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Sustainable Aquaculture for a Secure Future

Title: Effects of the filter feeder silver carp and the bottom feeders mrigal and common carp on small indigenous fish species (SIS) and pond ecology

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Abstract: A sustainable semi-intensive pond aquaculture technology including major carp species as cash-crop and small indigenous fish species (SIS) as food for the farmers' families is being optimized in Bangladesh. The inclusion of silver carp (*Hypophthalmichthys molitrix*), a cheap large species affordable by poor farmers, is now being considered. As part of a study on the effects of this filter feeder on polycultures including the SIS punti (*Puntius sophore*) and mola (*Amblypharyngodon mola*), an experiment was carried out in the ponds of the Bangladesh Agricultural University, Mymensingh, to test this fish effects in the presence of the bottom feeders either common carp (*Cyprinus carpio*) or mrigal (*Cirrhinus cirrhosus*) on production/reproduction of SIS, on the other fish species and on pond ecology. The data were analyzed using univariate and multivariate statistical techniques.

Reproduction of both SIS species occurred in all ponds, their fry numbers, weight and biomass at harvest not being affected either by silver carp or by the bottom feeder species. The addition of silver carp in mrigal ponds had a negative effect on both adult SIS, while its addition to carp ponds had a weaker negative effect on mola and a positive effect on punti. Common carp favoured mola growth and reduced punti survival. Silver carp performance was not affected by the species of bottom feeder present. Common carp performance was not affected by silver carp. Mrigal harvesting biomass and survival were not affected by silver carp, but its harvesting weight, growth rate and yield decreased respectively by 29%, 42% and 39% in its presence. Large carp and total harvested biomass and yields were over 50%

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higher when silver carp was also present. In the presence of silver carp, large carp and total yields were 20% higher in common carp ponds, while in its absence they were somewhat higher in mrigal ponds. The FCR calculated considering only the large fish were 10% higher in mrigal ponds. FCR calculated including all species were somewhat higher in common carp ponds without silver carp, and 35% higher in mrigal ponds with silver carp. The observed results are explained and discussed considering the feeding habits of each species, the natural food web, and the ecological processes developing in the ponds. The addition of silver carp did not reduce the income obtained from the cash-crop species and could contribute to the nutrition and/or extra income of the farmer's family. From the production and ecological point of views, addition of silver carp to common carp ponds is a better proposition than to add it to mrigal ponds.

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