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Paddy cum Channa (Fish) culture and its beneficial effect on rural population

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ABSTRACT

Farmers were becoming sick and losing their lives while applying the insecticides and pesticides in rice fields. Rice cum edible fish culture is beneficial to the farming community. Physical modifications are required to make a rice field fish friendly. This will protect the biodiversity of rice fields. Mosquito born diseases are life threatening. The impact of paddy cum Channa (murrel) culture on rural population in Vizianagaram field was studied. Murrels were observed to be biological control agents of mosquito larvae, insects and pests in the rice fields. Channa, being a hardy species, found suitable for culture in rice fields.

Key words: Biological control, hardy species, insecticides and pesticides, mosquito larvae, paddy cum Channa (Murrels) culture,

I.INTRODUCTION

Every year 4800 ton of pesticides and insecticides are being used in Andhra Pradesh. The farmers were becoming sick while applying these chemicals and some were eventually dying [1]. Paddy cum fish culture seems to be nutritionally complete, alleviating poverty of the rural people and improving their health in this environmentally conscious age. Fish can be used as biological control agent to control pests, insects and mosquitoes which use stagnant water in rice fields as their breeding ground [2]. The mosquitoes are responsible for the transmission of pathogens causing some of the most life threatening and debilitating diseases of man. The government of Andhra Pradesh was spending lot of money to prevent and cure the mosquito borne diseases.

The FAO Rice Committee recognized the importance of fish culture in rice fields back in 1948 [3]. Rice fish culture was introduced to south east Asia from India 1500 years ago [4]. Introduction of fish into rice fields in a managed way have a number of advantages such as increase in yield of rice and reduction of harmful insects, pests and weeds [5]. Rice fish culture has received greater attention in recent times because of the benefits made possible through this practice. Cagauan observed that the fish plays an important role in the nutrient cycle of rice field ecosystem:1. through its faeces excretion, 2. release of fixed nutrients from soil to water when the fish swims about and disperses soil particles when disturbing the soil water interface, 3. fishes make the soil more porous which facilitate the root penetration of rice plants[6]. Other benefits are: 1. Mosquito larvae are consumed by fish [8]. 2. Farmers' health is protected because of reduction of mosquitoes and non utilization of pesticides and insecticides in rice production and 3. The fish are harvested and used as food.

Murrel is an edible fresh water fish of tropical Asia and Africa [7]. It is known for its medicinal and recuperative value[8]. In the present work, suitability of murrel for rice fish culture in the prevailing climatic conditions of Vizianagaram district, was studied.

II. MATERIALS AND METHODS

The study was carried out in kharif season from September to December 2017.

2.1. Field modification and design for paddy cum fish culture:

2.1.1. Experimental design

Paddy plot was divided into two parts by constructing a dyke between them. One part was the Experimental farm (EF) and the other was the Control farm (CF). 75% of the EF was developed for paddy cultivation and 25% of it was developed into trenches for fish farming. Whole control farm was developed for paddy cultivation.

2.1.2. Construction of Trenches for fish dwelling

Trenches were dug on two adjacent sides of the moderately sloping paddy field. These trenches had one foot depth to hold an average of 30 cm of water in the field for three quarters of the growing season.

2.1.3. Construction of dykes of the field

The soil obtained from the trenches was used for dyke construction. The dyke was built in layers of 15 to 25 cm in thickness and water was sprinkled over the previous layers. Each layer was rammed well until clods were flattened to have good adhesion between successive layers. The dyke was strengthened and raised higher up to nearly 70 cm height so that it was 30 to 35 cm above the water level of the paddy cum fish culture area. Grass was grown on the sides of the dyke. Care was taken to prevent the presence of humus at the base of the dyke to facilitate proper adherence to the ground.

2.1.4. Transplantation of rice saplings

The rice saplings were carefully pulled out from the nursery and transplanted in the entire farm leaving the trenches for fish in EF. In EF the distance between two saplings was reduced by two inches. So that the rice plants will form a canopy while growing and hide the fishes from predators.

