

# Network of Aquaculture Genetics Projects in Asia

**M**aize, wheat, rice, poultry, cattle ... almost all of the primary foods of mankind have been so greatly improved genetically that their low-yield ancestors can barely be recognized. The one exception is fish. Domestication of fish, which for some species has gone on for thousands of years, has produced only rather small genetic changes, not all for the better. A network of researchers in Canada, China, Indonesia, the Philippines and Thailand is betting that new approaches to fish genetics can bring about spectacular improvements in this source of human food as well.

Starting with a project at the National Inland Fisheries Institute in Thailand (NIFI) in 1982, the International Development Research Centre (IDRC, Canada) has been helping to develop a network that links aquaculture genetics research projects in Asian countries with each other and with Dalhousie University in Canada. The objective is to produce, through modern techniques of selection, strains of fish that have markedly improved growth rates and disease resistance. The network linkage ensures that the specialized expertise, training capabilities and research findings of geneticists in each country are readily available to the others, and duplication of effort is avoided.

The network at present includes the following genetics projects:

**China.** Professor Li Sifa at Shanghai Fisheries University has begun within-

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family and size-specific selection for grass carp and Wuchang fish (*Megalobrama*). China joined the network only in 1986 and Prof. Li's projects have just begun.

**Indonesia.** The Research Institute for Inland Fisheries at Bogor, Indonesia (Mr. Atmadja Hardjamulia, Director) has been collecting genetically diverse strains of carp (*Cyprinus carpio*) from Java and, in the near future, elsewhere in Indonesia. Under the project management of Mrs. Hania Suharto, a breeding and hybridization program is underway to separate (and then recombine in optimal mixtures) the genes responsible for variation in shape, color, growth rate and disease resistance.

**Philippines.** Recently-started network projects with Mr. Terry Abella at Central Luzon State University, Mrs. Zubaida Basiao at the Southeast Asian Fisheries Development Center (SEAFDEC), Bina- ngonan, and Dr. Cesar Villegas at SEAFDEC, Iloilo, involve various aspects of tilapia strain improvement through selection for growth, stress resistance and salinity tolerance.

**Thailand.** Four to five generations of size-specific selection for fast-growing "red" tilapia (*O. niloticus*) have been completed by Mrs. Parnsri Jarimopas at NIFI (Dr. Kitjar Jaiyen, Director) with a "realized heritability" approaching 0.2. These fish are now being tested prior to release to farmers. Experimental selection using other techniques (size-specific selection, indirect selection on age-at-maturation) has also been applied for several fish generations by Mrs. Supattra Uraiwan. A 14-month study of traditional aquaculture near Chiangmai in northern Thailand by Miss Atchara Wongsangchan has shown that farmers exert strong genetic selection for smaller carp and tilapia unintentionally during routine farm operations. Similar "reverse selection" has previously been noted in the cultivation of *Macrobrachium* in Thailand and carp in India. Reverse selection may explain why little or no genetic improvement has occurred in domesticated fish in Southeast Asia. In any case, there are simple ways to avoid the problem, and handbooks and training programs for farmers and fisheries officers are planned.

**Canada.** The role of Dalhousie University (Roger Doyle, Network Project Leader, and Gary Newkirk, Coordinator) is to provide training and leadership in the development of new measurement techniques, experimental designs and data analysis procedures. Colleagues from the network visit Dalhousie for research collaboration and for training that may include three-month technical upgrading or advanced degrees (MSc and PhD).

Techniques developed at Dalhousie that are already being applied in the Asian Network projects include: (1) a procedure for estimating the growth rate of individual fish in aquaculture situations where the age of the fish is not definitely known; (2) standard designs for within-family selection; (3) other selection procedures, such as size-specific selection, that show promise for avoiding the effects of competition in cages and ponds; (4) new statistical estimators for inbreeding rates and selection intensities in artisanal aquaculture systems. ●



Participants in the Genetics Network analyzing data during the April 1986 network meeting at the Asian Institute of Technology, Bangkok, Thailand.