

# A STUDY ON PHYSICO-CHEMICAL CHARACTERISTICS OF AQUACULTURE POND SEDIMENTS AND ITS EFFECTIVE UTILIZATION FOR PLANT GROWTH

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## SUMMARY

The present study was focussed on the investigations on the physico-chemical characteristics of aquaculture pond sediments and its utilization for terrestrial agriculture, thereby reducing the pollution problems caused by pond aquaculture practices. For this study, sediments were collected from an aquaculture pond rearing *Heteropneustes fossilis* at Balaramapuram in Thiruvananthapuram district. Physico-chemical characteristics of sediments were determined. The sediment is acidic in nature, and the organic carbon, total nitrogen and potassium contents were very high. A pot experiment using plants to assess the nutrient status of aquaculture pond sediments was also conducted. Two species of plants i.e., *Vigna unguiculata* L. cv. KANAKAMONY and *Lycopersicon esculentum* Mill. cv. VIJAY were treated with different quantities of aquatic pond sediments. The effect of sediments on plant growth and physico-chemical characteristics of amended soils were also analyzed. The results revealed that pH, electrical conductivity, organic carbon, sodium and potassium contents were increased in amended soil after harvest compared to that of the garden soil. Biochemical analysis of plant leaves showed the increased synthesis of total proteins, carbohydrates and photosynthetic pigments in the plants grown in sediment amended soils. The combination of aquaculture sediment with potting mixture triggered the growth of plants. This study reveals the nutrient value of aquaculture pond sediments and the effective use of these sediments as a fertilizer / conditioner for land based agriculture.

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The practice of fish culture in shallow waste water sedimentation pond is quite popular. Aquaculture is now recognized as a major problem in fresh water, estuarine and coastal environment leading to eutrophication and ecosystem damage. Management of aquaculture pond sediments has become one of the most important environmental issues. The problem of pollution can be solved only through the change in our attitude to consider waste not as a nuisance and its disposal as a great problem. But it can be considered as a source material for various other useful activities.

Disposal of pond sediments to natural systems poses an environmental threat (Smith, 1996) and is a waste of valuable nutrients (Lin and Yi, 2003). Bonanni *et al.*, (1992) showed that sediments play an important role in the accumulation and regeneration of nutrients. Muendo (2006) reported the utility of pond sediment to fertilize crops. Although sediment accumulation and nutrient retention in pond sediments have been reported (Smith, 1996), quantitative data on sediment and nutrient accumulation in aquaculture ponds and its potential as an agricultural nutrient input is still minimal. Lack of scientific documentation on quantitative and qualitative aspects of

pond sediments hampers wider adoption and promotion of pond sediment use in agriculture.

The present investigation was undertaken to find out the physico-chemical characteristics of aquaculture sediment and to assess the morphological and physio-biochemical changes in plants grown in sediment amended soils.

## MATERIALS AND METHODS

Sediments were collected from an earthen aquaculture pond of size 9 m x 3 m x 1.8 m at Balaramapuram in Thiruvananthapuram Dist. (Kerala), during the month of October 2006 and analyzed for its physico-chemical properties using standard methods as recommended by APHA (1995) and Gupta (1999). Cowpea (*Vigna unguiculata* L. cv. KANAKAMONY) and tomato (*Lycopersicon esculentum* Mill. cv. VIJAY) were selected as test plants. Sixteen test plants of each variety (7 days old) were transplanted with two plants in each pot and were subjected to three different treatment combinations with 3 kg potting mixture containing garden soil, sand and cow dung in the ratio 1:1:1. Experimental design is given in Table 1.

Sediment treatment was done at two stages of plant growth. First treatment was at the time of transplantation