NOTICE OF PUBLICATION

AQUACULTURE COLLABORATIVE RESEARCH SUPPORT PROGRAM

RESEARCH REPORTS

Sustainable Aquaculture for a Secure Future

Title: Carbon Limitation in Fertilized Fish Ponds in Java

Author(s): C. D. McNabb and T. R. Batterson
Department of Fisheries and Wildlife
Michigan State University
East Lansing, Michigan 48823 USA

H. M. Eidman and Komar Sumantadinata
Institute Pertanin Bogor, Fakultas Perikanan
Jalan Raya Pajajaran
Bogor, West Java Indonesia

Date: 21 February 2006 Publication Number: CRSP Research Report 88-A2

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

Abstract: The backbone of Java consists of chain at some 25 major volcanic peaks. Among the peaks are ridges of uplifted limestone reefs. Groundwater and runoff from volcanic regions were mineral poor carbonate-bicarbonate alkalinity was on the order of 20 mg L^{-1}. By contrast, waster emerging from limestone regions had alkalinity near 160 mg L^{-1}. When phosphorus and nitrogen fertilizers were added to low alkalinity water in ponds in a volcanic region, the growth of algae and subsequent yield of Nile Tilapia were low: 1.1 g C m^{-1} day^{-1} and 1080 kg fish ha^{-1} per 150 day grow-out period respectively. With low alkalinity, carbon dioxide limited pond production, and phosphorus and nitrogen remained in pond water unused by the algae. When alkalinity was increased to 50-60 mg L^{-1} and fertilizer was applied at the same rate, algae productivity and fish yield increased to 1.5 g C m^{-2} day^{-1} and 1475 kg fish ha^{-1} per 150 day grow-out period. With increased abundance of CO_2 and increased growth of algae, phosphorus and nitrogen uptake from pond water increased, thus improving fertilizer efficiency. CO_2 continued to be in short supply at the highest levels of pond production obtained in the experiment. Fertilizer applied at the same rate to ponds in limestone drainage systems of Java with greater alkalinity would likely support pond productivity in excess of that obtained h ere. This work shows that CO_2 availability needs to be assessed during design of fertilizer application schemes in order to use fertilizers economically and to obtain consistent fertilizer-based yields from site to site in Java.

This abstract is excerpted from the original paper, which was in *Journal of the World Aquaculture Society*, 19:51A.

CRSP RESEARCH REPORTS are published as occasional papers by the Program Management Office, Aquaculture Collaborative Research Support Program, Oregon State University, 418 Snell Hall, Corvallis, Oregon 97331-1643 USA. The Aquaculture CRSP is supported by the US Agency for International Development under CRSP Grant No.: LAG-G-00-96-90015-00. See the website at <pdacrsp.orest.edu>.