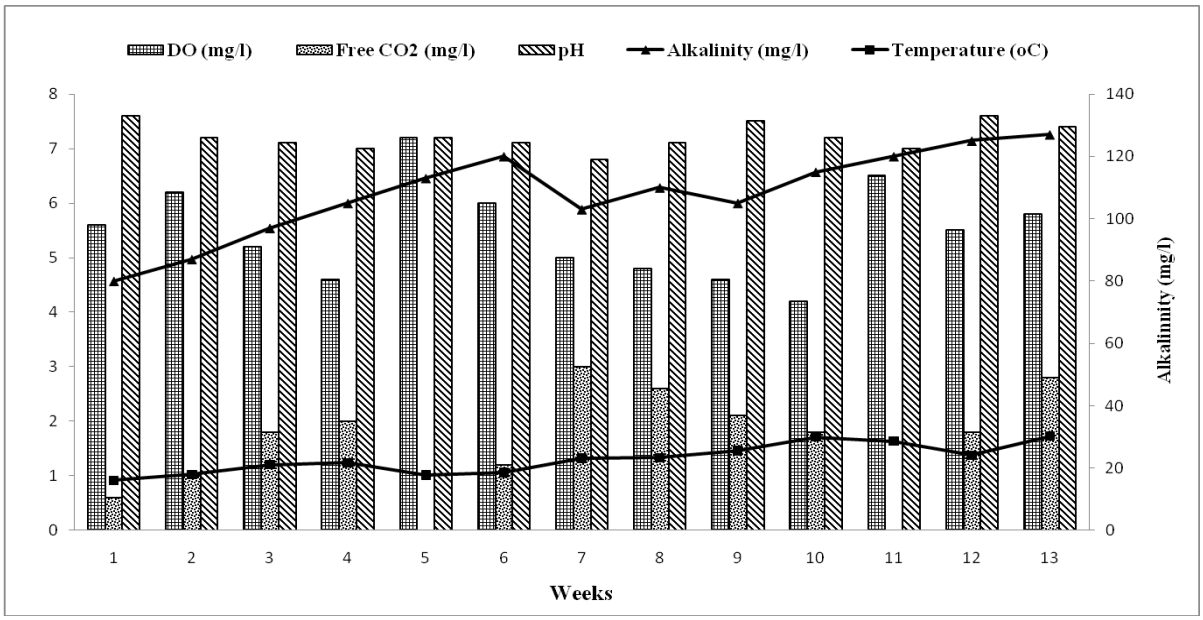

Fig 1: Water quality characteristics of control pond (P_1).

Table 1 and 2 indicate the population of zooplankton. It is clear that zooplankton population increased remarkably after fertilization. These values varied between 0.015 to 0.062 ml/ l and 0.013 to 0.041 ml/ l in experimental and control pond respectively. There was not significant variation in the total zooplankton count in P_1 and P_2 but rotifers were prominent in vermicompost manuring pond (P_2). Kaur, and Ansal, (2010) also reported similar findings. Occurrence of rotifers was 68.38 % in vermicompost manuring while it was 36.92 % in cow dung manuring. The rotifers followed by cladocerans and copepods with 19.77 and 11.38 % in experimental and 36.69 and 26.38 % in control pond respectively.

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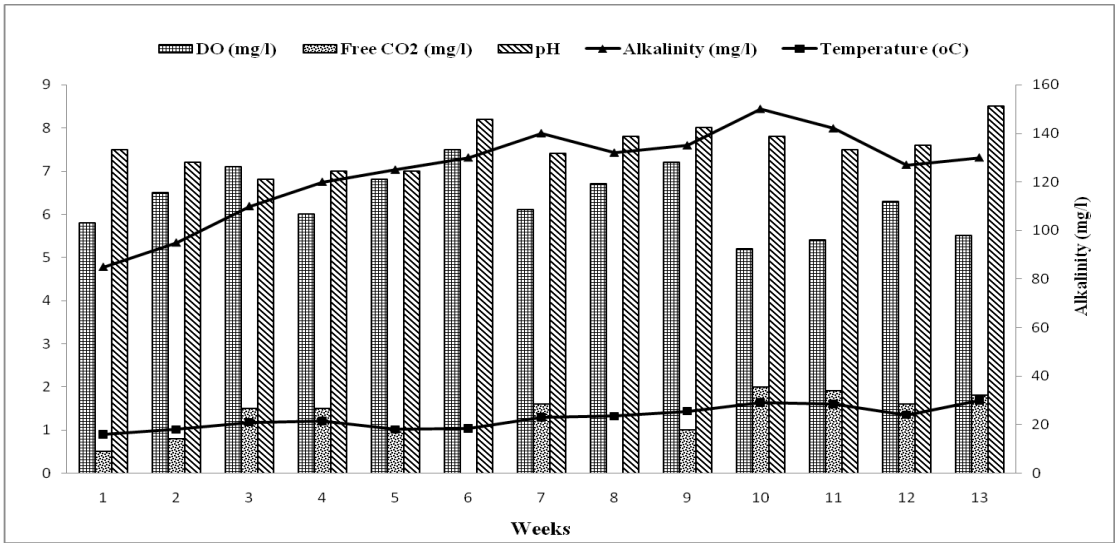

Fig 2: Water quality characteristics of experimental pond (P_2).

The application of vermicompost in the pond provides a nutrient base for dense bloom of phytoplankton, which in turn from a base for intense zooplankton production (Jhingran, 1991). Since rotifers are preferable food item of early fish stages, vermicompost can be recommended as a better manure for nursery pond management.

Table 1: Quanlitative and quantitative analysis of plankton in control pond (P_1).

