Sustainable *Artemia* pond production in coastal saltworks as a tool to solve aquaculture challenges

Van Hoa Nguyen, Thi Ngoc Anh Nguyen, Thi Hong Van Nguyen and Tran Huu Le

Department of Coastal Aquaculture, College of Aquaculture and Fisheries,
Can Tho University (CTU), Vietnam
E-mail: nvhoa@ctu.edu.vn

Recently, successful aquaculture meant to complete the cycle from hatchery to nursery and grow-out phases. The big challenge for the first phase is live foods as they provide substantial nutrients, enzymes for most of early shrimp/fish larval stages (Bardach *et al*., 1972; Goodwin, 1976; Kinne & Rosenthal, 1977). Nowadays, more than 80% of *Artemia* cysts have been used for marine shrimp hatcheries, but the main cyst source however comes from the wild (e.g. collected from salt lakes in USA, Russia, China) which are usually expensive and thus become bottle-necks to poor and developing countries. A successful story of *Artemia* farming in Vinh Chau (Vietnam) from introduction, adaptation of the original *Artemia* species (i.e. *Artemia franciscana* from solar saltworks in San Francisco, USA) to the new habitat (Vinh Chau), pond culture techniques and technology transfer to open out the possibility of fulfilling the need of *Artemia* cysts for local aquaculture development. In fact, the pond culture procedures of *Artemia* farming in solar saltworks in Vinh Chau through a so-called 'trial and error' to extensive - semi-intensive and intensive required a lot of efforts from indoor to outdoor application. As in the first phase, *Artemia* was stocked at a wider range of salinity (i.e. 60-150ppt) at appropriate evaporation ponds, low stocking density, direct feeding with manure or rice-bran lead the cyst production varied around 30-50kg wet weight/ha (in the period of 4 - 5 months in the dry season) (Vu Do Quynh, 1991; Brands, 1995; Nguyen Van Hoa *et al*., 2007); later on, it was found that *Artemia* could invade to any area where salinity met in the range of 80-120ppt (optimal range) and the key success as the fertilizer pond (kitchen pond) which needs at least 20-25% of the total culture area. Besides, the amount of manures and fertilizer had been fine-tuned according to the N:P ratio and the optimum rate of N:P varied from 3:1 to 5:1 (Nguyen Thi Ngoc Anh, 2009). Such a system was assigned as semi-intensive which could produce up to 70-90kg wet weight/ha. Recently, an intensive system for *Artemia* farming in Vinh Chau is being considered as an improvement of semi-intensive with the control in stocking density, pond level, aeration, supplementary feeding next to the biofloc technology application. The latest has been convinced not only to enhance cyst production as a whole but also to protect environment as less manures and fertilizers have been provided into the system. Thanks to the progress on *Artemia* farming technology in Vinh Chau and nowadays per hectare of solar saltwork could produce as high as 150-200kg wet weight/ha throughout the dry season. As the main solar saltworks in the Mekong Delta (Vietnam), Vinh Chau and Bac Lieu now could produce up to 50 tons (wet weight) of *Artemia* cysts per year and to be worth about USD 2-3 million. The most important issue is to sustain the local development of aquaculture activities as the cysts produced could be used for production of 7 billion of shrimp post larvae (PL), approximately.

Artemia farming in Vinh Chau is now to be considered as a new approach to generate higher income for poor salt-farmers (i.e. salt-farmers could increase their profit 3-5 fold compared to traditional salt production). At the time being next to the cysts, *Artemia* biomass is now being used for nurseries directly or incorporated as pellets for the grow-out phase of a number of shrimp/fish species.

Keywords:
Artemia culture, solar saltworks, culture model, environment protection.