

Hybrid seed production is generally the reserve of large-scale agribusiness, often to the detriment of local strains and small-scale operations. Improved germplasm of both crops and livestock often means reliance by developing countries on imported and high cost technology.

Producing hybrid catfish in Vietnam, however, is a small-scale family business using a minimum of resources and this article describes how Mrs. Quynh Mai has mastered the techniques and the business skills to produce 70 million hybrid catfish seed/year in the front room of the family's home in the middle of Ho Chi Minh City.



Catfish microhatcheries in Ho Chi Minh City

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The native Asian catfish *Clarias macrocephalus* is an important natural fish in much of Southeast Asia but a boom in its culture potential really began with the development in Vietnam of its hybrid with the African Sharptooth catfish (*Clarias gariepinus*) in the early 1980s. The hybrid progeny shares many of the physical characteristics with its Asian parent and the growth and culture tolerance of the exotic fish. Catfish are naturally more amenable to high density, backyard seed production than carps and tilapias. Naturally catfish spawn their sticky eggs in crevices and around tree roots. The fish do not require flowing water to induce them to spawn or to keep their eggs in motion. Catfish hatcheries can be much more efficient in using water than carps for instance, producing large amounts of seed in only aerated, static water. Moreover, air-breathing brood catfish can be easily transported without sophisticated facilities. Furthermore during the spawning process itself the fish can be held at very high density after injections of spawning-inducing hormones in contrast to the large areas required for the natural spawning of mouthbrooding tilapias. This means that the holding of broodfish, producing and incubating fertilised eggs and the early rearing of juveniles can be physically separate and, often, performed as specialised activities by different actors.

Fruitful business

Mrs. Quynh Mai produces hybrid catfish hatchlings in a 18m² front room of the family terraced shop house in Ho Chi Minh City. The broodfish are maintained in a small series of suburban ponds by her husband who also produces ornamental fish. Around 1500 kg of female catfish and 200 kg of African catfish are raised on trash fish and chicken intestines. The females can be reused 3 to 4 times per year. The ripe, selected fish are transferred in batches of up to 30 kg by motorbike from the pond to the hatchery in simple oxygenated plastic bags.

The final stages of maturation of the female's eggs are induced by injection of hormones, a combination of dried pituitary glands and Human Chorionic Gonadotropin (HCG). Dried pituitary glands, either of the common carp or chinese silver carp are purchased from within Vietnam (cheaper) or from former East Block countries whereas the HCG is imported from the Peoples Republic of China. The hormones are ground up, dissolved in distilled water and administered as a single injection in the evening which allows the ripe eggs to be manually stripped from the fish the following lunch time. This fits well with Ms. Quynh Mai's schedule as she returns from her daytime work at a research institute. Sperm is obtained from testes removed from a male African catfish by dissection and the eggs are fertilised by carefully mixing eggs and sperm together in a bowl. Normally between 40 and 50 kg of females are spawned per time. The number of eggs produced per female depends on the time

of year. In the early part of the season (February-April), 1 kg of females will produce around 5000-7000 hatchlings, but this rises to over 20,000 later in the season. A single male will produce enough sperm to fertilise 0.5 kg of eggs.

The hatchery is a series of tiered wooden frames holding plastic sheets in the form of a shallow tank (2 x 1 m, holding around 200 l water). The fertilised, sticky eggs are spread in a thin layer on a fine net panel suspended within the shallow tank and an electrical aquarium pump moves water around the eggs during incubation, 400,000 hatchlings can be produced per tank. Generally a batch of fish is spawned every two days in 4 tanks producing around 1.5 million hatchlings to sell. Last year Ms. Quynh Mai sold between 60-70 million fry.

Nursery operators in another area of Ho Chi Minh City buy the fry at 3 days post-hatch to nurse in either concrete tanks or

Catfish course

The Aquaculture Programme of the Asian Institute of Technology runs a two week short course "Catfish in Thailand: A Tradition and Future". For further information, please contact the Aquaculture Short Course Unit, School of Environment, Resources and Development, AIT, GPO Box 2754, Bangkok 10501, Thailand. Fax: +662 524 5484, or 524 6200. Telex: 84276 TH. E-mail: ascu@rccvax.ait.ac.th.

Mrs. Quynh Mai in her catfish hatchery. The design of the two-tier hatching trays makes optimal use of the limited space.

earthen ponds. Normally 50,000-100,000 are purchased for nursing in concrete tanks but between 0.5-1 million are bought at one time for stocking in earthen ponds. Nursery operators initially use the large zooplankton, *Moina*, as a first feed before then feeding them on tubifex worms harvested from Saigon River.

