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Sustainable Aquaculture for a Secure Future

Title: Effects of intervention in the water column and/or pond bottom through species composition on polycultures of large carps and small indigenous species

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Abstract: In Bangladesh, a sustainable semi-intensive pond aquaculture technology including large carp species as cash-crop and small indigenous fish species (SIS) as food for the farmers' families is being optimized. The present paper is on the effects on fish performance and pond ecology of interfering in the water column and/or on the bottom through changes in the polyculture composition. The Control polyculture was the 'no-effect' combination consisting of the traditional 33 rohu–33 catla–34 common carp stocking with the addition of 250 SIS and 3 silver carp per 100 m² of pond, as resulted from a previous experiment. Interferences on the water column were achieved by changing the density of the herbivorous fish (reducing the density of catla to 24/100 m² and increasing that of silver carp to 12/100 m²), and on the bottom by doing so on the benthophagous fish (replacing 10/100 m² common carp by the same amount of mrigal). Mola was the SIS included in the polyculture. Interfering in the water column and/or in the pond bottom through the polyculture composition produced complex responses in the pond ecosystem affecting the large carps' performances, while it did not significantly affect the reproduction and the harvested biomass of the small fish mola. Relationships among the different fish species and the environment are described for each polyculture. The four polycultures tested allowed a good production of large carp species as cash-crop, of silver carp as an option to consume or to sell, and of the small species mola as food for the farmers' families. The Control polyculture is appropriate to produce relatively large herbivorous species, mainly silver carp. The

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polyculture combination in the Water treatment is appropriate to obtain a larger amount of smaller silver carp that can be afforded by the poor people but also smaller rohu and catla, while maintaining the same level of total yield and income with reduced feed conversion ratio (FCR) than in the Control treatment. The polyculture combination in the Bottom treatment allowed a larger fish species diversity and also produced smaller herbivorous fish with still reduced FCR, while maintaining the same level of total yield and income than the Control treatment. The polyculture combination in the Water & Bottom treatment gave the best results: it allowed a larger fish species diversity, is appropriate to obtain a larger amount of small silver carp that can be afforded by the poor people, and gives the highest total yield and income with the lowest FCR.

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