

60 years of tilapia aquaculture  
RESEARCH in nigeria

O.A. FAGBENRO, F.S. FASASI  
T. JEGEDE & O.O. OLAWUSI-PETERS

**FEDERAL UNIVERSITY OF TECHNOLOGY, AKURE  
NIGERIA**

# INTRODUCTION

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- 📄 Nigeria is the second largest producer of farm-raised tilapias in Africa, after Egypt
- 📄 The first attempt at fish farming was in 1951 and various *Tilapia* species and the mirror carp, *Cyprinus carpio*, were used.
- 📄 Tilapias are widely cultivated in ponds, reservoirs and cages in Nigeria

# Cultivated tilapias

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Six species are used for aquaculture, namely,

☰ *Tilapia zillii*

☰ *T. guineensis*

☰ *Sarotherodon galilaeus*,

☰ *S. melanotheron*

☰ *Oreochromis niloticus*

☰ *O. aureus*

# Tilapia production in Nigeria

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📄 Tilapia farming technology is well established and tested, ranging in production from 200-2000kg/ha/yr.

📄 Tilapia aquaculture industry produced

14,388 tonnes in 2000
19,546 tonnes in 2005
28, 950 tonnes in 2010 (estimate)

📄 Tilapia aquaculture was based mainly on *O. niloticus* cultivated under intensive (commercial) and semi-intensive (artisanal) production systems.

# 1. Tilapia population control

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- 📄 The ease with which tilapias spawn and produce offspring creates problems. Survival of young is high and grow-out ponds can become crowded. Fish become stunted as the supply of natural food organisms in the pond is depleted.
- 📄 Several effective methods were used to control such undesirable tilapia population and very few have progressed from use in experimental studies or development trials to widespread adoption by farmers.
- 📄 Where a thorough assessment of user (farmer and consumer) perspectives are considered, the use of local predatory fish species to control such undesirable tilapia recruitment in ponds is one of the most effective and practical methods.

## Table 1: Predatory fishes used to control tilapia reproduction in Nigeria)

### Predatory species and their qualities

#### *Clarias isheriensis* (*C. agboinensis*)

- prefers tilapia eggs to juvenile tilapia
- poor market value due to small adult size
- easily propagated in captivity using natural or hormone induced techniques

#### African (sharptooth) mud catfish - *Clarias gariepinus* (*C. lazera*)

- omnivorous with high propensity for carnivory
- becomes inefficient, competing for food with prey
- fast growth, attains large adult size
- easily propagated in captivity using natural or hormone induced techniques

#### *Heterobranchus bidorsalis*, *H. bidorsalis*/*H. longifilis* x *Clarias gariepinus*

- carnivorous with high propensity for piscivory
- fast growth, attains large adult size
- easily propagated in captivity using natural or hormone induced techniques

#### Snakehead - *Parachanna obscura*

- voracious predator, - difficulty in obtaining its seeds in natural waters
- inability to reproduce in captivity,- attains large size

#### The jewel cichlid - *Hemichromis fasciatus*

- voracious predator
- a prolific breeder with short generation time (5-6 months)
- poor market value due to small adult size

Even with the use of predators, the main drawback remains the excessive recruitment in ponds, which result in low yields of harvestable size.

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Presently, the use of biological inhibitory agents is being advocated. Plants with antifertility properties may offer solution as they are easy to obtain and can be incorporated into tilapia feeds. Plants that were tested and proved for antifertility properties in Nigeria include *Quassia amara*, *Aloe vera*, *Hibiscus rosa-sinensis*, pawpaw (*Carica papaya*), neem (*Azadirachta indica*) and morinda (*Morinda lucida*).

Extracts of pawpaw seeds, neem leaves, had been investigated as fertility control agents in *O. niloticus*, and *T. zillii* and their contraceptive efficacies in combating the problem of tilapia overpopulation in ponds have been established.



## 2. Feed/Diets For Farmed Tilapias

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- intensive and semi-intensive systems involve input of supplementary and complete feeds, accounting for up to 40 and 60% of production costs, respectively
- Two major feed types are produced by both sectors namely herbivorous fish (tilapia) feeds containing 30-35% cp, and carnivorous fish (catfish) feeds containing 45-50% cp.
- In 2000, the Nigerian tilapia aquaculture industry consumed an estimated 35,570 tonnes of feed (Fagbenro and Adebayo, 2005).
- The gross ingredient composition used in tilapia feeds follows the least cost formulation presented in Table 3.



