

NOTICE OF PUBLICATION

POND DYNAMICS/AQUACULTURE COLLABORATIVE RESEARCH SUPPORT PROGRAM



RESEARCH REPORTS

SUSTAINABLE AQUACULTURE FOR A SECURE FUTURE

Title: Recycling pond mud nutrients in integrated lotus–fish culture

Author(s): Yang Yi and C. Kwei Lin
Aquaculture and Aquatic Resources Management Agricultural and
Aquatic Systems and Engineering Program
School of Environment, Resources and Development
Asian Institute of Technology
PO Box 4, Klong Luang
Pathum Thani 12120, Thailand

James S. Diana
School of Natural Resources and Environment
University of Michigan
Ann Arbor, MI 48109-1115, USA

Date: 14 November 2002 **Publication Number:** CRSP Research Report 02-183

The CRSP will not be distributing this publication. Copies may be obtained by writing to the authors.

Abstract: An experiment was conducted in nine 200-m² fertilized earthen ponds at the Asian Institute of Technology, Thailand, during January–September 2000. This experiment was designed to assess the recovery of nutrients from pond mud by lotus (*Nelumbo nucifera*), to assess pond mud characteristics after lotus–fish co-culture, and to compare fish growth with and without lotus integration. There were three treatments in triplicate: (A) lotus–tilapia co-culture; (B) tilapia alone; (C) lotus alone. Seedlings (0.39 ± 0.09 kg) of Thai lotus variety were transplanted to ponds of the treatments with lotus (treatments A and C) at a density of 25 seedlings pond⁻¹, while sex-reversed all-male Nile tilapia (*Oreochromis niloticus*) fingerlings (8.6–10.3 g) were stocked at two fish per square meter in ponds of the treatments with tilapia (treatments A and B) when the water depth had been increased to 50 cm due to increasing lotus height. Ponds stocked with tilapia (treatments A and B) were fertilized weekly with urea and triple super phosphate (TSP) at a rate of 4 kg nitrogen (N) and 1 kg phosphorus (P)/ha/day after tilapia stocking. There was no fertilization in ponds of the lotus alone treatment. Lotus co-cultured with tilapia or cultured alone in ponds was able to effectively remove nutrients from old pond mud. Annual nutrient losses from mud in a 1-ha pond was about 2.4 ton N, and 1 ton P, among which about 300 kg N and 43 kg P were incorporated in

lotus biomass. There were no significant differences in lotus growth performance between the lotus-tilapia and lotus alone treatments, while Nile tilapia cultured alone grew significantly better than when co-cultured with lotus. The present experiment has demonstrated the effectiveness of nutrient removal from old pond mud by lotus and the feasibility of rotation and co-culture of lotus and Nile tilapia. Both systems can recycle nutrients effectively within ponds and are environmentally friendly culture systems.

This abstract was based on the original paper, which was published in *Aquaculture*, 212 (2002):213–226.