Weeks	Plankton volume		No. of individual (zooplakton)		Composition %		
	ml/ 50L	ml/ L	ml	L	Rotifer	Cladoceran	Copepods
1	0.65	0.013	2150	285.95	55	16	29
2	0.85	0.017	2380	316.54	60	15	25
3	1.05	0.021	2520	335.16	55	20	25
4	1.1	0.022	2600	345.80	50	21	29
5	1.5	0.03	2920	388.36	45	17	38
6	1.8	0.036	3330	442.89	57	16	27
7	2	0.04	3405	452.87	44	28	28
8	2.05	0.041	3380	449.54	35	41	24
9	1.9	0.038	3120	414.96	20	52	28
10	1.7	0.034	2920	388.36	16	65	19
11	1.8	0.036	3030	402.99	8	71	21
12	1.5	0.03	2720	361.76	10	60	30
13	1.4	0.028	2600	345.80	25	55	20

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Table 2: Quanlitative and quantitative analysis of plankton in experimental pond (P_2).

Weeks	Plankton volume		No. of individual (zooplakton)		Composition %		
	ml/ 50L	ml/ L	ml	L	Rotifer	Cladoceran	Copepods
1	0.75	0.015	2410	320.53	92	6	2
2	1.15	0.023	2800	372.4	85	8	6
3	2.1	0.042	3680	489.44	72	20	8
4	2	0.04	3620	481.46	68	26	6
5	1.9	0.038	3610	480.13	78	18	4
6	2.3	0.046	3943	524.419	65	32	3
7	2.1	0.042	3720	494.76	88	30	12
8	2.5	0.05	4050	538.65	51	31	18
9	2.1	0.042	3550	472.15	48	30	22
10	2.75	0.055	4280	569.24	54	17	24
11	2.8	0.056	4420	587.86	68	14	18
12	3.1	0.062	4800	638.40	72	15	13
13	2.7	0.054	4408	586.264	78	10	12

It would be quite feasible to mention here that use of vermicompost has no deleterious effect on the hydrological characteristics and productivity profile of the cultivable pond. It is therefore could be concluded that the application of vermicompost as an organic manure to produce sufficient quantity of zooplankton for nursery fish pond management is not only better but also safe than the raw cow dung..

REFERENCES

Alikunhi, K. J. (1957). Fish culture in India. Farm Bull No. 20, Indian Council of Agriculture Research, New Delhi, p. 144.

APHA (1985). Satandard methods for the examination of water and waste (16th edition). *American Public Health Association.*

Bhuyan, S. (2010). Hydrological characters and their relationship in fish ponds manured with different organic manures. *Asian Journal of Environmental Science*, vol. 5 [1]: 14-18.

Boyd, C. E. (1984). *In*: Water quality in warm water fish pond. Auburn University, Alabama USA 369.

Chattopadhyay, G. N. and Mandal L. N. (1982). *Indian J. Fish.* 29, 191.

Das, M. (1987). Effect of biogas plant effluent on aquatic biomass and fish production. Ph.D. Thesis, G.B.P.U.A. &T., Pantnagar, U.S. Nagar, India.

English, P. R.; Fowler, V. R.; Boxte, S. and Smith, B. (1989). Effluent storage, treatment and disposal. *In*: The Growing and Finishing Pig : Improving Efficiency. Uni. Of Illionis Farming Press, 411-447.

Coden : IJABPT Copyrights@2012 ISSN : 0976-4550

Ismail, S. (1994). Vermitech: The use of local species of earthworm in aquaculture. Changing Villages, April-June, 27-31.

Jhingran, V. G. (1991). Fish and Fisheries of India, Hindustan Publ. Corp. New Delhi, 511-516.

Kapur, K. (1981). The utilization of some organic wastes for fish culture. *Acta. Hydrobiol.*, 23, 95- 102.

Kapur, K and Lal, K. K. (1986). Relative potency of certain livestock wastes for fish culture. *In:* Proc. First Asian Fisheries Forum (Ed: Maclean) Phillipines.

Kaur, V. I. and Ansal, M. D. (2010). Efficacy of vermicompost as fish pond manure – effect on water quality and growth of *Cyprinus carpio* (Linn.). *Bioresource Technology*. 101[15], 6215-6218.

Malik, S. (1996). Assessment of toxicity and utilization of piggery waste as feed and fertilizer for fish production. Ph.D. Thesis H. A.U., Hissar.

Olah, J.; Sinha, V. R. P.; Ayappan, S.; Porushothusmsn, C. S. and Radheyshyam, S. (1986). Primary production and Practices. *Aquaculture*. 58, 111-122.

Ovie, S. I. and Adeniji, H.A. (1991). Zooplankton culture in outdoor concrete tanks; the effect of local fertilizer on zooplankton population development. *Ann. Rep. Nat. Inst Fresh water. Fish Res. Nigeria* 129-135.

Ovie, S. I. and Fali, A. I. (1990). Preliminary investigation into the use of cow dung and rice straw mixture in the propagation of zooplankton. *Ann. Rep. Nat. Inst Fresh water. Fish Res. Nigeria* 140-149.

Saini, V. P. (1993). Experimental evaluation of aquaculture potentiality of night soil and domestic sewage effluents. Ph.D. Thesis, RAJAC, Bikaner India.

Saini, V. P. and Sharma, O. P. (1992). Preliminary study on culturing zooplankton with the application of biogas slurry. *Uttar Pradesh J. Zool.* 12, 81- 86.

Sharma, O. P. and Saini, V. P. (1992). Evaluation of pig manure fertilization in relation to zooplankton production and water quality. *J. Ecobiol.* 4, 27-31.