

# AQUAFACTS



## Freshwater Shrimp Production in Louisiana?

### Introduction

Freshwater shrimp, or prawns, occur throughout the world. Many of the largest species belong to the genus *Macrobrachium*. Four species of *Macrobrachium* are native to rivers and streams in the United States, as are several smaller types of freshwater shrimp known as grass or glass shrimp. Throughout the world, pond production of freshwater shrimp for food is usually based on culture of a tropical species, *Macrobrachium rosenbergii*, which is native to a number of countries in the Indo-Pacific region. Culture techniques for this species were originally developed in Malaysia, Hawaii and Israel. Basic production methods have been modified to fit local conditions in tropical countries throughout the world. Unfortunately, the tropical nature of *M. rosenbergii* has resulted in limited production success in research trials and pilot projects in cooler climates. The terms "prawn" and "freshwater shrimp" used here refer to *M. rosenbergii*.

### Constraints

Technical constraints to commercial production of freshwater shrimp in Louisiana include temperature intolerance and cost and availability of post-larvae for stocking. Prawns cannot tolerate cold water. Growth is limited at temperatures below 70° F, and prawns will become stressed at 65° F. Death begins to occur at 60° F, with few surviving temperatures below 58° F for any period.

Availability and cost of post-larvae (small prawns that have passed through the larval stages of

the life cycle and are ready for stocking into fresh water) are also other major constraints to producing prawns commercially in the southeastern U.S. Few if any sources of post-larvae exist in the U.S. at any given time, and animals for stocking must be air freighted, often from sites as far away as California or the Caribbean. This expense automatically increases the cost of production to a point where prawn producers have difficulty competing with wild-caught shrimp in the local marketplace.

Marketing problems have been a direct result of the cold intolerance of this species. Producers in the southeastern U.S. are forced to leave prawns in ponds as long as possible to maximize size at harvest, but all animals must be removed from ponds in the fall before temperatures drop to lethal levels. Few marketing outlets are available for this type of one-time sale, especially with a species most buyers are not familiar with. An additional problem associated with batch harvesting is excessive size variability; many animals are too small to market. Producers should identify markets before preparing to produce prawns.



Louisiana State University

**Agricultural Center**

Louisiana Cooperative Extension Service



*Freshwater shrimp harvested from Louisiana ponds typically exhibit substantial size variation.*

## **Permitting**

Prawns are not native to Louisiana, so the Louisiana Department of Wildlife and Fisheries requires anyone wishing to culture this species within the state to obtain a special letter of permission from the secretary. Additionally, a fish farmer's license may be required. Contact the Permits Supervisor, Inland Fisheries Division, Louisiana Department of Wildlife and Fisheries, P.O. Box 98000, Baton Rouge, LA 70898-9000 for permitting information and procedures.

## **Production Ponds**

For individuals in Louisiana wishing to culture prawns for personal consumption or for a special market, recommended culture techniques have been developed based on research conducted through the LSU Agricultural Center. Ponds used for prawn production should have the same management characteristics of catfish or crawfish facilities, although some crawfish ponds may not be deep enough (approximately 2.5 ft) for reliable prawn production. Larger ponds (more than 3 acres), old ponds with soft bottoms and ponds which cannot be easily drained are difficult to harvest. Prawns are sensitive to a number of agricultural pesticides, so exposure to potential pesticide drift should be considered when choosing a pond site.

## **Water Supply**

Good quality well water is the best source for filling prawn ponds. Surface water from rivers or

streams may be acceptable if wild fish and pesticides can be avoided. Although brackish water is required for the complicated larval development of this species, post-larvae and adults are stressed if salinities rise above 8 parts per thousand (roughly 1/4 strength seawater.) Excessively hard (> 300 parts per million (ppm)) or soft (< 50 ppm) water should also be avoided for prawn production ponds.

## **Pond Preparation**

If an established pond is to be used, you must eradicate existing fish and predacious insects. If rotenone applications are required, contact your local Louisiana Cooperative Extension Service office for guidance concerning application rates, pesticide certification and disposal of dead fish. At least one week before stocking, a liquid fertilizer (any formulation within the range of 9-32-0 to 13-38-0) should be sprayed on the pond at a rate of 1/2 gallon per surface acre. A second application may be necessary if a green color has not developed in the pond after one or two weeks.

An alternative type of pond culture which has proved successful in research and private production throughout the Southeast relies on planting rice over 50 percent to 70 percent of the pond at a relatively low rate (approximately 50 lb. of seed per surface acre planted) around mid-March. The low end of the pond must be left open to allow for harvesting. As the rice begins to grow, water levels are gradually increased and ponds are generally ready for stocking by mid- to late April. Rice growth may be encouraged with bi-weekly applications of 12-12-12

fertilizer at approximately 30 lb. per acre until one week before prawns are stocked. Rice plants serve as cover, habitat and a substrate for natural foods such as algae, insects and bacteria.

## Stocking

Stocking rates of 15,000 to 20,000 juveniles per acre have given satisfactory results in growth studies throughout the Southeast. Since the growing season is usually limited to months when pond temperatures exceed 70° F, juvenile prawns (500 or less per pound) are usually preferred to the younger and smaller post-larvae. Temperature acclimation is important during the stocking process. Bags containing post-larvae or juveniles should be floated in the pond for at least 30 minutes before release, preferably in a shady area.

