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CULTURE OF SALTWATER SHRIMP

IN PANAMA

David B. Rouse

International Center for Aquaculture

Auburn University

Auburn, Alabama 36849

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Introduction

Shrimp culture in Panama began in 1974 when Agromarina, a subsidiary of Ralston Purina, began their operation with a series of experimental ponds near Aquadulce and a hatchery at Veracruz. On this visit, Agromarina had 600 ha of ponds in production and their hatchery was producing 12 million postlarvae per month. Agromarina's operation is considered by many to be the most successful shrimp culture operation in the world.

With the apparent success of Agromarina and news of the tremendous expansion of shrimp culture in Ecuador, many Panamanian companies are now getting into shrimp farming. The areas where shrimp are being cultured in Panama are located near the sea on the Pacific coast. The lands most suitable for culture are found from Panama City westward and south to the peninsula of Los Santos. These lands are called albinas and are flat lands with little vegetation, located between the coastal fringe of mangrove forest and the higher elevations covered with freshwater vegetation. Additional lands suitable for shrimp culture but at higher elevation are found in the province of Chirique near David. Estimates of total suitable acreage of albinas range from 14,000-19,600 ha. The area of suitable land at slightly higher evaluations called "tierra dulce" has not been determined.

Of the total area of albinas, some are presently used for salt production, some are in private ownership and not available for development and some have already been developed in shrimp ponds. One reliable source said that as little as 3,000 ha may actually be available for future development.

There are reported to be twelve shrimp farms operating in Panama. Although there was a large variation in pond design and culture techniques, there appears to be an effort to work together by many of the operators. In 1980, the Panamanian Association of Shrimp Producers was formed. Sr. Ruben Espanno, manager of Palangosta Shrimp farm in Aquadulce is chairman of the Association.

The national Government of Panama has also shown its support for the development of the industry. In 1979, the GOP through the National Aquaculture Directorate (DINAAC) constructed an Experimental Marine Station "Ing. Enrique Ensenat" in Aquadulce to provide research information for shrimp and other brackishwater organisms.

In December 1982, the GOP was also negotiating a loan of $12 million U.S. dollars with the Inter-American Development Bank (IDB) to further support the industry. The money would be available as low interest loans through the National Bank of Panama for shrimp farm construction and to construct a saltwater shrimp hatchery and maturation facility at Punta Chame and a combination laboratory/training facility at the Experimental Marine Station.

Present Culture Practices

There are three commercially important, white shrimps in Panama: *Penaeus occidentalis*, *P. stylirostris*, and *P. vannamei*. Shrimp farmers prefer the latter two species. The former species grows poorly in culture ponds but comprises the majority of shrimp in the commercial shrimping industry.

Shrimp ponds in Panama are usually constructed in a rectangular shape with dikes formed from soils either taken from the pond bottom or hauled in from adjacent areas. The most suitable sites are located in albina or salt flats. These albinas are lands that are inundated only during the spring or

highest tides, twice each lunar month and are usually connected to the sea by esteros or tidal creeks.

Pond bottoms are generally sloped toward a drain box or sluice gate. Pumping stations are located at or near the tidal creek and pump during daily high tides into a supply canal or reservoir. The incoming pumped water is filtered through screens in the sluice gate to eliminate predators and competitor fish. Ponds are usually arranged in a series along either side of the supply canal. There are usually drainage canals along each side of the deep end of the pond. Pond sizes range from 2-30 ha.

At least three of the new shrimp farms visited were constructed in what had once been mangrove forest. Although numberous papers have been written which document the environmental damages and the water quality problems which often occur in culture ponds as a result of this practice; the practice still occurs. This points out the need for more educational programs by marine extension agents of the DINAAC. Other shrimp farms visited, displayed excellent inovations in new pond designs and in corrective measures in older ponds.

One particular operation worth noting was owned by Sr. Xavier Perez in Punta Chame. Sr. Perez had no salina on which to construct ponds so instead of utilizing mangroves he constructed shrimp ponds in an upland area slightly above the mangroves using a stair step arrangement of ponds. He had a series of three ponds one built just below the other with each successive pond larger in size. He stocked small shrimp at $500/m^2$ in the first pond (nursery) for 45 days then released them into the next two ponds each for 45 days. The system was new and had not been fully tested but has an estimated production of 700 lbs (heads on) ha/45 days. A design similar to this had been very recently studied in Texas but had yet to be tested on a large scale. All shrimp growers, with the exception of Agromarina, must catch their seed stock from the

wild. After the highest tides of each lunar cycle, waters are trapped in natural ponds in the albinas. These small shrimp are then harvested with small mesh nets and taken to the farms. The abundance of small shrimp is seasonal with the largest numbers occurring during the dry season between December and May.

Nursery ponds are used by some growers. Stocking rates vary depending on management techniques. If supplemental feeds are added, a stocking rate of 75-150 post larval shrimp/m^2 may be used. If no additional feed is added to the pond, stocking rates of 25-50 shrimp/m^2 may be used. After 45-50 days in the nursery ponds, juvenile shrimp of 1-1.5 g are transferred to growout ponds. Stocking rates of juveniles are again dependant on management techniques. Some growers add very little additional nutrients and may only stock 1-2 shrimp/m^2 of pond area. Other growers may stock up to 4 or 5 shrimp/m^2 and add supplemental feeds.

The length of culture for each crop varies depending on climatic conditions and management techniques but usually ranges from 120-150 days. Production varies from 700 kg/ha/yr for some extensive operations to 2500 kg/ ha/yr for the more intensively managed operations.

There are presently two companies producing and selling shrimp feeds in Panama. Both companies use essentially the same ingredients and method of fabrication, ingredients and their final products are similar. They make a pellet of about 25% protein using fish meal as the primary protein constituent. Vitamins and ground whole grain are also a part of the formula. These pellets dissolve quickly in water and the particle size of the grain is large. These feeds might be graded average to poor in quality.

Harvesting as practiced in Panama is relatively simple. The pond water level is drawn down for several days before the harvest until only 25-30 cm of

water covers the bottom. A net is placed over the outlet side of the drain pipe. The remaining water and shrimp pass out of the pond and into the net. The water passes through the net while the shrimp are collected. The shrimp are usually placed in ice water on the pond bank immedately after harvest at which time the shrimp are transported to an area for deheading; they are then placed on ice again and sent to a processing plant.