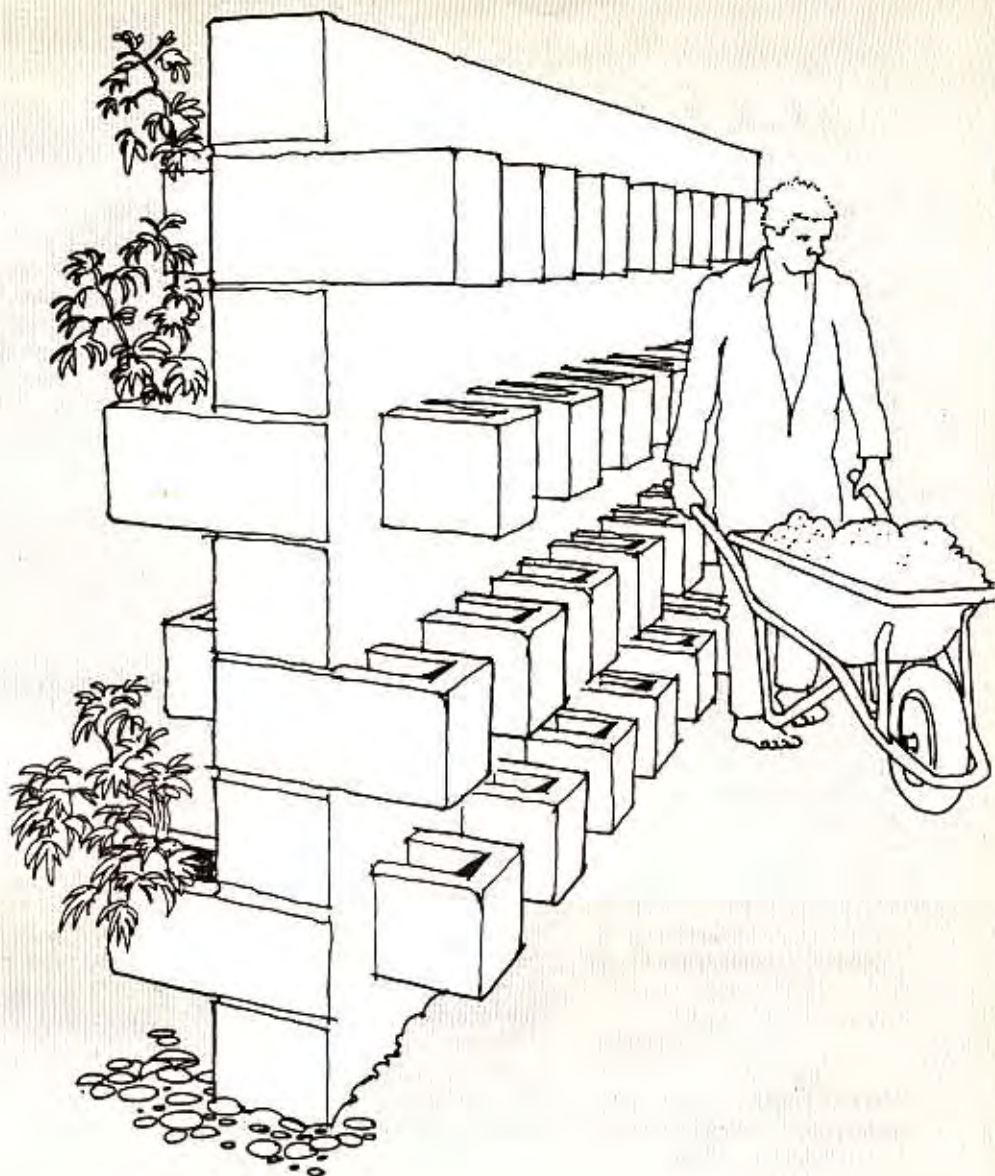
Keys to success

A good water source and high standards of hygiene is the key to predictable success in this type of operation. Water is obtained from the chlorinated city supply. Sodium thiosulphate ($\text{Na}_2\text{S}_2\text{O}_3$) at a rate of 7 g/m³ and aeration is used to remove chlorine before use which would otherwise kill the eggs. Careful cleaning is made easy by the plastic lined tank and this enhances survival. Salt and hypochlorite are used to clean and sanitise tanks between sets of eggs. Dead eggs and waste are carefully siphoned off into a bucket, there is no need for constantly running water. The materials used are simple and cheap and no elaborate piping or pumps are required. The shallow tray design facilitates observation of the developing embryos, enhances the diffusion of oxygen and appears best for just hatching catfish larvae. The use of many small tanks helps to optimise the supply of breeding fish with the demand from nursery operators for fry and having the hatchery located in the family home ensures that regular care and attention can be given and combined with other work.

Mrs. Quynh Mai and her husband are both fisheries graduates and this probably gives them a special advantage as hatchery operators. Basic knowledge about breeding technology and water quality has probably helped in their attempts to develop and refine their own methods. Favoured access to new information and specialised inputs also probably explains their early adoption. In most cases however, high returns normally quickly attract other entrepreneurs and if markets are available, the technology spreads rapidly to meet the demand. Government policy, particularly with respect to dissemination of information can speed up this process considerably.

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Growing walls

If you have too little space on the ground to grow vegetables, then why not make space in the walls? In Botswana, a container gardening system has been developed based on walls with built-in growth boxes made of hollow concrete blocks. These blocks are made using a simple, hand-operated machine. With such a machine, two persons can make 100 blocks per day. When the wall is built, some of the blocks are turned sideways and the protruding hollow part is provided with a floor and a hole for drainage. These containers are filled with sand on top of a layer of manure.

The wall containers can then be used for producing various types of vegetables such as spinach, beans, tomatoes, leek, garlic and pepper. Based on local market prices in Botswana, it has been calculated that one square meter of wall with 8 con-

tainers can produce enough vegetables to recover the costs of building the wall already within one year.

The containers can be arranged in various patterns, and the wall can have containers on one or both sides. Using such "growing walls" not only around compounds but also for the outer walls of houses would be an interesting possibility for low-income housing development.

For more information, write to the Louise Akesson, Swedish International Development Authority (SIDA), Birger Jarlgaten 61, S-10525 Stockholm, Sweden, and ask for *The productive homestead* by Uno Winblad. This is a 21-page report (free of charge) on a 1992 study tour to examine the "growing walls" plus several other innovations for space-saving food production developed by Gus Nilsson in Botswana.