Table 2. Least cost feedstuffs used for tilapia feed production in Nigeria.

<b>Feedstuffs</b>	<b>g/kg diet</b>
Fish meal (65% cp)	150
Soybean meal (45% cp)	450
Maize	250
Fish oil	40
Vegetable oil	60
Mineral-vitamin premix	30
Binder	20

Source: Fagbenro and Adebayo (2005)

Table 3. Practical feedstuffs used/tested in tilapia diets in Nigeria.

Plant residues		Animal by-products	Oils
African yam bean meal	Roselle seed meal	Fish meal	Cod liver oil
Kidney bean	Kenaf seed meal	Fish silage (dry)	Palm oil
Winged bean meal	Mango seeds	Fish silage (moist)	Soybean oil
Mucuna seed meal	Cassava peels	Blood meal	Groundnut oil
Lima bean meal	Defatted cocoa cake	Shrimp head meal	
Jackbean meal	Cocoa pod husk	Shrimp head silage	
Tamarind seed meal	Maize meal (yellow, white)	Hydrolysed feather meal	
Cottonseed meal	Sorghum	Poultry offal silage	
Palm kernel cake	Acha seeds	Poultry meat meal	
Macadamia presscake	Cassia seed meal	Poultry wastes/manure	
Sunflower seed cake	<i>Azolla</i>		
Sesame seed meal	Duckweed		

Source: Jegede (2004), Fagbenro et al. (2003, 2005), Ochang (2007)


### 3. Stunted Tilapias Silage Production


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- 📄 Fermented silage prepared from a mixture of minced tilapias (*Oreochromis* spp.), different carbohydrate sources (molasses, corn flour, tapioca flour), with *Lactobacillus plantarum* used as inoculum, incubated anaerobically for 30 days at 5-35 °C.
- pH and protein solubilization were temperature-dependent.
- source of carbohydrate did not affect non-protein nitrogen (NPN) content or proximate composition of tilapia silage
- during storage at 30 °C for 180 days, NPN content increased and there was 8-11% loss of tryptophan.

## 4. Use of Tilapia Silage in Fish Diets

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 *O. niloticus* and *C. gariepinus* fed with moist or dry diets containing fermented tilapia silage showed good growth performance and protein utilization.

 There were no differences in body (carcass) composition and hepatosomatic and no morphological deformities were observed .

## 5. Use of Tilapia in Salted Dried Minced Cake

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☰ Cakes produced from tilapias were stored at 25-32 °C for up to 2 months during which the microbial count (total viable count, TVC) reduced from  $4.4 \times 10^3$  to  $1.5 \times 10^2$  which was attributed to a lowering of water activity with increasing water loss.

☰ A taste panel confirmed the flavour as good, without a strong “fishy” taste. Odour, texture, saltiness and colour were satisfactory and no rancid taste was detected.

## 6. Use of Tilapia Pituitary in Catfish Breeding

Acetone-dried tilapia pituitary extracts (ADTPE) effectively induced oocyte maturation, ovulation and spawning in African clariid catfishes using as a single intramuscular injection of 6-10 mg.kg<sup>-1</sup> (optimum 8 mg.kg<sup>-1</sup> ADTPE).

At 27°C, ovulation occurred within 14-18 hours post-injection resulting in 16-20% increase in egg diameter. Fertilization and hatching percentages increased with increasing hormone dosage. Optimal egg and larval quality in catfishes were also achieved by using ADTPE; the efficacy of which precludes the depletion of mature catfish (potential brooders) traditionally sacrificed for collection of hypophyses in fish hatcheries.

## 7. Use of Tilapia: Cereal Blends in Human Nutrition

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☰ The replacement of legume in cereal-legume diet with the underutilized tilapias, with the resultant production of highly digestible novel food .

☰ “Cereal-Tilapia flour” mixes had favourable physicochemical and storage stability properties which have potentials in food systems hence its usefulness and acceptability for industrial and consumption purposes.



# CONCLUSIONS

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- ☞ Tilapia aquaculture research and development are producing promising results. The future of tilapia farming remains bright, despite the somewhat disappointing recent statistics.
- ☞ Tilapias are likely to be the major farmed fish commodity if research is better directed towards farmers' needs; if better breeds and farming systems are developed together; if anti-tilapia attitudes are changed where they are ill-founded; and if tilapia farming becomes a more sustainable and environmentally compatible enterprise, well-integrated with other development initiatives.



I thank you all for listening!!!!

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