



## FACTSHEET

### Genetically Improved Farmed Tilapia (GIFT)



Spanning nearly three decades, a pioneering selective breeding program that began in 1988 led to the development of the Genetically Improved Farmed Tilapia (GIFT) strain. Selective breeding is the process of choosing the parents of the next generation in such a way that it will result in improved performance for certain traits considered to be important during production and marketing.

The GIFT strain grows 100% faster than the fish used at the beginning of the breeding program and is able to thrive in a wide range of environments, leading to increases in productivity and income for fish farmers throughout many developing countries in Asia.

## Background

Genetic improvement through selective breeding has been used for millennia on crops and livestock, but up until the 1980s, little had been done to utilize this process for farmed fish.

In response to the inadequate supply of tilapia seed and the deteriorating performance of the fish in many aquaculture systems in Asia, WorldFish and partners began the Genetic Improvement of Farmed Tilapia project to develop a faster-growing strain of Nile tilapia (*Oreochromis niloticus*) that was suitable for both small-scale and commercial aquaculture.

Nile tilapia was selected due to its popularity in aquaculture, short generation time of approximately 6 months, naturally high tolerance to variable water quality, good disease resistance, and ability to adapt to many different farming systems.

At the end of the project in 1997, after six generations of selective breeding, WorldFish and partners distributed the highly productive strain to the Philippines, Bangladesh, China, Thailand and Vietnam. The improved strain was made available to research organizations and national governments for continued work on selective breeding and distribution to farmers.

In 2001, the GIFT strain was transferred from the Philippines to WorldFish headquarters in Malaysia. The center continues to improve GIFT through selective breeding at a research station provided by the Malaysian Department of Fisheries in Jitra, Malaysia.

## Key Facts

- The Genetic Improvement of Farmed Tilapia project ran from 1988 to 1997.
- The GIFT selective breeding program is ongoing and now on its 14th generation since transfer to Malaysia.
- The founding population comprised wild Nile tilapia from Egypt, Ghana, Kenya and Senegal and farmed Nile tilapia from Israel, Singapore, Taiwan and Thailand.
- The breeding methodology was originally based on selective breeding programs for salmon and trout established in Norway in the 1970s.
- GIFT has been disseminated to 16 countries.
- All international introductions and transfers of Nile tilapia by WorldFish are carried out in an environmentally and socially responsible manner according to internationally accepted guidelines for introductions and transfers.
- The original project partners were the Institute for Aquaculture Research, Norway (AKVAFORSK, now Nofima) and national fisheries institutions in the Philippines (the Bureau of Fisheries and Aquatic Resources, the Freshwater Aquaculture Center of Central Luzon State University, and the Marine Science Institute of the University of the Philippines).

# The success of GIFT and GIFT technologies

A study by the Asian Development Bank found that in 2003, GIFT and GIFT-derived strains accounted for 68% of tilapia production in the Philippines, 46% in Thailand and 17% in Vietnam. In 2010, a sample survey in Bangladesh found that 75% of mono-sex tilapia hatcheries exclusively used GIFT as their brood stock.

The selective breeding methodology developed through the GIFT project, known as "GIFT technology," has also been successfully applied to Nile tilapia and other tilapia species in Egypt, Ghana and Malawi, as well as to other fish species, including carp.

In Egypt, the second-largest tilapia-producing country in the world, the Abbassa strain of Nile tilapia developed by WorldFish grows up to 28% faster than the most commonly used commercial breed in the country. The improved strain was disseminated to Egyptian hatcheries in 2012 and is expected to have significant economic benefits for the country's booming aquaculture industry.

Countries that have received GIFT from WorldFish



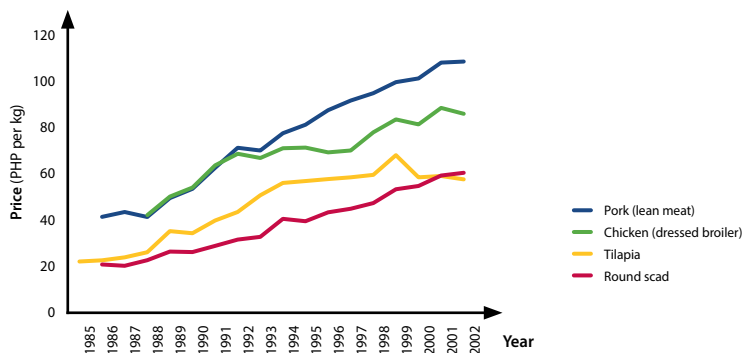
GIFT are currently used by partners in Ghana and the United States for research purposes only.

## Benefits for the developing world

Faster-growing, hardier and more disease-resistant fish have numerous benefits for small-scale farmers and resource-poor consumers. They allow farmers a greater return on their investment, and in some countries genetically improved tilapia has increased the national production rate of tilapia and led to lower prices for consumers.

The Asian Development Bank reports that during the period between 1979 and 1988, before the development of GIFT and other genetically improved tilapia, the average consumption rate of tilapia in the Philippines was 0.66 kilograms (kg) per capita per year. This increased dramatically—by 144%—to 1.61 kg per capita per year during 1989–1997, a time frame which corresponds to the development of GIFT.

Tilapia is an affordable source of protein, vitamins, minerals and essential fatty acids that are vital for good health. GIFT and other improved strains of Nile tilapia have helped improve food and nutrition security in the developing world. In Africa, the contributions of improved tilapia strains are a focus of current and future research.



Nominal Retail Prices of Tilapia, Round Scad, Chicken, and Pork in the Philippines, 1985–2002

## Ongoing and future research

WorldFish continues to push new boundaries in its genetic improvement program on the GIFT strain and to support development of better strains globally, building on the GIFT approach to fish improvement. New frontiers for research are exploring the enhancement of economically important traits, including tolerance to salinity, disease and cold temperatures, feed conversion efficiency, and resilient fish. Efforts are also underway to investigate the utility of genomic tools to further enhance the efficiency of our breeding programs, including in the GIFT strain.

## Resources on GIFT

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