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Presence of the invasive nile Tilapia *Oreochromis niloticus* Linnaeus, 1758 (Perciformes, Cichlidae) in the Yamdena Island, Indonesia

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ABSTRACT

Nile Tilapia *Oreochromis niloticus* is native fish to North Africa, with introductions reported from many regions in the worldwide. In Indonesia, *O. niloticus* was reported in the several conservation islands. On 11-29 June 2019 specimens of *O. niloticus* were captured from temporary swamp and estuary in Yamdena Island, Indonesia. These records are among first of this species from a remote island in the Eastern Indonesia Archipelago. In many cases, introduced of non-native fish would cause a negative impact on the aquatic fauna by predation of larvae and eggs of native fish, so that the presence of the *O. niloticus* is a danger alert. The specimens of *O. niloticus* were characterized as follows dorsal spin rays 15, dorsal soft rays 10, pectoral fin rays 11, pelvic spin rays 1, pelvic soft rays 5, anal spin rays 8, anal soft rays 10. Other description of spesific morphological characters of a specimen are provided.

Key words: *Freshwaters, Invasive, Non-native fish*

Introduction

The adverse ecological impacts associated with non-native fish introductions on recipient fresh and brackish water ecosystems worldwide have drawn attention to the need to control and manage the movement of invasive species (Cambray, 2003; Pimentel *et al.,* 2005). Nile Tilapia *Oreochromis niloticus* Linnaeus, 1758 is the most successful invasive Tilapia worldwide (Maddern *et al.* 2007; Martin *et al.,* 2010). It is now introduced to many regions for aquaculture, exotic pet and sport fishing (Canonico *et al.,* 2005). *Oreochromis niloticus* exhibits highly omnivory habits, tolerance to salinity and new habitats. This fish can be found in high altitude or estuary (Peterson *et al.,* 2005; Kulac *et al.* 2012;

Vicente and Fonseca-Alves, 2013). It can have negative impacts in fresh and brackish water communities through competition for food and other resources, and as a vector of disease causing pathogens (Cucherousset and Olden, 2011: Torchin *et al.* 2013; Tuttle *et al.*, 2017).

Oreochromis niloticus spread in mainland Indonesia is due to aquaculture and aquarium trade activities (Basuki and Sri, 2014). Previous records showed this species was found in several remote islands and conservation area, among others Bawean Island (Hasan and Tamam, 2019) and Kangean Island in the Java Sea (Hasan *et al.,* 2019a; Hasan *et al.,* 2019b). Yamdena, remote island and fisheries center in the Eastern of Indonesia, is a conservation area and has no record of culturing *O. niloticus*. The presence of *O. niloticus* in the Yamdena Island constitutes a new record.

Materials and Methods

Twenty three live specimens of *O. niloticus* were obtained from a local fisherman during a fieldwork carried out on 11-29 June, 2019 in the temporary swamp and estuary, Yamdena Island. Eight of them were used as preserved specimens in 10% formalin solution (Hasan *et al.,* 2019b) and deposited at the Zoology Laboratory, Generasi Biologi Indonesia, Gresik, Indonesa. Diagnostic morphological characters of *O. niloticus* were analyzed following Trewavas (1983). Administratively, the site is located in Tanimbar Regency, Maluku Province, Indonesia. The fishing gear used by the fisherman was a cast net, fish trap and medium hook with bottom and bait used were crustaceans.

Results

New record

Indonesia: Maluku Province: Tanimbar Regency: temporary swamp (7°52′23.1"S; 131°13′56.6"E), V. Hasan and F.S Pratama collectors, 11 June 2019, 14 specimens of *Oreochromis niloticus* GBI0016. Indonesia: Maluku Province: Tanimbar Regency: estuary (7°50′11"S; 131°10′55"E). V. Hasan and F.S Pratama collectors, 29 June 2019, 9 specimens, photographed.

Identification

Specific morphological characters of *O. niloticus* are as follows: Snout moderate; scales cycloid; 3 rows of scales on cheek; gill rakers short; teeth widen; maxilla and lower jaw equal; pectoral fin pointed; dorsal, pectoral and anal fins blunt; caudal scaly. Coloration fresh specimen: upper margin of dorsal fin grey or black, the melanin sometimes slightly mixed with red, not orange or vermilion even in breeding males. Head and trunk of breeding male suffused with red; in some localities lower jaw, pelvics and anterior part of anal fin black; caudal fin covered with narrow vertical stripes; anal fin faintly barred; about 9 narrow dark bars on sides body; dark blotch at corner of operculum; dorsal spin rays 15, dorsal soft rays 10, pectoral fin rays 11, pelvic spin rays 1, pelvic soft rays 5, anal spin rays 8, anal soft rays 10 (Figure 1).

