IMPROVEMENT OF CARPS-POLYCULTURE SYSTEM TO INCREASE YIELD AND PROFIT

AQUA FISH INNOVATION LAB

Carps polyculture?

Culture of 6-7 species of Asian carps together in a pond with fertilization and supplemental feed is a common and established culture system for small and medium-scale farmers. It is a semi-intensive natural food based system with or without supplemental feed. The carp species include common carp (*Cyprinus carpio*), silver carp (*Hypophthalmichthys molitrix*), bighead carp (*Aristichthys nobilis*), grass carp (*Ctenopharyngodon idella}*, rohu (*Labeo rohita*) and mrigal (*Cirrhinus mrigala*). All the species are stocked in certain ratio as available with a total stocking of 10,000 fingerlings per hectare and cultured for 8-10 months with a range 3.0 - 3.5 t. ha^{-1} of productions.

Common carp

Silver carp

Bighead carp

Grass carp

Rohu

Mrigal

Carps-tilapia-sahar polyculture?

AquaFish innovation lab in collaboration with Aquaculture and Fisheries Program of Agriculture and Forestry University, Nepal promoted research on mixed-sex Nile tilapia (*Oreochromis niloticus*) and sahar (*Tor putitora*).

Nile tilapia

Sahar

We recently completed experiments to enhance carps polyculture production incorporating tilapia and sahar in existing system of carps-polyculture pond with no added inputs. Since tilapias consume plankton, they will also improve water quality in ponds and in effluents at harvest. Such improvements in water quality, larger economic gain, and production of fish with no further inputs enhance the sustainability of an aquaculture system environmentally and economically. Sahar controls tilapia recruits restricting over population in the pond. Additionally, sahar are an endangered species (IUCN 2016), so any success in rearing them will either relieve pressure on wild populations as a food source or will be used to supplement wild populations by stocking, again worthy goals to improve sustainability of aquaculture in Nepal.

Yield and Profit:

The addition of tilapia (3000/ha) and sahar (1000/ha) into the existing carps production system could increase yield by 30% and profit margin by 81% (Table 1 and 2).

Table 1. Comparison between carps polyculture and carps-tilapia-sahar polyculture (on-station results)

Parameter	Carps polyculture	Carps-tilapia-sahar polyculture
Mean Extrapolated GFY ($t.ha^{-1}year^{-1}$)		
Carps	3.13	3.33
Tilapia	-	0.45
Sahar	-	0.14
Combined	3.13	3.93*
Including Tilapia Recruits		4.04
Mean Extrapolated NFY ($t.ha^{-1}year^{-1}$)	3.05	3.93*
Food Conversion Ratio (FCR)	2.53	2.41
Overall Survival (%)	81.2	80.5
Gross Margin (NRs/ha)	130,000	236,000*
Gross Margin(USD/ha)	1300	2360*

*Significantly high value at ($p<0.05$)

Table 2. Comparison between carps polyculture and carps-tilapia-sahar polyculture (farmer's ponds results)

Parameter	Carps polyculture	Carps-tilapia-sahar polyculture
Mean Gross Fish Yield ($t.ha^{-1}year^{-1}$)	4.41	5.80*
Mean Net Fish Yield ($t.ha^{-1}year^{-1}$)	4.21	5.60*
Overall Survival (%)	74.0	89.9*
Food Conversion Ratio (FCR)	2.61	2.20
Gross Margin (NRs/ha)	180,000	322,000*
Gross Margin (USD/ha)	1800	3220*

*Significantly high value at ($p<0.05$)


Nile tilapia


Grass carp


Common carp


Silver and Bighead carp


Fish harvest

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