2.1.5. Stocking of fish fingerlings

The fish stocked in rice fields should be capable of tolerating a harsh environment of shallow water, temperature fluctuations and high turbidity [9], and low dissolved oxygen and higher ammonia concentrations

in the water [7]. Hence murrel fish was selected as it is a hardy fish [8]. One week after transplantation of paddy seedlings murrel fingerlings were stocked in the EF. One thousand fingerlings were released in 0.5 acre. Murrrel seed was collected from natural spawning grounds. The fish seed were in late fingerling stage. Murrel fingerlings were acclimatized to the field water and released into the trenches. Water quality parameters and the growth of the fish were observed. Water temperature increased in the month of September but murrel fish were found to be tolerent. Water level was maintained through irrigation of the field.

2.1.6. Sampling of mosquito immature

The samples of mosquito immatures were collected using a standard 350 ml dipper. Larval instars and pupae of mosquito were counted in each dip. The sampling was carried out thrice a week and the relative populations of mosquito immature in CF and EF were estimated following John Victor et al [10].

III. RESULTS AND DISCUSSION

Mosquito immatures were estimated during the first three fortnights after transplantation. There was a considerable reduction in the population of mosquito immatures in EF when compared to CF (Table-I and Fig-I). The fortnightly presumptive percentage consumption of mosquito immatures in EF are presented in (Fig-2).

Table -1: Population Density and Presumptive Consumption of Mosquito immatures by Murrel fish

Days of Culture	No. of Mosquito immatures in		Consumption by Murrel fish	
	Control Farm (CF)	Exp.Farm (EF)	Number	Percentage
1	109	113	0	0
15	110	77	33	30
30	105	50	55	52
45	103	20	83	81
Total	318	147	171	54

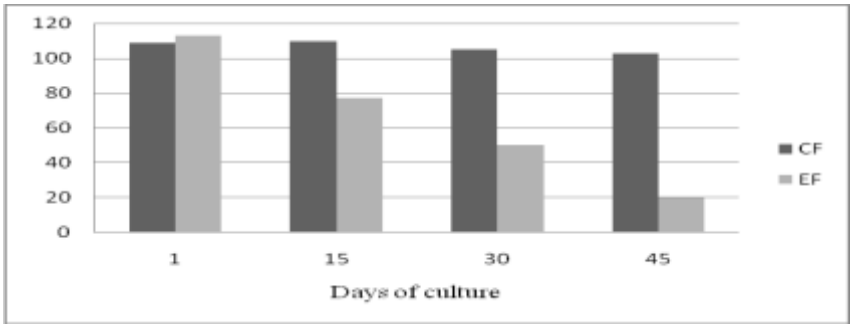

Fig-1: Population density of mosquito immatures in CF and EF

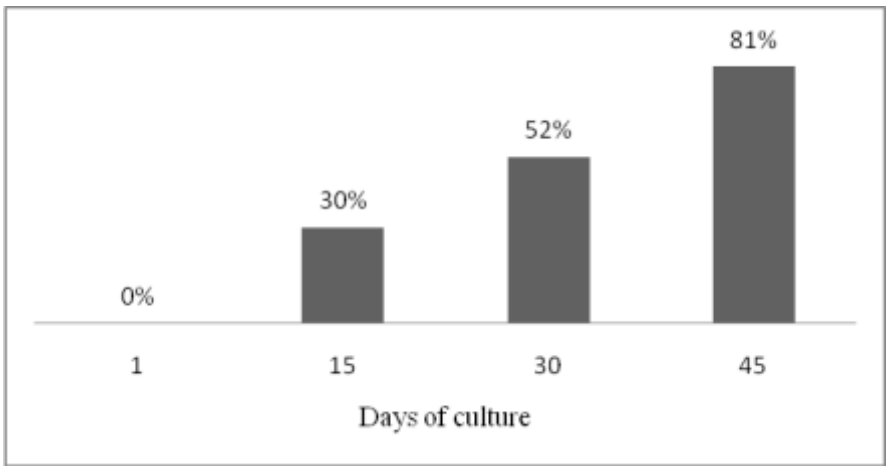

Fig-2: Presumptive percentage consumption of mosquito immature by the murrel fish

