

Fluctuations in Zooplankton Density on Sugarcane Bagasse Substrate Used for Fish Culture

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Abstract: The present investigation has been conducted to evaluate the effect of sugarcane bagasse as an artificial substrate for plankton productivity. Sugarcane bagasse bundles (Length 50 cm; diameter 4cm) of 5 kg were hung in a large cement tank (5x5x1 m) with 15 cm soil base with well water. The observed zooplankton are Protozoans (*Euglena*), Rotifers (*Brachionus calyciflorus*, *Conochilus unicornis* and *Keratella cochlearis*) and Crustaceans (*Daphnia retrocurva*). The zooplankton growth showed an increasing trend from the control water. The maximum growth noted after 60 days. The result demonstrate that sugarcane bagasse can effectively use as a substrate for zooplankton productivity.

Key words: Sugarcane bagasse • Artificial substrate • Zooplankton density

INTRODUCTION

The plankton productivity of water differs considerably from very high to scanty plankton production. In fish culture systems whereas fishes are not provided supplemental feed, planktons form the most abundant base of food make a close relationship between plankton abundance and fish production. There is a growing interest in the potential of artificial substrates for plankton production in ponds to reduce costs and to increase nutrient utilization [1]. Organic substances such as plant materials, food scraps and paper products can be recycled using biological process. Diversity, distribution, abundance and variation in the biotic factors provide information of energy turnover in the aquatic systems [2]. In these systems plankton is of great importance [3]. Their sensitivity and large variations in species composition are often a reflection of significant alteration in ambient condition within an ecosystem [4, 5]. Hence for any scientific utilization of water resources plankton study is of primary interest. Several studies on plankton diversity made in India and abroad on the ponds, lakes and reservoirs [6, 7-9] but the data dealing with the effect of substrate on plankton population are scanty. The intention of biological processing is to control and accelerate the natural process of decomposition of organic matter. Sugarcane bagasse is the fibrous residue remaining after sugarcane stalks are crushed to extract their juice and is currently used as a renewable resource in the manufacture of pulp and paper products

and building materials. Sugarcane bagasse, a by product of sugar industry is generated in large quantities Hence in the present study efforts have been made to understand fluctuations in zooplankton density on sugarcane bagasse substrate used for catfish culture.

MATERIALS AND METHODS

The experiment was conducted in a 25 m² (5 x 5 x 1 m) cement tank with 15-cm soil base. Water was filled to the tanks from a perennial well. Sugarcane bagasse collected from E.I.D. Parry (I) Ltd/ Nellikuppam, Cuddalore district was sun dried and bundles were made using nylon rope (Length 50 cm; diameter 4cm) and were introduced into the tank randomly at the rate of 5 kg, by suspending the bundles at regular distances from bamboo poles keeping across the tanks. Evaluation of the zooplankton from the substrate added water and well water (Control water) were carried out for 60 days from 40 l of water using a 60- μ m net and numerical estimation done by the Direct Census Method using a Sedgewick Rafter Cell having 100 equal squares.

RESULTS AND DISCUSSION

The density of zooplanktons is given in Figure 1. The observed zooplankton are Protozoans (*Euglena*), Rotifers (*Brachionus calyciflorus*, *Conochilus unicornis* and *Keratella cochlearis*) and Crustaceans (*Daphnia retrocurva*). The zooplankton growth showed

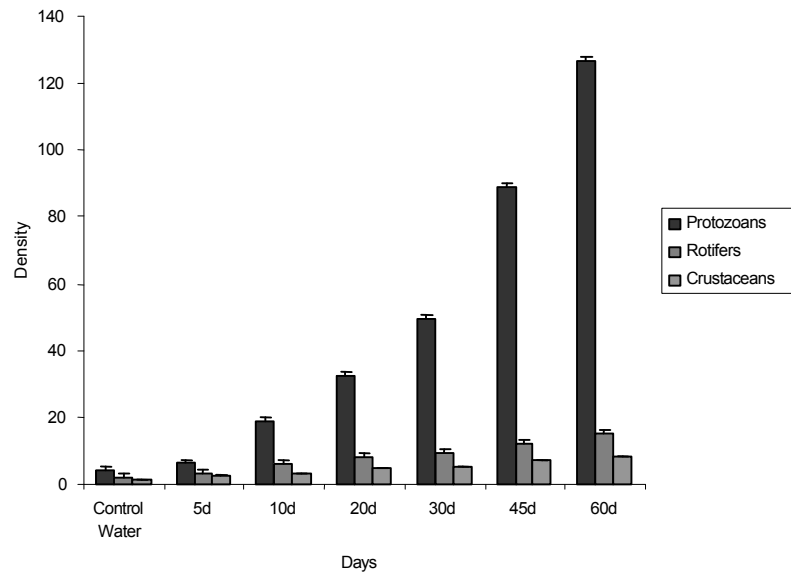


Fig. 1: Showing fluctuations in zooplankton density in control water and substrate added water for 5,10,20,30,45 and 60days

an increasing trend from the control water. The maximum growth noted after 60 days. For optimum growth of fish and overall productivity of fish culture ecosystem, a variety of nutrient carriers probably have been subjected to most study and for many good reasons receives much attention [10]. The amount of different nutrients present in any natural aquatic environment is generally low and indicates unproductive, while the quantity required for the growth of fish and fish food organisms (Phytoplankton, Zooplankton and bottom fauna /flora) is comparatively large [11]. When too much nutrient carriers (organic and inorganic) are used for fish culture, substantial amounts of nutrients are lost through several ways and may become pollutants. Therefore, large applications of nutrient carriers may cause hazards to fish [11]. Nutrients are utilized by the fish through food chains. Although inorganic fertilizers and organic manure contain various essential elements, all of them are not necessary for fish growth but must be conserved and carefully managed [10]. Chemical fertilizers and organic manures are very important in supplementing the ability of fish culture ponds and lakes to provide nutrients for fish and fish food organisms. At present, a large variety of nutrient inputs are available to the market to meet the demands of fish farmers [11]. Substrate based aquaculture is a technology that has generated a lot of interest in recent years [12-15].

In the present study the *Euglena* sp. showed a high density than other zooplanktons. Abundance of this group can be attributed to the influx of warm summer

temperature and high organic load derived from sugarcane bagasse. Further, high concentration of calcium and magnesium in the system might also have played a key role [16, 17]. The density of zooplanktons was more in substrate added water as the sugarcane bagasse provide substratum and bacterioplankton for the growth of zooplankton. From this study it is clear that sugarcane bagasse help to increase the growth of zooplankton. Hence it can effectively be used as a substrate for the growth of planktons in aquaculture ponds. These types of studies are prerequisites for evolving fish culture programmes and management of water resources.

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