

Rice-fish culture systems

By **AP Surtida**

Rice-fish culture has a long history in Indonesia, beginning in 9th century in West Java. Today, it is practiced in 17 out of 27 provinces in Indonesia. Rice-fish culture has spread to about 94,309 ha with 69% in Java, 15% in Sumatra, 6% in Sulawesi, and 10% at Nusa and Tenggara islands (Supriatna 1998).

Its distinct advantages are: (1) it allows farmers to maximize farm resources and therefore diversify harvest that leads to additional income; and, (2) it provides fish protein for land-locked areas otherwise deprived of fish from marine sources.

The rice field offers a special environment for raising fish if farmers use fertilizer properly. The ricefield has a high level of fertility owing to the rates of mineral elements, which result in higher production of rice. It is also rich in flora (algae, phytoplankton) and fauna (insect larvae, worm, zooplankton) which can serve as fish food.

Conversely, fish are beneficial to rice plants because they help provide a better growing environment of rice by controlling weeds and species of insect pests.

There are two types of rice-fish culture in Indonesia: (1) simultaneous rice-fish culture at the same field at the same time and (2) crop rotation wherein rice and fish are alternately raised as crops in the same rice field. Generally, the rice-fish technology was developed by farmers themselves.

The widely practical rice-fish culture in irrigated areas of West Java are: *minapadi*, *penyelang* and fish *palawija*. In the coastal areas of East Java, there is a special system called *sawak tambak* (de la Cruz 2000).

Most of the fish pro-



A "primitive passion card" hand-made by Z. Sunarya in Bali, 1991
courtesy of CR Lavilla Torres

duced from ricefields are used mainly for restocking in growout systems such as: floating net, bamboo cages, running water (concrete tanks) and irrigation canal systems.

Rice varieties such as the IR64 (wet season) and *ciliwung* (dry season) which are proven to yield high with fish are planted.

Planting distance of rice plants is 20 x 20 cm, 22 x 22 cm or 25 x 25 cm. West Java farmers use the following fertilizers (in kg per ha): urea, 200; triple superphosphate, 100; potassium chloride, 100; and ammonium sulfate, 50.

At the tillering stage of rice, water is kept low and is gradually raised to 10-15 cm throughout the rice growth.

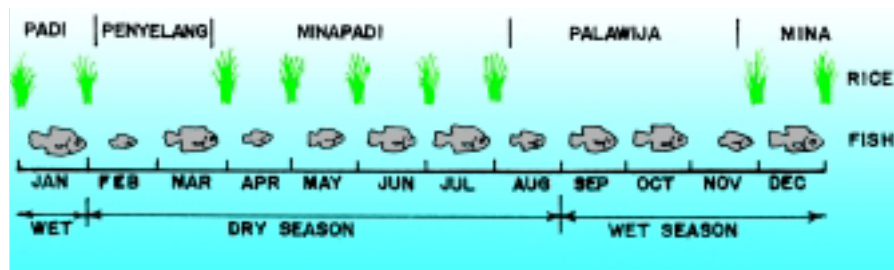
Common carp (*Cyprinus carpio*, 15-25 g) are stocked at 2,500-3,000 per ha 7-10 days after rice planting. A center or a

cross trench occupies about 2% of the total

rice field area. Harvesting is done by draining the field slowly after a culture period of 40-60 days. By this time, the fish attain 50-100 g, the size desired for stocking cages and running water culture systems.

In the *minapadi* system, rice and fish are simultaneously raised in the same area. A trench refuge (0.5m wide and 0.3-0.4 m deep) is used. There is a variation called *payaman* method. The difference is that the rice-fish field is connected to a pond refuge instead of a trench.

The *penyelang* system is the culture of fish in between the first and second rice crops. Fish culture is shorter than the *palawija* system. A portion of the rice field with rice



A schedule for rice-fish farming in Indonesia (redrawn from de la Cruz 2000)

stubbles is immediately stocked with common carp, while the remaining portion is prepared for the dry season's crop.

Stocking size ranges from 5-8 or 8-12 cm or 15-25 g, depending on availability. Stocking rate is 2,000-4,000 fish per ha. Water depth is 10-20 cm. Fish are harvested after 30-40 days. The short period may not produce the desired size for grow-out in cages and running water systems, especially if stocked small. However, grow-out operators also buy small fish seeds if supply is scarce. The unsold fish are restocked in the following dry season crop.

The *palawija ikan* system is immediately done after the harvest of the dry season rice crop.