Fig. 1. *Oreochromis niloticus* fresh specimen GBI0016, from temporary swamp, Yamdena Island, Indonesia.

Discussion

Oreochromis niloticus is listed among the top 100 worst alien species around the globe and have successfully established in more than 90 countries on five continents (all except Antarctica) (De Silva *et al.* 2004; Russell *et al.,* 2012). Temporary swamp conditions in Yamdena Island, namely salinity 2-7 ppt, temperature 29–30 °C, current velocity 4.5 cm/s and depth 55–81 cm, while estuary namely salinity 20-26 ppt, temperature 30–31 °C, current velocity 8.1 cm/s and depth 67–111 cm are ideal for *O. niloticus* reproduction, survival and growth and (Riede, 2004; Admassu, 1996). They are a benthopelagic species, feeding near the surface as well as near the bottom. They can survive in fresh and brackish water with low dissolved oxygen (Abdel-Tawwab *et al.,* 2015). These characteristics make *O. niloticus* a dangerous non-native species, with potential for a massive invasion (Colautti *et al.,* 2004). The size of sampled individuals, ranging from adults to young fishes, suggest that *O. niloticus* is able to adapt well in the

Yamdena Island waters, and can possibly establish a viable population there. This is further supported by observation of fish gonad. Variation of Gonad maturity in several specimens indicate that the fish are able to breed in the Yamdena Island.

The first establishment of tilapias is believed to have occurred in Indonesia Archipelago in the 1930s as a result of an aquarium release (Courtenay and Williams, 1992). Due to intensive aquaculture, *O. niloticus* occurs in all fresh and brackish waters of mainland Indonesia such as Sumatra, Java, Borneo, Celebes and Papua. Its presence on the island of Yamdena, represents a new record (Figure 2). We speculate that *O. niloticus* were released into temporary swamp and estuary in Yamdena Island by human, but the purpose is not clear. As the island does not have an aquaculture industry, further investigation is warranted to determine the source of *O. niloticus* in the Yamdena Island. In the future further introductions should be prevented to reduce the impact of invasive fish species on the conservation area on does not disturb the conservation area (Peterson 2004; McDonald 2007; Mert and Cicek 2010).

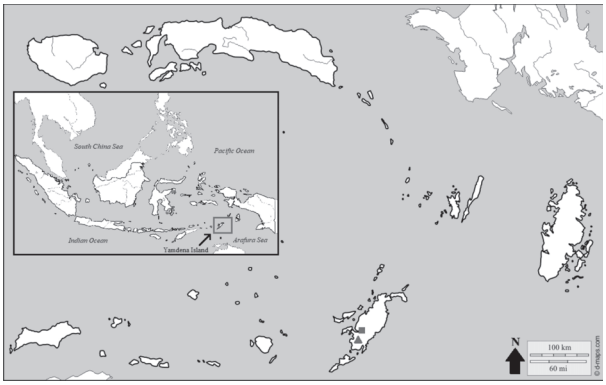

Fig. 2. Presence of Oreochromis niloticus in the Yamdena Island. Red square is the estuary and red triangle is temporary swamp.

There are many native aquatic organisms in the waters of Yamdena Island, mostly fish (Gobiidae, Latidae, Chanidae, Anguillidae and Mugilidae) and invertebrata (Palaemonidae, Portunidae, Nephropidae and Octopodidae), that can be affected by *O. niloticus*, including through predation and competition for niche, so that the presence of *O. niloticus* is a danger alert.

Regulations on the prohibition of the entry of *O. niloticus* into the Indonesian waters environment have not been established by the Indonesian goverment. While Europe, Australia and America have banned *O. niloticus* from entering into natural waters (Petterson, 2004; Petterson, 2005; Maddern, 2007). Although the Indonesian government has not officially banned it, it is necessary to socialize the community related to the impact of the entry of foreign fish. The way to overcome foreign fish that has already entered is by catching it, making it community food or fish meal as feed. This habit can suppress *O. niloticus* populations so that the population is not massive, because actually *O. niloticus* do not have natural predators as in their original habitat, whereas in its original habitat *O. niloticus* is main food for several predators such as African Catfish *Clarias gariepinus*, Nile Perch *Lates niloticus* and Nile Crocodile *Crocodylus niloticus.*

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