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Comparative Production of Zooplanktons for Fish Production using Cow Dung and Chicken Droppings in Katsina Metropolis

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ABSTRACT

Comparative study on the production of zooplanktons for fish production using cow dung and chicken droppings was carried out in Biological Garden of Umaru Musa Yar'adua University, Katsina State in January 2019 using standard methods and procedures. Zooplankton with highest abundance in pond water cultured with Cow dung in week 1 was rotifers 21 (16.67%), followed by Trichocera spp and Tunicate Veliger 14 (11.11%) and the least in abundance was Ostracods with 2 (1.59%) Zooplankton with highest abundance in pond water cultured with Chicken droppings in week 1 was gastrotrica and adult copecods each with 21 (11.29%), followed by rotifers and Veliger larva 19 (10.22%) and the least in abundance was shelled amoeba with 2 (1.08%). The results of the study indicated Rotifers, Ostracods, Copecods, Tunicate Velliger, Gastrotrica, Trichocera spp as the most dominant zooplanktons during the study period. The least abundant zooplanktons in both the two cultures were leeches, flat worms and amoeba. Comparison of zooplanktons produced from ponds cultured with cow dung and chicken droppings indicated that zooplanktons produced from chicken droppings are significantly higher ($p<0.05$) than those produced from cow dung. Chicken droppings are therefore recommended for use in zooplanktons production for fish farming to enhance productivity.

Keywords: *Abundance, Comparative, Cow dung, Chicken dropping, Zooplanktons.*

INTRODUCTION

Plankton is derived from the Greek word "Planktos" meaning errant which by extension means "drifter" or "wanderer". They are aquatic organisms e.g. animals, plants or bacteria, inhabiting the pelagic zones of the oceans, seas or freshwater bodies and are incapable of swimming against the water current (Ekelemu, 2010).

Zooplankton which are the animal components of the plankton, derived their name from the Greek word "zoon" meaning animal. Many of the zooplanktons are too small to be seen with the naked eyes (Jude e t al., 2005). They feed extensively on phytoplankton and bacteria and are regarded as heterotrophic (sometimes 'detritovorous'). Zooplanktons are the initial prey item for almost all fish larvae, as they switch from their yolk sacs to external feeding. (Kibria et al., 2011).

Over the years, different researches have been conducted on the composition, variation and distribution of zooplanktons in Nigeria, as well as comparison of zooplanktons from different organic manure. (Ekelemu, 2010, Ekelemu and Nwabueze 2011). However, there is scarcity of this research in Northern Nigeria and in particular Katsina State. The aim of this study was therefore to compare the production of zooplanktons for fish farming using cow dung and chicken droppings from Katsina Metropolis.

MATERIALS AND METHODS

Study Area (Site)

The research was conducted at the department of Biology laboratory of Umaru Musa Yar'adua University, Katsina, Katsina State in January 2019.

Source of Manure and Chicken Droppings

The cow dung manure was sourced from College of Agriculture Hassan Usman Katsina Polytechnic, while the chicken droppings were obtained from Sani Abdul-Salam Poultry Farm Gurjiya Daura Katsina State.

Experimental Design

Four (4) concrete tanks each of dimension (1mx1mx1m) were filled with 150 liters of

water from the main tank of the garden (same source). The tanks were labelled A-D. Three (3 kg) of cow dung was applied to Tank A and B and Three (3 kg) of chicken droppings was applied to tank C and D respectively as done by Ekelemu (2010). The experimental setup was left without change of water for a period of four weeks.

Zooplankton Harvesting and Identification

Zooplanktons was harvested weekly by the horizontal trawl method, using micro-filament plankton net of 50µm mesh size after collection in a 60ml plastic bottle. The samples collected were stored in 10% buffered formalin to fix the zooplanktons and viewed under microscope. Identification of zooplanktons was carried out with the aid of a key prepared by Emi and Cartin, (2007).

Statistical Analysis

The data and results collected were analyzed with descriptive statistics and t-test. The analysis was done with graph pad prism statistical software version 6.04 at a significance level of $p \leq 0.05$.

Results

Table 1 shows zooplanktons abundance in pond water cultured with Cow dung. The organism with highest abundance in week 1 was rotifers 21 (16.67%), followed by Trichocera spp and Tunicate Veliger 14 (11.11%) and the least in abundance was Ostracods with 2 (1.59%). Similarly, in week 2 rotifers and Trichocera spp were highest in abundance with 13 (13.68%) each and least in abundance was flatworms 1(1.05%). Table 2 shows zooplanktons abundance in pond water cultured with Chicken droppings. The organism with highest abundance in week 1 was gastrotrica and adult copecods each with 21 (11.29%), followed by rotifers and Veliger larva 19 (10.22%) and the least in abundance was shelled amoeba with 2 (1.08%). Zooplanktons production in both cow dung cultured ponds and chicken droppings drastically go down in week 4 of the research. Comparison of zooplanktons produced from ponds cultured with cow dung and chicken droppings showed that zooplanktons produced from chicken droppings are significantly higher ($p<0.05$) than those produced from cow dung.

