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An Improved Strategy for Building Brackishwater Culture Ponds with Iron Pyrite Soils in Mangrove Swamps

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The problems associated with acid sulfate soil limit the potential utilization of vast coastal areas of mangrove swamps for brackishwater aquaculture. There is an estimated 4.8 million ha of mangrove area in the ASEAN countries alone. Until recently, most attempts to build earthen ponds in these areas have yielded poor results.

Aquatic Farms, as technical consultants for a 250 ha-prawn farm in Johore Peninsula, Malaysia, developed a construction technique that utilized the volcano-like burrow mounds of the mud lobster (*Thalassina anomala*) to cover and seal pond embankments that has minimized the culture problems usually experienced with iron pyrite soil. The strategy, pond design and construction technique are described. Pond dynamics and performance are discussed since the commencement of culture operations and these are compared with a nearby prawn farm that was constructed using conventional techniques. A cost benefit analysis is given in conclusion.

Penaeid Larval Culture Using Microencapsulated Diets

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Whilst it has been possible for many years to feed postlarval penaeids successfully on artificial diets, problems of nutrient leaching, particle breakdown, and water fouling have prevented the use of such diets for early planktonic larval stages. It has recently been demonstrated that the technique of microencapsulation may be used to overcome these problems. Live foods used for penaeid culture have been successfully replaced by microencapsulated diets, both in the laboratory and at the hatchery level. The technology has now reached the level at which dietary requirements of individual species can be met by the incorporation of specific nutrients. Capsules can be supplied to function either as complete nutrient delivery systems or as food supplements.

The present paper reviews this progress towards the total replacement of live foods in penaeid culture, and assesses the results of recent culture trials.

The Use of Microencapsulated Feeds to Replace Live Food Organisms in Shrimp Hatcheries

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An adequate supply of hatchery produced shrimp fry is the major constraint to the intensification and growth of shrimp culture practices. If even 20% of the more than 500,000 ha of the world's existing tropical and sub-tropical brackishwater ponds were to stock at the relatively low density of 50,000 fry/ha/year, it would take thousands of new hatcheries to produce the 25 billion fry required. The availability of artificially produced diets to replace cultured live food organisms would alleviate many of the problems currently limiting shrimp hatchery production by: (i) reducing the level of technical skill required to operate a hatchery; (ii) assuring a reliable supply of a nutritionally balanced larval feed; (iii) reducing sources of contamination and larval disease; and (iv) simplifying hatchery design and capital cost requirements, thereby facilitating small scale hatchery development.

Aquatic farms has been working with the Mars Microencapsulation Research Group (MMRG) to develop techniques for adapting current shrimp hatchery technology and design so that MMRG feeds can be used in existing hatcheries as a live feed replacement. Feeding trials have been conducted in commercial hatcheries in Hawaii, Malaysia and Thailand. The results of these trials and the techniques employed are discussed. Growth and survival of larvae fed microencapsulated diets as total or partial replacement of live foods was comparable to larvae cultured in control tanks using the standard operating procedures of the hatchery in which the trials were conducted. In trials to date, larval survival from nauplii to postlarvae has been as high as 70%.

The Response of *Penaeus monodon* Juveniles to Varying Protein/Energy Ratios in Test Diets

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The response of *Penaeus monodon* juveniles (0.71±0.11 g) to varying protein/energy ratios in test diets was determined. Purified diets consisting of different levels of protein, lipid and carbohydrates were formulated. Two sets of experiments were conducted with the following diet combinations: (1) 30, 30, 50% protein, 5, 10, 15% lipid and 0, 10, 20%