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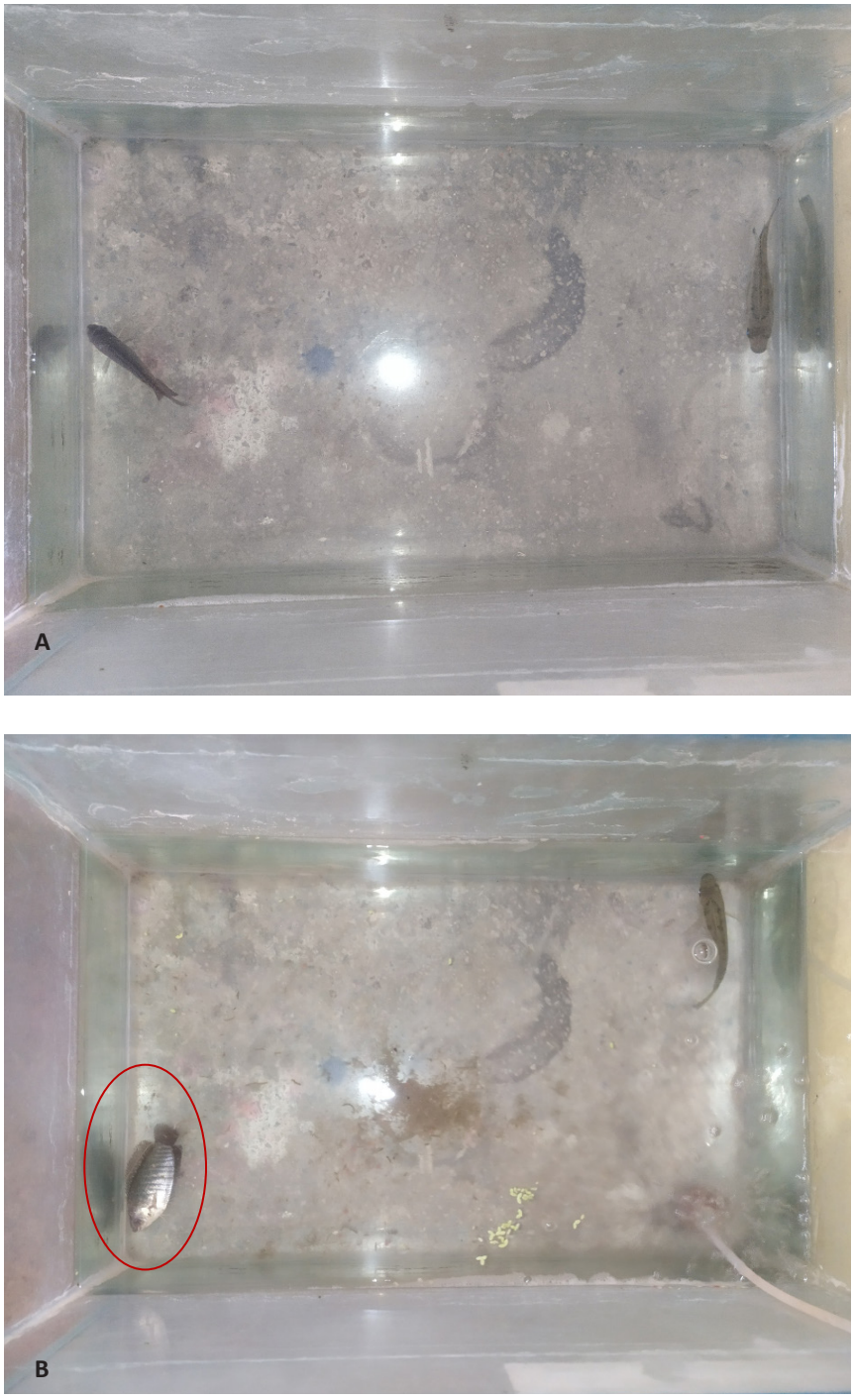
Competitive interaction between invasive fish Mozambique Tilapia on native fish Banded Gourami based on food preference

Biological invasions of non-native fish have a negative effect to the structure and function of native ecosystems, which is a critical environmental issue regarding the aquatic life (Martin et al. 2010). The increasing number of invasive species and the demise of native species are the result of agonistic interactions, where aggressive behaviors by invasive species push native species out of their preferred habitat. These agonistic interactions can result in an increased movement, ultimately making the fishes to consume more food, increase predation risk and reduce growth.

