

AQUACULTURE IN ISRAEL: AN OVERVIEW

SHEENAN HARPAZ

*Department of Aquaculture, Institute of Animal Science
Agricultural Research Organization, the Volcani Center
P.o.box 6, bet dagan 50250 Israel*

PREGLED AKVAKULTURE U IZRAELU

Abstract

Due to the severe water constrictions in Israel (60% of the country is a desert with less than 80 mm rainfall per year), the aquaculture practices in the country have had to rely on innovative methods designed to overcome the water shortage. These include: the extended use of saline water not suitable for other agricultural crops yet very suitable for fish culture; dual use of irrigation reservoirs for fish culture and intensive production ponds in which the fish yields per cubic meter of water are extremely high. Pelleted fish feeds of high quality, especially designed for the different cultured fish species are used in all the ponds. The main edible fish cultured in freshwater are tilapia and carp. In the marine water sea bream and European sea bass are the main cultured species. In addition there is a growing sector of ornamental fish these include cold water fish such as koi carp and warm water tropical species such as guppies. Bird predation of fish is major problem and a number of methods are utilized in order to overcome the problem. These include various scaring devices such as: noise makers, scarecrows of different shapes and colors, self propelled small airplanes in the shape of predatory birds and nets.

Key words: *desert aquaculture; irrigation/fish culture reservoirs; saline water*

Background

Due to the severe water constrictions in Israel (60% of the country is a desert with less than 80 mm rainfall per year), the aquaculture practices in the country have had to rely on innovative methods designed to overcome the water shortage. In the course of this presentation, the different innovations and rearing systems used will be discussed.

Pond types utilized

- Earthen ponds

The average depth of these ponds is typically around 1-1.5 meters. The average size of the ponds ranges from one tenth of a hectare to a few hectares. These sizes are

preferred since they are easier to handle. Production levels are on average between 5-10 tons per hectare per annum.

- Dual - purpose reservoirs utilized for both irrigation and fish farming.

These are usually large size reservoirs ranging in size from 10 to 50 hectares and the average depth ranges from 3 to 12 meters. In some cases, to prevent water losses, thick plastic is used to line the bottom of the reservoirs. Production levels range from 10 to 20 tons per hectare per annum.

- Intensive fishponds in which the bottom is either plastic lined or made of concrete to prevent seepage.

Often these ponds are conical shaped with a drainage opening in the center. The water is circulated with the aid of paddle wheel oxygenators causing all the particular organic matter, excess food and feces as well as dead fish to concentrate in the center. Periodic draining of the pond through the central drainage can eliminate the build-up of pollutants and enable higher stocking levels. Production levels range from 150-250 tons per hectare per annum.

- Highly intensive production ponds built of concrete or thick plastic.

These ponds are similar in their design to the intensive ponds. Higher production levels are achieved using liquid oxygen in order to meet the high oxygen demand of the densely stocked fish. These ponds are usually small in size with a volume of about 200-500 cubic meters on the average. Production levels range from 75-150 kg per cubic meter of water corresponding to 750-1500 tons per hectare. At present these ponds are very expensive to use and highly risky, requiring additional monitoring and alarm systems. Nonetheless, these ponds can provide better marketing possibilities as fish of larger sizes can be supplied on any given day during the year.

Due to the severe shortage of freshwater in the country, the aquaculture sector has utilized saline water, which cannot be used for other agricultural crops (water salinity of 1000mg chlorine and above). The main area used for fish culture in Israel is the Bet Shean valley close to the Jordan River, an area which has many saline springs.



Fish species

The two main species reared in Israel are tilapia hybrids (*Oreochromis niloticus* x *O. aureus*) accounting for 40% of the yield and common carp (*Cyprinus carpio*) accounting for 38%. Other fish reared are mullet (*Mugil cephalus*), trout (*Oncorhynchus mykiss*), hybrid striped bass (*Morone saxatilis* x *Morone chrysops*) as well as various carps.

A genetic selection program has been employed, selecting strains more suitable for the culture conditions in the country.

In mariculture the two main species reared are sea bream (*Sparus aurata*) and the European sea bass (*Dicentrarchus labrax*).

A growing industry in Israel is the production of ornamental fish. These include the cold water fish – mainly koi carp reared in outdoor ponds. In addition a variety of different warm water tropical ornamental fish are reared in indoor facilities where the conditions are kept at optimal levels for these fish. The main fish reared are live bearers such as the guppy (*Poecilia reticulata*) of which dozens of different varieties are reared. Most of the ornamental fish are exported – the main market is Europe.

Feeds

The rearing of the fish does not rely on natural food and all cultured fish are fed artificial diets. Pelleted feeds especially designed for the different fish species are used. Most of the pellets are produced using extruders enabling the preparation of floating pellets. The pellet size of the feeds is carefully selected to fit the mouth orifice of the reared fish. The feeds are manufactured in Israel by a number of feed mills and only one of them exclusively specializes in fish feeds. Since the climate in Israel is relatively hot, special care is taken to reduce the level of fats in the diets. This is especially important during the hot summer months.

Bird predation

Israel is on the path of migrating birds from Europe to Africa and back. Large flocks of cormorants pass through the region during the spring and autumn and this creates a serious problem for the aquaculture industry. On average, an adult cormorant can consume ½ kg of fish per day. The size of some of the flocks can reach 2000 birds and therefore the damage caused by these birds can be devastating. The major problem is in the spring when the small fish are consumed by the birds. In addition, the birds are vectors of parasites and diseases. The following methods have been used over the years with limited success: scarecrows of different sizes and colors, exploding/noise making devices, balloons of different designs; and providing the birds with feeding ponds stocked with small or undesirable fish. More successful methods include the use of a small self-propelled airplane in the shape of a large predatory bird, or covering the ponds with nets.

PREGLED AKVAKULTURE U IZRAELU

Abstrakt

Usled ozbiljnog nedostatka vode u Izraelu (60 % zemlje je pustinja sa manje od 80 mm padavina godišnje), akvakultura je morala da se osloni na inovativne metode koje prevazilaze nedostatak vode. Ove metode su: upotreba slane vode koja inače ne odgovara ratarskim kulturama ali je pogodna za gajenje riba, dvostruka upotreba rezervoara

za navodnjavanje za gajenje riba i intenzivna proizvodnja u ribnjacima sa ekstremno visokim prinosima po kubnom metru vode. U ribnjacima se koristi visokokvalitetna peletirana hrana, posebno pripremljena za različite vrste. Najvažnije jestive vrste gajenih riba su tilapija i šaran. U morskoj vodi su najznačajnije orada i brancin. Postoji i rastući sector ukrasnih, ornamentalnih riba koje obuhvataju hladnovodne ribe poput koi šarana i toplovodne vrste kao što je gupi. Piscivorne ptice su veliki problem koji se rešava brojnim metodama: naprave koje prave buku, razna, strašila, aviončići na propeler koji liče na ptice predatore i mreže.

***Ključne reči:** pustinjska akvakultura, navodnjavanje/gajenje riba, slana voda.*