Gradual mixing of pond water with transport water in bags (after temperature adjustment) is usually desirable when moving prawns from hard water to moderately or very soft water. When attempting this procedure, however, monitor the prawns closely for signs of stress, and introduce them directly into the pond if they begin to appear weak or disoriented.

This problem occurs occasionally because carbon dioxide and ammonia build up in shipping bags during transport. Since these compounds cannot dissipate into the atmosphere, dissolved carbon dioxide reaches very high levels, lowering the pH of the shipping water. Opening the bags allows the carbon dioxide to escape rapidly, and aerating or splashing accelerates this process. The pH rises drastically, and any ammonia present rapidly converts to the toxic form. This chain of events will kill post-larvae and juvenile prawns quickly if they are not released into the pond. This problem is less serious when transport times are short and when prawns have not been fed for several days.

## Feeding

A readily available source of suitable feed is sinking catfish feed. A general rule is to feed roughly 10 pounds of fry feed per acre per day for the first month of growth, switching to 20 pounds of sinking pellets per acre per day for the remainder of the growing season. For best results, scatter feed as widely as possible.

## Water Quality

Dissolved oxygen is the most critical aspect of water quality for prawn producers. An effective oxygen monitoring program and aeration capabilities are essential for success. One important point to remember when monitoring dissolved oxygen is to determine oxygen concentrations near the bottom of the pond where the prawns spend most of their lives. Oxygen levels near the pond bottom must be maintained at a minimum of 3 ppm to avoid stress and promote good growth rates. Freshwater shrimp will become stressed and die at oxygen concentrations below 2 ppm.

Other important water quality parameters affecting prawn growth and survival are unionized ammonia, nitrite and pH. During the normal growing season in Louisiana, unionized ammonia and nitrite concentrations will rarely exceed safe levels. If unionized ammonia and nitrite levels rise to dangerous levels (0.1 and 1.8 ppm, respectively), the only practical control measure is to flush the pond. In many parts of Louisiana, however, well water ammonia levels should be determined before flushing.

Ponds with low alkalinity often exhibit drastic daily shifts in pH levels. A simple solution to this problem is to lime affected ponds to increase buffering capacity. Contact your local Louisiana Cooperative Extension Service for help in determining pond lime requirements.

## Harvesting

Fast-growing prawns can be removed from ponds as early as late August. A 1-inch bar mesh seine can be used for selective harvesting. Open areas can be "baited" with feed and seined approximately 20 to 30 minutes later. Time and labor involved with this type of partial harvesting may not be justified if prawns are to be sold rather than used for personal consumption.

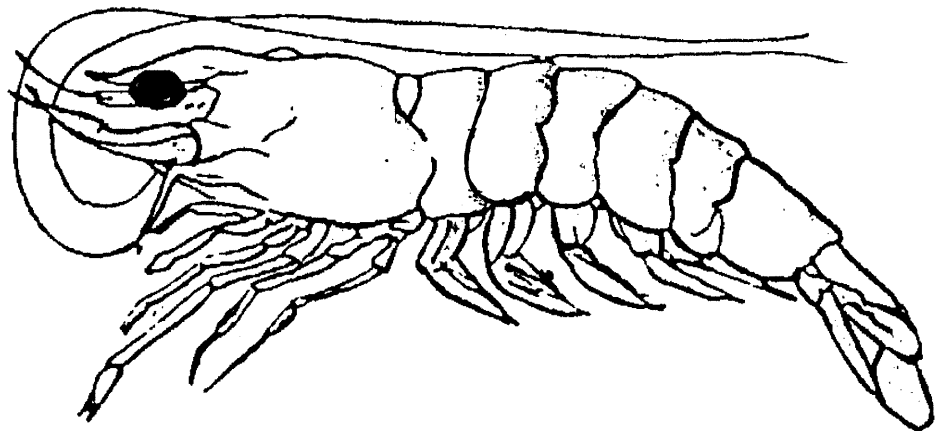
By mid- to late October, ponds must be completely harvested to avoid losing prawns to low temperatures. The water level should be lowered gradually to encourage prawns to congregate in the low end of the pond where they can be seined with a 1/2- to 1-inch bar mesh seine. Invariably, some will become stranded in low spots throughout the pond. These animals must be harvested with dip nets or by hand. Final harvest is accomplished by complete draining with a screen or net placed over the drain pipe.

Prawns should be rinsed in clean water for up to five minutes to remove mud and vegetation, then placed in ice water or an ice slush. Failure to immerse prawns in ice water within five minutes of harvest may lead to product quality problems such as discoloration and softness of tail meat.

## Summary

Technical and marketing problems face potential commercial producers of freshwater shrimp in Louisiana and elsewhere in the Southeast. Most problems stem from the tropical nature of this

species. At this time research data and practical experience indicate very limited potential for economic success. For further information on techniques and management involved in prawn production in tropical countries, consider obtaining a copy of Freshwater Prawn Farming: A Manual for the Culture of *Macrobrachium rosenbergii* by Michael B. New and Somsuk Singholka, FAO Fisheries Technical Paper No. 225; ISBN 92-5-101265-2. This publication can be ordered from the United Nations Food and Agriculture Organization, Via delle Terme di Caracalla, 00100 Rome, Italy.



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