The Mozambique Tilapia or *Oreochromis mossambicus* Peters, 1852 is an extensively distributed invasive fish species worldwide, causing environmental and ecological problems in many places of Assam. Thus, *O. mossambicus* is listed in the IUCN Invasive Species Specialist Group-Global Invasive Species Database



A – *Oreochromis mossambicus* and *Trichogaster fasciata* were kept together | B – Critical condition of *Trichogaster fasciata* (red colour circle) after the aggressive behaviour between *Oreochromis mossambicus* and *Trichogaster fasciata*. © Bandita Talukdar.

(2024) as being in the top 100 invasive alien species on the planet (Ganie et al. 2013). It is possible therefore, that the effects of tilapia may have been disastrous for native biodiversity, especially if their invasion resulted in the aggressive exclusion of native species from protection of structured habitats as would be speculated based on their aggressive nature (Martin et al. 2010). Tilapia created a major problem in the pond culture system in Assam and northeast India because of the difficulty in removing tilapia from the local culture pond and it dominates the system for food and space creating a havoc in growth and development. So, this subtle experiment is to analyze common problem faced by many in the field of fisheries and a threat to the aquatic ecosystems. Therefore, the present study was conducted to investigate competitive interaction between invasive fish Mozambique Tilapia *O. mossambicus* on native fish Banded Gourami *T. fasciata* based on food preference.

To study the food preferences and the behavioral interaction between the invasive and the native fishes, invasive fish Mozambique tilapia *O. mossambicus* and one native fish Banded Gourami *T. fasciata* was selected and collected from a freshwater pond located in Ramhori, Darrang District, Assam, India. In the laboratory, fishes were acclimatized separately in different aquarium and observed carefully. Prior to the initiation of the experiment no food was provided. Each time after giving foods, the competitive interactions between the different species in the tank was noted for the food preference and behaviour.

In this experiment (Martin et al. 2010) with modification, one tilapia and one native fish were used to document the food preference and behavioral interactions between the species stocked in a glass tank. The experiment was conducted for a period of seven days. Fish were fed twice per day, around 1000 h and around 1400 h. After the food was provided, the fishes were observed for 30 minutes each time. Based on the diet composition (Sakhare & Jetithor 2016) of these fish species, the food that were provided mainly included earthworm cut into many tiny pieces, some phytoplanktons and algae, and fish feed used for aquarium fishes.

The results showed that on the first day both the fishes were maintaining a noticeable distance without any competition for the feed but from the next day onwards there was a fierce competition between the two fishes. Poking or stabbing behaviour of tilapia was observed which deteriorated the health of other fish. Also, there was a decline in the food intake of *T. fasciata* from this competitive interaction. On fifth day, *T. fasciata* was found dead succumbed to its injuries from the attacks of the tilapia.

The most preferred food from the choices that were provided (i.e., algae, commercial fish feed and earthworm) in experimental tank with both the fishes was the earthworm. The consumption rates are; algae 13.4 ± 1.66 %, commercial fish feed 28.2 ± 2.03 % and earthworms 58.4 ± 2.7 %.
In this study, we observed that the native fish, *T. fasciata* was highly affected by the aggressive

behavior of the invasive fish *O. mossambicus* when kept in the same fish tank for a certain period of time and ultimately leading to the death of *T. fasciata*. The experiment done based on the food preference of the fishes. Additional research is needed to identify the other native fishes that are vulnerable to the direct and indirect effects of *O. mossambicus* presence. Experimental results showed that the unintended release of the common aquaculture fish, tilapia, can have negative impacts on the survival of native fishes and suggested that these findings are applicable to a number of systems containing tilapia and perhaps other aggressive invasive fishes.

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