Vizianagaram distict is characterized by high humidity and oppressive summer. Water temperature increased in the month of September. Murrel fingerlings survived at high temperature. After applying urea, ammonia level of the EF was increased. But that increase did not have any adverse effect on murrel survival which indicated the suitability of the species[11]and [12].

According to Saikia [13] most preferred food item for Channa fry and juveniles was insects and their larvae. Laxmappa et al [8] observed that murrels are so significant in biological control of mosquito larvae and aquatic insect population in stagnant water pools which are harmful to human beings.

IV. CONCLUSION

The biological eradication of mosquitoes was clearly evident from the observed results. The resultant benefit for the rural environment and health benefit to rural people are envisaged. The paddy cum *Channa* (murrel) culture was proven to be beneficial to the rural population. It was also found that murrel fish can survive in the rice fields of Vizianagaram district coping up with their harsh environment.

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REFERENCES

[1.] Eenadu, *Telugu daily news paper, Visakhapatnam edition*, dated 14 Oct 2017,15

[2.] Chandra, G, I. Bhatachargee, S.N. Chettarjee and A. Ghosh, Mosquito control by larvivorous fish, *Indian .J. Med. Res.127*, Jan. 2008, 13-27.

[3.] FAO, Fish culture in rice field, *IPFC proc.(II & III)7*, 1957, 193-206.

[4.] Ali, A.B, Rice fish farming in Malaysia: past present and future, *ICLARM Conference. Proc.24*, 1992, 69-76.

[5.] Coche, A.G, Fish culture in rice fields, a worldwide synthesis, *Hydrobiologya, 30*,1967,1-44.

[6.] Cagauan.A.G, Overview of potential roles of pisciculture on pest and disease control and nutrient management in rice fields. *Proc. Seminar on"The management of integrated Agro-Pisciculture Ecosystems in Tropical areas, Brussels*, 1995, 203-244.

[7.] Ng. P.K.L, and K.K.P.Lim, Snakeheads (Pisces: Channidae): Natural history, biology and economic importance, *Essays in Zoology, Department of Zoology, National University of Singapore, Singapore*,1990,127-152.

[8.] Laxmappa. B and G.Vijay Babu, Present status and prospectus of murrel farming in Andhra Pradesh, India, *Intl. J. Fisheries and Aquatic studies, 2014, 1 (5)*, 22-31.

[9.] Asem Sanjith Singh, Manoharmayum Shaya Devi, Sagar C Mandal, and Debtanu Barman, Paddy cum fish culture in north eastern states of India: A better scope in the exploitation of resources, *World Aquaculture, December- 2011*, 58-60.

[10.] John Victor T, B Chandrasekharan, and R Rueben, Composite fish culture for mosquito control in rice fields in Southern India 1994. *Southeast Asian. J. Trop.Med. Public Health, Vol 25 No 3*, 1994, 522-527.

[11.] Qin, J.G., A.W. Fast, D. DeAnde and R. P. Weidenbach, 1997. Growth and survival of larval snakehead *Channa striatus* fed different diets. *Aquaculture, 148*,1997,105-113.

[12.] Halwart, M. and M.V.Gupta, Culture in Rice fields (FAO and The World fish center,2004).

[13.] Saikia.A.K, Abujami.S.K.S and Biswas.S.P, 2012: Food and feeding habits of *Channa punctatus* from the paddy fields of Sivsagar District, Assam, *Bulletin of Environment, Pharmacology and Life Sciences vol 1. Issue 5, April* 2012, 10-15.