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Sustainable Aquaculture for a Secure Future

Title: Effects of silver carp and small indigenous species on pond ecology and carp polycultures in Bangladesh

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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 large carps rohu (*Labeo rohita*), catla (*Catla catla*) and common carp (*Cyprinus carpio*) and the SIS punti (*Puntius sophore*) and mola (*Amblypharyngodon mola*), an experiment was carried out to test the effects of silver carp and of each SIS species on the growth, survival and yield of the large and small fish and on pond ecology.

The ecology of the ponds was dominated by changes in time, strongly related to the development of a surface plankton scum at the beginning of the culture season and weather conditions. The surface scum increased decomposition processes and decreased algal development in the water body, promoted photosynthesis and ammonium release and reduced nitrification. Over those effects, the presence of silver carp in the ponds decreased algal biomass through grazing and promoted nitrification providing and re-suspending particles in the water column. These effects were also produced by mola, but were evident only in the absence of silver carp. Punti stirring on the pond bottom increased nutrient flow from the sediments into the water column and promoted nitrification, but were also evident only in the absence of silver carp.

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The addition of 10 silver carp over the 99 large carps stocked in the 100 m² fishponds did not affect punti and mola reproduction in the ponds, negatively affected rohu and catla growth and yield by about 20–25% but not their survival, did not affect common carp performance, reduced punti harvested biomass by 10%, reduced mola performance by about 50%, and silver carp's own biomass increased total yield and total income in about 20% each. The addition of 250 mola or punti to the large carp polycultures did not affect the performance of any of the large carps. The decreased income from selling the more expensive large carps was more than compensated by that obtained from silver carp, which increased total income by 13–24% as compared to the corresponding treatments without silver carp. This allows the option to the farmer of selling part of the silver carp to complete the cash income that would have been obtained from large carps only if silver carp would not be stocked, and consume the rest with the family.

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