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AQUACULTURE & FISHERIES INNOVATION LAB

## RESEARCH REPORTS

Sustainable Aquaculture for a Secure Future

**Title:** Production of periphyton to enhance yield in polyculture ponds with carps and small indigenous species

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**Abstract:** Although carp polyculture is well established throughout southern Asia, its overall efficiency in providing sufficient nutrients and financial profit remains variable. Site-specific adjustments are needed to improve efficiencies of polyculture under local circumstances. We evaluated variations of carp polyculture systems in two separate trials: one on a research station (on-station), and one in farmers' ponds (on-farm). The on-station experiment included four treatments: TF (carp + 100% feed), TFS (carp + SIS (small indigenous species) + 100% feed), TFSP (carp + SIS + 50% feed + bamboo substrate) and TSP (carp + SIS + bamboo substrate with no feed), each done with three replicates. Silver carp (*Hypophthalmichthys molitrix*), bighead carp (*Aristichthys nobilis*), grass carp (*Ctenopharyngodon idella*), common carp (*Cyprinus carpio*), rohu (*Labeo rohita*), and mrigal (*Cirrhinus mrigala*) were stocked at a ratio of 4:1:4:3:5:5 and a rate of 15,000 fish/ha. Additionally, 2 SIS, dedhuwa (*Esomus danricus*) and pothi (*Puntius sophore*), were stocked at 1:1 and a combined density of 50,000 fish/ha. Carps were fed daily at 5% of body weight (BW) for 60 days, then 2% BW for 150 days, using a supplemental feed composed of dough (mustard oil cake and rice bran (1:1)), or using grass (for grass carp). Total carp yield and FCR were highest in TFSP ponds. Gross margin was also higher in treatments enhanced with

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periphyton (TFSP and TSP). Overall, TFSP was determined the best on-station result, based on total production of fish and profit. The two treatments with the highest net fish yield, TF and TFSP, were introduced to 37 women farmers in Chitwan and Nawalparasi districts for on-farm trials. After 8 months of culture, total fish weight and gross margin were 24.0% and 51.2% higher, respectively, in TFSP ponds than in TF ponds. Reduced feed application with increased periphyton enhancement dramatically improved profit while maintaining fish yields similar to those of traditional polyculture systems with full feeding.

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