Dikes are raised to contain water depth of 30-40 cm. The stocking rate and size vary. In West Java, common carp of size 3-5 or 5-8 cm are stocked at 5,000 per ha without feeding. In North Sumatra, consumption size is produced in the *palawija* system. Stocked sizes are 30-50g or 50-100 g at the rate of 1,000-1,500 (no feeding); and 1,500-3,000 (with supplemental feeding). Supplemental feeds are rice bran, chopped cassava, corn kernel soaked in water, poultry feed, kitchen refuse and others. Harvesting the fish is done by draining the field.

The above systems are combined into sequential cropping patterns in a year such as:

- *Minapadi* (rice-fish), *penyelang* (fish only), *minapadi* (rice-fish), then *palawija* (fish only)
- Rice, *penyelang*, then rice *palawija*
- Rice, rice, then *palawija*
- Rice-fish-duck, fish-duck, rice-fish-duck, then fish-duck

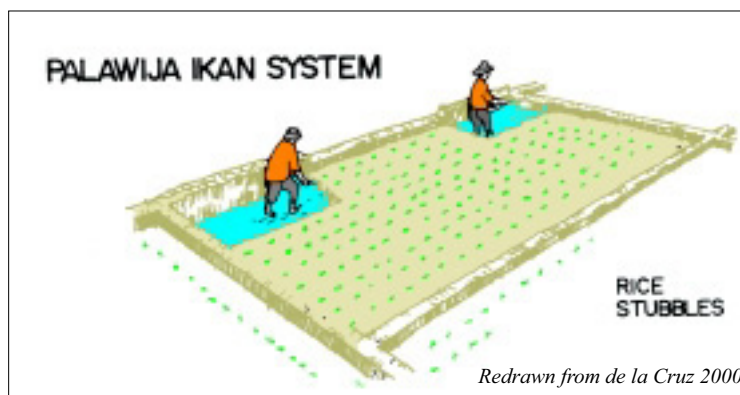


Redrawn from de la Cruz 2000

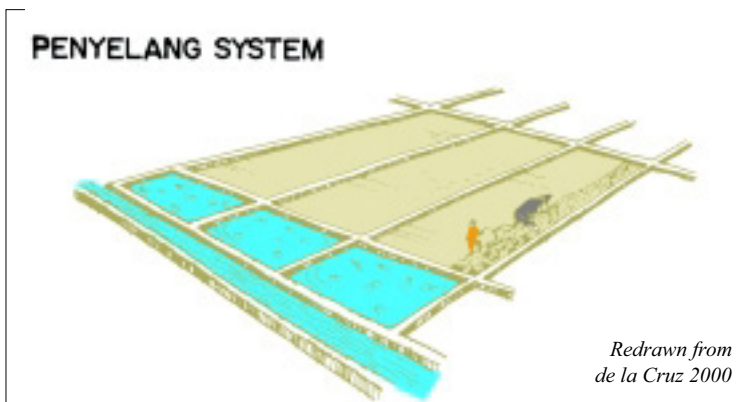
are kept when necessary. Ducks can make the system most profitable. The year-round supply of eggs provides monthly income to the farmer. Without ducks, the first pattern (*minapadi-penyelang-minapadi-palawija*) is the most profitable.

Fish stocking and production data

System	Stocking size	Rate per ha	production (kg per ha)	Culture period
Minapadi	15-25 g	2,500-3,000	100-200	60
Penyelang	15-25 g	2,500-3,000	70-100	30-40
Palawija	5-8 cm	5,000	200-300	60
	30-50 cm	1,000-3,000	300-800	60-70
	50-100 cm			



Redrawn from de la Cruz 2000



Redrawn from de la Cruz 2000

REFERENCES

- de la Cruz CR. 2000. Rice-fish systems in Indonesia, Agriculture Magazine, Vol. IV, No. 9
- Huat KK and Tan ESP. 1979. Review of rice-fish culture in Southeast Asia. IN: Pullin RSV and Shehadeh ZH (eds). Integrated Agriculture-Aquaculture Farming Systems Conf. Proc. ICLARM and SEARCA
- Sing VP, Early AC and Nickham TH. 1979. Rice agronomy in relation to rice-fish. IN: Pullin RSV and Shehadeh ZH (eds). Integrated Agriculture-Aquaculture Farming Systems Conf. Proc. ICLARM-SEARCA
- Supriatna A. 1998. Rice fish culture: Basic technique and management considerations. Indonesia Agricultural Research and Development Journal 20 (3)

###