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## RESEARCH REPORTS

Sustainable Aquaculture for a Secure Future

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**Title:** The effects of partially substituting Indian carps or adding silver carp on polycultures including small indigenous fish species (SIS)

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**Date:** 25 August 2017

Publication Number: AquaFish Research Report 08-A25

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**Abstract:** A sustainable semi-intensive pond aquaculture technology including major carp species (Indian, Chinese and common carp) as cash-crop and small indigenous fish species (SIS) as food for the farmers' families is being optimized in Bangladesh. Silver carp inclusion in the polyculture is now being considered, because this very efficient filter feeder has a strong impact on pond ecology and also on the farmers' family nutrition because it is a cheap fish that the family can afford to eat instead of selling. The present paper is centered on the reduction of silver carp negative effects on other species while keeping the advantages of increased total yield and income due to silver carp stocking. It presents the results of two experiments, one on-station and one on-farm, in which 3–5 silver carp/100 m<sup>2</sup> were added or partially substituted major carp filter feeders. The basic stocking density was 100 carps (rohu, catla and a bottom feeder, either mrigal or common carp, at a 1:1:1 ratio) and 250 SIS (punti and mola) per 100 m<sup>2</sup>. In the on-station experiment silver carp density was 3 and 5 fish/100 m<sup>2</sup> and the large carp bottom feeder was common carp. In the on-farm experiment silver carp density was 5 fish/100 m<sup>2</sup> and the bottom feeder was either common carp or mrigal.

Most of the water quality and fish performance parameters tested were not affected by the polyculture composition. Adding 3–5% silver carp or substituting 3–5% of the herbivorous fish species by this highly efficient filter feeder increased grazing pressure on the

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**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 < <http://pdacrsp.oregonstate.edu/> >.

phytoplankton, which led to a 25–40% reduction of the chlorophyll concentration in the water column. The increased grazing pressure was not enough to affect other water quality parameters and fewer effects on the availability of food for the other fish species occurred than when the silver carp addition was 10% of the polyculture, as reported in a previous work. The strong negative effects of silver carp on the other species of the polyculture and the higher total yields and income recorded in previous experiments with the addition of 10 silver carp/100 m<sup>2</sup> were much weaker and their expression depended on other pond conditions when 3 or 5 silver carp/100 m<sup>2</sup> were added or substituted the same number of rohu or catla, either when the bottom feeder was mrigal or common carp. It was concluded that stocking 3 silver carp/100 m<sup>2</sup> over the usual 100 large carp and 250 SIS /100 m<sup>2</sup> can be considered a ‘no effect’ stocking density in relation to the control without silver carp, while stocking 10 silver carp/100 m<sup>2</sup> should be preferred by farmers to keep the option of selling or consuming the silver carp.

This abstract was excerpted from the original paper, which was in the *Aquaculture* (2008), 279(1-4): 92–98.