

Studies into the Utilization of Pig Manure for Aquaculture in Central Vietnam

Nguyen Duy Quynh Tram
*Hue University of Agriculture and Forestry,
Hue City, Vietnam*

Introduction

Aquaculture is the cultivation of aquatic animals and plants. Its primary aim is to produce aquatic food organisms for human consumption, but includes other purposes such as the cultivation of ornamental and aquarium fishes (Egna, 1997). According to FAO (1995) the total capture fisheries of the world peaked at about 90 million metric tons in 1989 and so aquaculture will become increasingly important in the future. Aquaculture is usually sustainable because it normally makes use of locally available resources. Integration of aquaculture with other forms of agriculture diversifies farm productivity. This, in turn, provides opportunities for intensified production with more efficient allocation of land, water, labor, equipment and other limited inputs than enterprises which are independently operated. Stored pond water may serve as a catalyst for rural development because a variety of activities may be simultaneously undertaken. For example fish culture integrated with garden irrigation, livestock watering, and various domestic uses are all possible. (www.ag.auburn.edu/icaae/intraqua.htm).

Fresh water fish culture has in many ways with a diversification of cultured species (Grass Carp, Common Carp, Silver Carp, Bighead Carp, etc) and applied-aquaculture production systems (VAC system, fresh water fish culture in reservoirs, rice-fish culture system, running system, etc). Demand for aquaculture products for food and export is increasing and aquaculturists are trying to increase production in various ways. One technical application for the appropriate use of available resources to increase cultured fish production is fertilization. There are many kinds of potential fertilizers for fish pond fertilization, including inorganic fertilizer and organic fertilizer (manure, green fertilizer, sewage) in which manures from livestock are used more often. Farmers usually apply manure directly to the fish ponds, which is not appropriate as it causes water pollution, fish disease and eutrophication because of the high organic matter content. Livestock excreta are frequently a source of environmental pollution in intensive, specialized animal agriculture. In contrast, the efficient recycling of manure in integrated farming systems can lead to increased profits and reduced environmental damage. To solve the problem of pollution from animal excreta, there are several techniques that can be applied at present. The plastic biodigester is one of the most efficient technologies for small-scale animal farms because of its low cost, fast payback, simplicity and positive effect on pollution (Bui Xuan An, *et al.*, 1997) The main products from the biodigester are biogas and effluent, which is a potential fertilizer because the anaerobic digestion process results in conversion of organic nitrogen from manure to ionized ammonia (NH_4^+), which can be used directly by plant roots. Thus it has been found in Vietnam that effluent was a better fertilizer compared with raw manure for application to cassava and duckweed (Le Ha Chau, 1998), although there are few reports of trials to compare the two sources of plant nutrients. It is also important to note that biodigester effluent, as well as behaving as organic fertilizer, also contains the organic materials from the digestion of bacteria that fish can use as food to grow. Increased productivity in polyculture fish ponds when biodigester effluent, rather than manure, was used as fertilizer was reported by Han Yuqin and Ding Jieyi

(1984), and yields of fish were increased by 26% when the effluent was applied compared with the original manure.

However, organic wastes from livestock, plant and vegetable industries are becoming increasingly difficult and expensive to dispose of using conventional technology. Waste management using earthworms is an increasingly attractive option, with earthworms being commercially produced on a large scale using organic waste. To achieve this organic wastes from cattle and pigs may require solid separation from slurry, and poultry waste requires composting, washing or ageing to remove inorganic salts and ammonia. However, horse manure, paper waste, paper pulp solids, brewery waste and spent mushroom compost require no further modification. Urban waste including food scraps and grass clippings are suitable for earthworms, but are best fed after mulching and mixing to produce a uniform feed stock (Edwards and Bohlen, 1996). The worms themselves can also be fed to chickens as a high quality protein supplement (Rodríguez *et al.*, 1995). Earthworms are also important in improving the quality of soil by recycling decaying material, and are also a source of protein for other animals. The cultivation of earthworms using local resources such as livestock manure would seem to be a valuable intervention for the improvement of living standards of smallholders in the countryside. This research is aimed at finding the most suitable way of utilizing manure to develop fresh water fish culture and increase the incomes of rural people in Central Vietnam.