

TECHNOLOGIES FOR POPULATION CONTROL OF TILAPIA
IN THE PHILIPPINES

Rafael D. Guerrero III
Central Luzon State University

TECHNOLOGIES FOR POPULATION CONTROL OF TILAPIA
IN THE PHILIPPINES

Rafael D. Guerrero III
Central Luzon State University

Introduction

Tilapia is one of the most important foodfishes cultured in the world (Bardach et al., 1972). One species, Tilapia mossambica, is extensively cultivated in over 25 countries.

T. mossambica was introduced to the Philippines in 1950. Other tilapia species were imported in 1973 (T. nilotica) and 1977 (T. aurea). No record is available for the introduction of the fourth species, T. zillii, which was first recognized in 1974.

Culture of tilapia is an important source of low cost animal protein in developing countries. It is easy to breed, resistant to parasites and diseases and economical to grow. Tilapia farming in the Philippines has been found to be profitable (Tidon and Librero, 1978).

A major problem faced by tilapia culturists throughout the world is frequent breeding in ponds which leads to overcrowding and stunted growth. In countries where marketable size fish is large, a harvest of small-sized fish fetches a lower price.

Many techniques have been tried to solve the over population problem of tilapia in ponds. These techniques include monosex culture, polyculture with pisivorous fishes, cage culture, hybridization and sex reversal (Guerrero, 1975).

This paper reviews the technologies for population control of tilapia tested in the Philippines.

Monosex Culture of Tilapia

Monosex culture for controlling tilapia reproduction was first applied in East Africa (Maar et al., 1966). The technique is done by manually separating the sexes of tilapia. Males are generally preferred over females because of their faster growth.

Guerrero and Guerrero (1975) tested monosex culture of male Tilapia mossambica at the Freshwater Aquaculture Center in CLSU, Nueva Ecija. Males stocked at 10,000/ha gave a net production of 730 kg/ha of harvestable size fish in 60 days.

The technology for monosex culture is relatively simple and can be easily imparted to fishfarmers in the Philippines. Its application, however, for large-scale production may be hampered by the lack of post-fingerlings for sexing.

Culture of Tilapia with Piscivorous Fishes

Stocking of piscivorous fishes in tilapia ponds has also been applied in the Philippines. In this technique, reproduction of tilapia is cropped by the carnivorous species which are usually of higher value.

The mudfish, Ophicephalus striatus, has been cultured with T. mossambica in freshwater ponds to control reproduction of the latter (Inland Fisheries Project, 1975). Poor recovery of the mudfish at harvest was attributed to cannibalism and escape.

The brackishwater Aquaculture Center in Leganes, Iloilo has evaluated the efficiency of the tenpounder (Inland Fisheries Project, 1976a) and tarpon (IFP, 1976b) in controlling the reproduction of T. mossambica. Use of the two carnivorous species in brackishwater ponds has shown promise.

Sex Reversal of Tilapia

Since the work of Clemens and Inslee (1968) on the induced sex reversal of T. mossambica using synthetic hormone, the technique has been successfully applied on T. aurea (Guerrero, 1975), T. nilotica (Guerrero and Abella, 1977) and T. zillii (Woiwode, 1976).

Artificial sex reversal involves the feeding of sexually undifferentiated tilapia fry with hormonal steroids (e.g., methyltestosterone and ethynyltestosterone) to achieve masculinization of genetic females. Application of the technique for commercial production of T. mossambica has been demonstrated to be economically feasible (Guerrero, 1976).

The sex reversal method of population control for tilapia requires intensive culture facilities for effective treatment and a hatchery for producing the needed fry.

Cage Culture of Tilapia

The culture of T. aurea in floating cages was found effective in controlling reproduction of the fish in the United States (Pagan, 1969). Cage culture of T. nilotica in the Philippines also indicated effectiveness of the technique in limiting reproduction (Guerrero, 1978).

Mouthbrooding T. mossambica were found by Guerrero (1975) in cages stocked with females only. These females were believed to have successfully mated with males outside the cages. Cruz and Laudencia (1976) reported that feeding of T. mossambica breeders in cages with ipil-ipil leaf meal significantly reduced production of young compared with the unfed fish.