Table1. *Zooplanktons abundance in pond water cultured with Cow dung during 4 weeks Period*

Species	Week 1 (%)	Week 2 (%)	Week 3 (%)	Week 4 (%)
Adult copepod	11 (8.73)	9(9)	13 (8.90)	8 (11.42)
Copepod nauplius	4 (3.17)	2(2.11)	5 (3.42)	-
Barnaclenauplius	9 (7.14)	8(8.42)	14 (9.59)	7 (10)
Cypris larva	8 (6.35)	7(7.36)	10 (6.85)	5 (7.14)
Adult Oikopleura spp	8 (6.35)	5(5.26)	11 (7.53)	3 (4.29)
Turnicate larva	7 (4.56)	6(6.31)	8 (5.48)	4 (5.71)
Veliger larva	14 (11.11)	11(11.58)	14 (9.59)	9 (12.86)
Rotifers	21 (16.67)	13(13.68)	21 (14.38)	7 (10)
Trichoceraspp	14 (11.11)	13(13.68)	15 (10.27)	13 (18.57)
Shelled amoeba	8 (6.35)	5(5.26)	8 (5.48)	4 (5.71)
Gastrotrica	4 (3.17)	2(2.11)	6 (4.11)	10 (14.29)
Leeches	13 (10.32)	12(12.63)	14 (9.59)	-
Ostracods	2 (1.59)	1(1.05)	3 (2.05)	-
Flat worms	3 (2.38)	1(1.05)	4 (2.74)	-
Total number	126 (92.65%)	95(99.51%)	146 (99.98%)	70 (99.99%)

Table2. *Zooplanktons abundance in pond cultured with Chicken droppings during 4 weeks Period*

Species	Week 1 (%)	Week 2 (%)	Week 3 (%)	Week 4 (%)
Adult copepod	21 (11.29)	18(12.76)	22 (10.47)	13 (10.83)
Copepod nauplius	20 (10.75)	11(7,80)	22 (10.47)	9 (7.5)
Barnacle nauplius	13 (6.99)	10(7.09)	16 (7.62)	8 (6.6)
Cypris larva	14 (7.53)	5(3.55)	14 (6.67)	3 (2.5)
Adult	11 (5.91)	9(6.39)	14 (6.67)	8 (6.67)
Oikopleura spp	13 (6.99)	10(7.09)	15 (7.14)	8 (6.67)
Turnicate larva	14 (7.53)	11(7.80)	20 (9.52)	8 (6.67)
Veliger larva	19 (10.22)	16(11.35)	21 (10)	11 (9.17)
Rotifers	19 (10.22)	18(12.76)	20 (9.52)	21 (17.5)
Trichocera spp	9 (4.84)	8(5.67)	11 (5.24)	9 (7.5)
Shelled amoeba	2 (1.08)	1(0.71)	1 (0.48)	1 (0.83)

Gastrotrica	21 (11.29)	20(14.18)	22 (10.47)	18 (15)
Leeches	2 (1.08)	-	3 (1.43)	2 (1.67)
Ostracods	8 (4.30)	4(2.84)	9 (4.29)	1 (0.83)
Total	**186 (87.65%)**	**141(99.27%)**	**210 (99.99%)**	**120 (100%)**

DISCUSSION

The result of the study revealed that the two culture media favored the production of different zooplankton species. Veliger larva, Copecods, Rotifers and Gastrotrica. This abundance could be attributed to the availability of elements such as potassium, nitrogen, phosphorus, carbon, etc. in the ponds cultured with cow dung and chicken droppings. This finding concurred well with the findings of Adeyemo e t al., (2014); Ekelemu and Nwabueze (2011).

Zooplanktons production was found to be high in pond cultured with chicken droppings than that of cow dung. This might be attributed to the facts that chicken droppings are easily soluble and has more nutrients than the later. This view was supported by Orji and Agunwa, (2005) and Ekelemu (2010).

It was noticed that zooplankton drastically reduced during the fourth week of the research. This might be as results of depletion of dissolved oxygen which was more abundant during the first and second week. This agreed with the findings of Catton et al., (2007) who reported dissolved oxygen problem after fertilization of pond with organic manure.

CONCLUSION

The study therefore revealed high production of zooplanktons for fish production with both chicken droppings and cow dung organic manure. However, higher production was achieved with chicken droppings compared to cow dung manure.

RECOMMENDATION(S)

- Fish farmers should be educated on the importance of producing zooplanktons for fish farming using organic fertilizer or manure so as to minimize cost.
- Further researches should be conducted with different organic manures to compare the effectiveness of each for zooplanktons production for use in aquaculture.

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