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Impact study of the feral population of Tilapia (*Oreochromis mossambicus*) on growth of Indian Major Carp in Veeranna tank of Tatikonda Village in Mahabubnagar District, Telangana, India

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Abstract

Mozambique tilapia, *Oreochromis mossambicus* (Peters, 1852) is a highly successful invader of aquatic ecosystems due to its adaptable life history and has formed a feral population in the irrigational tanks of Mahabubnagar district in India. The study was carried out from March 2013 to June 2015. Documentation of this species in irrigational tanks in the district is scanty. The paper describes occurrence and impact of *Oreochromis mossambicus* on commercially important cultured carp species in the Veeranna tank. The present account is an attempt to document the occurrence and abundance of this feral fish in Veeranna tank of Tatikonda village in Mahabubnagar district of Telangana state, India.

Keywords: Veeranna tank, *Oreochromis mossambicus*, Mahabubnagar District, Telangana.

1. Introduction

Tilapia, a native to Africa and Middle East has emerged as one of the most internationally traded food fishes in the world. The African mouth-brooder cichlid, *Oreochromis mossambicus* (Peters, 1852), or the Mozambique tilapia, is native to the eastward flowing rivers of central and southern Africa. *O. mossambicus* is a successful invader of aquatic ecosystems due to its adaptable life history, tropic flexibility, ability to tolerate extreme and often unfavorable environmental conditions, rapid reproduction and maternal care of offspring's. Invasive populations are now causing environmental and ecological problems in many countries ^[1] and as such, *O. mossambicus* is listed in the Global Invasive Species Database (2006) as being in the top 100 invasive alien species on the planet.

Official records show that *O. mossambicus* was first introduced to India from Srilanka in 1952 and thereafter stocked in several reservoirs of southern India for production enhancement ^[2]. Tilapia now forms a part of fish fauna in the Godavari, Krishna, Cauvery, Yamuna and Ganga Rivers ^[3]. Escapement of tilapia from aquaculture facilities due to recurring floods or inadvertent releases frequently happened into the rivers in India. However, recent occurrence of tilapia in the fishery of the irrigational tanks has been a concern. It was interesting to see a considerable quantity of it in the fishery of the irrigational tanks. This scenario prompted us to study its population abundance, size range and assess its possible impacts on the cultured fishery in the Veeranna tank of Mahabubnagar District.

2. Materials and Methods

Mahabubnagar is the largest district in Telangana state of India and about 100 Km away from Hyderabad city. About 6200 irrigational tanks exist in the district. These tanks are primarily used for agriculture and fish culture is the secondary activity. Of this Veeranna tank of Tatikonda village, Bhoonthpur mandal was selected for the study in the district (Fig. 1 & 2). Data was collected from this irrigational tank from March 2013 to June 2015 which was the fish harvesting time every year and calculated the abundance of *Oreochromis mossambicus* along with carp and other species (Fig: 3-7).

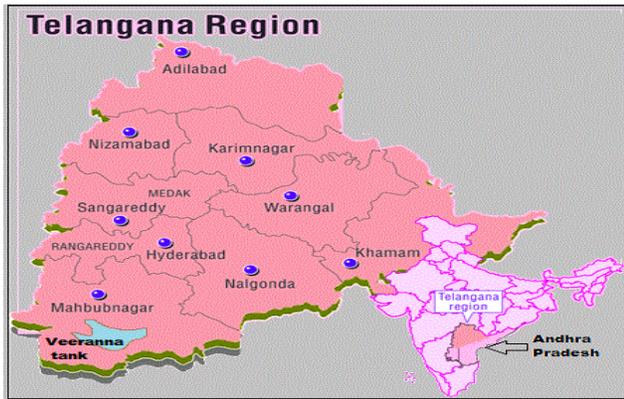


Fig 1: Location of Veeranna tank in Mahabubnagar District.



Fig 5: Carp fish harvested from Veeranna tank.



Fig 2: Satellite map of Veeranna tank.



Fig 6: Tilapia fish harvested from Veeranna tank.



Fig 3: Fish catching in Veeranna tank.



Fig 7: Carp and Murrel fish harvested from Veeranna tank.



Fig 4: A heap of Tilapia fish from Veeranna tank.



Fig 8: Different sizes of Tilapia fish collected from Veeranna tank.

3. Results and Discussion

The important fish species landed from the Veeranna tank were identified and commercially important fish were grouped as carp, tilapia and miscellaneous fishes. The carps comprised of *Catla catla*, *Cirrhinus mrigala*, *Labeo rohita*, *Cyprinus carpio*, Grass carp etc. constituting 60.32% in 2013 and declined significantly to 12.02% in 2015 of the total catch.