Hybridization of Tilapia

All-male broods have been produced with the hybridization of tilapia species in Malacca (Hickling, 1960), Brazil (Lovshin, 1975) and Israel Pruginin et al., 1975). In the Philippines, the crossing of male T. aurea and female T. nilotica has yielded 75% male hybrids (Guerrero, unpublished data).

Summary

Technologies for the population control of tilapia such as monosex culture, sex reversal and cage culture have been evaluated and found effective in the Philippines. Application of the monosex culture and sex reversal techniques has increased yields of marketable-size T. mossambica. Control of T. nilotica reproduction has been achieved by cage culture.

Literature Cited

- Bardach, J.E., J.H. Ryther, and W.O. McLaren. 1972. Aquaculture. Wiley-Interscience, New York. 868 p.
- Clemens, H.P. and T. Inslee. 1968. The production of unisexual broods by Tilapia mossambica sex-reversed with methyltestosterone. Trans. Amer. Fish. Soc. 97(1):18-21.
- Cruz, E.M. and I.L. Laudencia. 1976. Effects of the two levels of ipil-ipil leaf meal as supplemental feed on the reproductive performance of Tilapia mossambica raised in cages. XII(2):105-107.
- Guerrero, R.D. 1975a. Use of androgens for the production of all-male Tilapia aurea (Steindachner). Trans. Amer. Fish Soc. 104(2): 342-348.
- _____. 1975b. Cage culture of male and female Tilapia mossambica with and without supplementary feeding in a fertilized pond. CLSU Scientific Journal. IX(2):18-20.
- Guerrero, R.D. and L.A. Guerrero. 1975. Monosex culture of male and female Tilapia mossambica in ponds at three stocking rates. Kalikasan, Philipp. J. Biol. 4:129-134.
- Guerrero, R.D. 1976. Culture of male Tilapia mossambica produced through artificial sex reversal. Paper presented at the FAO Technical Conference on Aquaculture, Kyoto, Japan. 26 May - 2 June, 1976. 3 p.
- Guerrero, R.D. and T.A. Abella. 1976. Induced sex reversal of Tilapia nilotica with methyltestosterone. Fish. Res. J. Philipp. 1(2): 46-49.
- Guerrero, R.D. 1978. Studies on the feeding of Tilapia nilotica in floating cages. Provisional Report No. 2 Aquaculture. International Foundation for Science, Stockholm, Sweden. pp. 55-69.
- Hickling, C.F. 1960. The Malacca Tilapia Hybrids. J. Genetics. 57(1):1-10.
- Inland Fisheries Project. 1975. Use of dalag for biological control of tilapia reproduction. In: IFP-TR No. 7, Second Half FY 1975. U.P. Diliman, Q.C., pp. 67-70.
- _____. 1976a. The culture of tilapia in brackishwater ponds using tenpounder to control reproduction. In: IFP-TR No. 9, First Half of CY 1976, U.P. Diliman, Q.C. p. 16-24.

- _____. 1976b. Culture of tilapia in brackishwater ponds using tarpon to control reproduction. In: IFP-TR No. 10, Second Half of CY 1976, U.P. Diliman, Q.C. pp. 41-51.
- Lovshin, L. 1975. Progress report on fisheries development in Northeast Brazil. International Center for Aquaculture Research and Development Series No. 9. Auburn University, Auburn, Alabama. 11 p.
- Maar, A., M.A.E. Mortimer, and I. Van Der Lingen. 1966. Fish culture in Central East Africa. FAO, Rome. 158 p.
- Pagan, F.A. 1969. Cage culture of tilapia. FAO Fish Culture Bull. 2(1):6.
- Pruginin, Y. et al. 1975. All-male broods of Tilapia nilotica x T. aurea hybrids. Aquaculture. 6(1975):11-21.
- Tidon, A.G. and A.R. Librero. 1978. A socio-economic study of tilapia farming in the Philippines. Research Paper Series No. 10. SEAFDEC-PCARR Research Program, Los Baños, Laguna, Philippines. 92 p.
- Woiwode, J.G. 1977. Sex reversal of Tilapia zillii by ingestion of methyltestosterone. Bureau of Fisheries and Aquatic Resources Technical Paper Series. Vol. 1, No. 3. 5 p.