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Culture of giant freshwater prawns in China

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Novel system used in Yangtze River Delta region



Cultured freshwater prawns are very popular and prominent in China.

The giant freshwater prawn (*Macrobrachium rosenbergii*) is one of the most commercially cultured crustaceans in the world. It has been grown in China for nearly 40 years, since it was first introduced from Japan in 1976. Freshwater prawn farming is very popular in many regions in China, especially in the Yangtze River Delta region – the most important giant freshwater prawn farming areas – as many local farmers regard the farming of these crustaceans as a good way of making money. The Yangtze River Delta region produced 85,195 tons of *M. rosenbergii* in 2014, and contributes more than 60 percent of the national giant freshwater prawn production. The economic input from prawn farming is important to local farmers for their livelihoods and income.

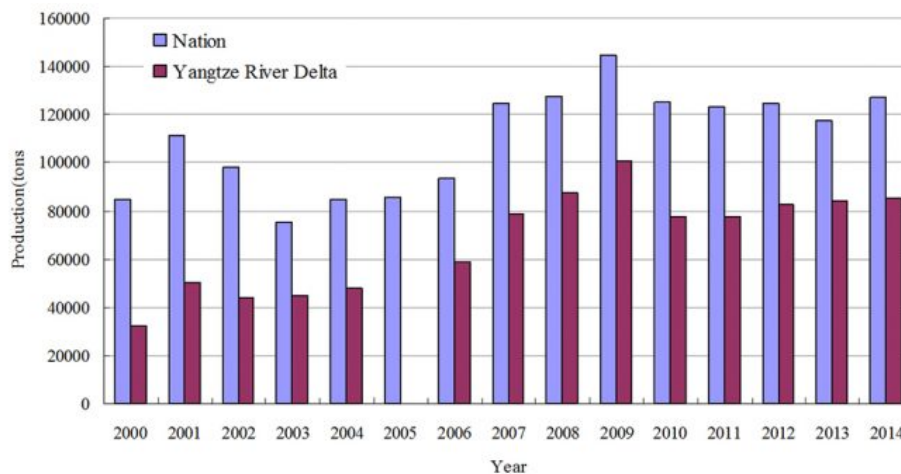


Fig 1. Annual production (tons) of farmed *Macrobrachium rosenbergii* in China.

Traditional giant freshwater prawn farming can only be implemented annually during the period from mid-May to early October (a five-month culture period), and therefore, only one single crop can typically be cultured annually in the Yangtze River Delta region due to seasonal temperature restrictions. However, local farmers have adopted a greenhouse system, covered with plastic film and using a boiler to raise the water temperature. This allows farmers to stock prawn seedstock into nursery ponds in early spring (mid-March), two months ahead compared to the traditional, open culture method. This farming practice has made it possible to extend the culture period and achieved remarkable expansion in the past, since the beginning of the century in the Yangtze River Delta region. The nursery period usually lasts for about two months, depending on the outdoor water temperature and when seasonal temperatures reach adequate levels for outdoor pond grow-out.

Greenhouse and facilities

The nursery systems consist of greenhouses, and heating and aeration equipment. The greenhouse is placed inside rectangular, 300 to 600 square-meter culture ponds depending on the number of total prawn seeds stocked into the culture pond. The main structure of the greenhouses is built with bamboo and galvanized steel pipe bound with iron wire, and serves as the structural support of the greenhouse. This structure is covered with a layer of transparent plastic film, tied down and kept in place using ropes. Greenhouses are set up usually about one month ahead of the stocking time for the young prawn postlarvae.



Fig. 2. Common greenhouse used as a nursery pond in Yangtze River Delta.

Water heating is done using simple, coal-fired boiler and a heating distribution system with pipes. The water temperature is generally heated above 26 degrees-C for the duration of the nursery period, and typically lasts until late May. Water aeration is done using air compressors and diffusing equipment, with air stones or micro-bubble generators and air distributing hoses. Dissolved oxygen levels are generally maintained above 5 ppm.

Water quality control

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Fig. 3. Liquid fertilizers and commercial microbial probiotics used during the prawn nursery period.

stocking density of prawn postlarvae is high during the nursery period. Poor water quality often results in low survival rates in the nursery ponds, so water quality plays an important role in this phase. The use of probiotics during the nursery period is widely implemented by the local prawn farmers. Before stocking, the nursery ponds are filled with freshwater pumped from the nearby river. Most farmers use probiotics, reportedly as algae growth regulators to stimulate an initial algae bloom, then use other probiotics to improve water quality and stimulate the immunity of the postlarvae. The use of probiotics can increase prawn survival and growth in the nursery phase, and the use of liquid fertilizers and commercial microbial probiotics is very popular among local prawn farmers. Pond water is partially exchanged during the nursery period, depending on water quality.

Management strategies

The stocking densities used depend on the total number of postlarvae that will be stocked into grow-out ponds, and can vary from 1,000 to 3,000 postlarvae per square meter in the outdoor nursery greenhouses. The addition of artificial substrates can reduce cannibalism and provided more space for the young prawns, and can be used to increase the survival rate of prawns. Substrates used are mostly made with bamboo bound into bundles that are submerged in the pond water.

Fig. 4. Farm workers examining growth performance of prawns inside a greenhouse nursery pond.

In normal culture, postlarvae are generally stocked directly into the grow-out ponds in late May, and market-sized prawns are harvested in early October. Therefore, the grow-out season in the Yangtze River Delta region is short at only 120-150 days. However, the stocking time can be head-started by two months with the use of greenhouse and nursery facilities. Because larger juveniles can be stocked into grow-out ponds after the 60-day nursery, the duration of the grow-out season to market size can be extended to 180 to 210 days. Starting in mid-March, the first batch of postlarvae are stocked into nursery ponds. Water temperatures are maintained above 25 degrees-C by operation of the boiler in this phase. After stocking, the prawn postlarvae are fed with pelleted commercial feed twice per day every day.

After about one month, water heating is discontinued and water temperatures can be kept above 20 degrees-C due to heat preservation by the greenhouses covered with plastic membrane. At this time a second batch of postlarvae are stocked into the nursery ponds. When the outdoor water temperature exceeds 20 degrees-C in late May, the plastic-covered greenhouses are removed and all prawn juveniles are stocked into the grow-out ponds. A third batch of postlarvae can then be added into the grow-out ponds if necessary. After the nursery phase, the average stocking density in the grow-out ponds is generally about 100 juveniles per square meter.

Harvest of farmed freshwater prawns.

Harvest

After one month of culture, the grow-out ponds are first harvested in late June using seine nets. Larger, 12-g prawns are individually selected by hand for sale, and smaller animals are returned to the grow-out ponds. Marketable animals are then harvested using seine nets every 10 to 15 days. Periodic removal of larger prawns provides smaller ones with a chance to grow to commercial size. At the last harvest period, in early October, ponds are drained and all prawns are sold. The average production of this culture mode is 5,250 kg/ha, but even higher production levels can be obtained by the more skilled farmers.

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