Tilapia was present in all the catches in different percentage ranging 38.05% to 84.47% from 2013 to 2015 (Image & Table: 1). The size of the tilapia fish ranged from 2 cm to 16 cm and weight ranged from 4 to 350 g (Fig. 8). Other miscellaneous fishes were present mainly Murrels representing 1.32% to 2.08% of total catch from 2013 to 2015.

Table 1: Fish production trends in Veeranna tank of Mahabubnagar District from 2013 to 2015.

Year	Total fish production in tons	Carp production in tons	Production %	Murrel production in tons	Production %	Tilapia production in tons	Production %
2013	25.86	15.60	60.32	0.42	1.62	9.84	38.05
2014	23.52	8.15	34.65	0.31	1.32	14.76	62.76
2015	27.95	3.36	12.02	0.58	2.08	23.61	84.47

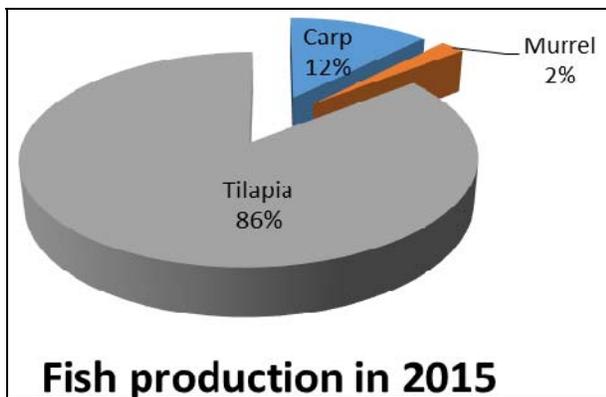
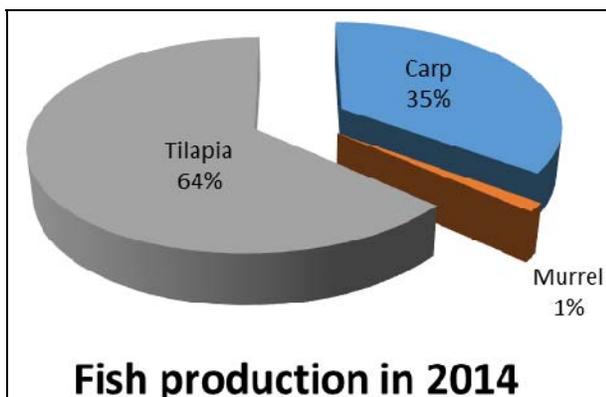
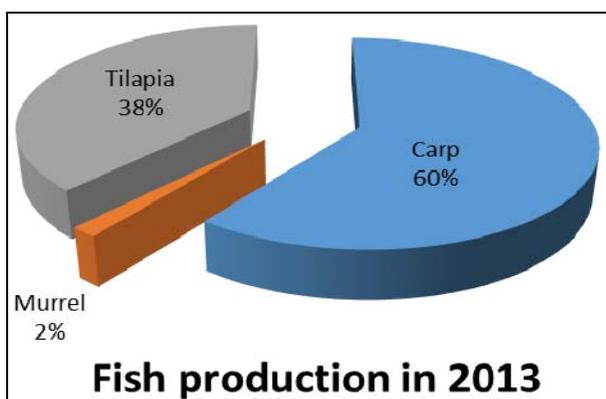


Image: Fish production from 2012 to 2015

gradually expanded for enhancing reservoir fishery production [2, 4]. Results of this study delineated increased abundance of tilapia species in the fishery and have now established feral population in the tank. Tilapia develops its own ecology for its survival and repopulating by competing with other fishes.

The most obvious factor that could be attributed to the carp seed contaminated / mixed with the tilapia seed at rearing centres where the seed rearing with canal water. That fisher folk purchase the carp seed from these sources and stocks in their village tanks without proper checking of the seed. There is a chance to develop the alien species in the culture tank along with carp species as the alien species are stronger and adapts to adverse ecological conditions.

Significant negative effects of tilapia on the piscine diversity have been reported [3]. Consequently, the catches of local fish species have been adversely affected [5, 6]. Discussion with the fishermen of the tank also indicates that cultured carp species production decreased drastically since 2014. And also Tilapia fish population catching increased significantly since last two years without stocking seed of this species in the tank. Now this tank has become the tilapia infested tank.

4. Conclusion

The invasion of tilapia has increasingly taken-over in irrigational tanks particularly canal fed and rain fed tanks, which is considered serious in view of sustainability of indigenous fish diversity. Further investigations should be carried out to determine the extent of spread of these species in other rain fed tanks in the district and to understand its impact on native fish and fisheries. Suitable control and management methods should be found. Such information could contribute to the development of management plans aimed at minimizing possible impacts of this potential invasive species. Moreover, awareness of the implications concerning this invasive species should be generated among scientists, farmers, fishermen, legislators and the general public to provide for the rigorous application of such regulatory measures.

5. Acknowledgements

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