

Lecture:1: Major species cultures, Freshwater aquaculture resources-pond, lakes, tanks, Reservoir etc.

Aquaculture resources India is blessed with rich natural sources for enhancing freshwater aquaculture production: 2.42 million ha of ponds and tanks; 1.07 million ha of beels, jheels and derelict waters; 0.12 million km of canals; 3.15 million ha of reservoirs and 0.72 million ha of upland lakes. Only around 35% of ponds and tanks are being used currently for aquaculture. Small and marginal farmers, especially in eastern India have ponds of less than 1 ha and are typically homestead ones.

Carp Site-specific input availability and monitoring capacity of farmer to invest, influences the type of culture systems adopted in various regions. In extensive aquaculture system, inputs are limited but for the seed stocked. It harnesses natural productivity. On the other hand in semi-intensive system, fertilisation and feeding are adopted to enhance productivity. Information is available on composite carp culture; sewage-fed fish culture; weed-based carp polyculture; biogas slurry-fed fish culture; integrated fish farming with poultry, pigs, ducks and horticulture, as well as pen culture. The optimum achievable production rates of 3-6 t ha⁻¹yr⁻¹ are standardised. Intensive culture systems like cage culture and running-water fish culture have given productions of 10-15 and 20-50 kg m⁻² yr⁻¹ respectively. Carp culture is practiced as polyculture of the three IMCs (catla, rohu and mrigal) as well as composite carp culture of the three IMCs with the three exotic carps (silver carp, grass carp and common carp).

Standard practices in carp culture include: (i) Stocking at combined densities of 4,000-10,000 fingerlings ha⁻¹; (ii) Pond fertilisation with organic manures from cattle or poultry as well as inorganic fertilisers like urea and single super phosphate and (iii) Supplementary feeding using a mixture of rice bran/wheat bran and groundnut/mustard oilcake in equal ratio. The three IMCs, namely catla (*C. catla*), rohu (*L. rohita*) and mrigal (*C. mrigala*) contribute the bulk of production to the extent of 70 to 75% of the total freshwater fish production, followed by exotic carps comprising silver

carp, grass carp and common carp forming the second important group contributing to the balance 25 to 30% (FAO, 2017).

Despite the fact that the country also possesses several other cultivable medium and minor carp species which show high regional demand, including *L. calbasu*, *L. fimbriatus*, *L. gonius*, *L. bata*, *L. ariza*, *Puntius sarana*, *Hypselobarbus pulchellus*, *H. kolus* and *Amblypharyngodon mola* as well as several others, commercial farming of these species has been almost non-existent or picking-up slowly. These medium sized carps have initial higher growth rate and market. These species can be considered as more suitable for the utilisation of seasonal ponds, which have 5-6 months of water retention. Over the years, incorporation levels of the various species of minor carps and barbs in the IMC based grow-out polyculture system have been standardised.

Catfishes : Pond culture of catfish involves mainly magur (*Clarias magur*) and singhi (*Heteropneustes fossilis*) and is practiced in states like Assam, Bihar, West Bengal and Odisha. Though modern farming techniques for these species advocates monoculture at stocking densities of 20,000-50,000 fingerlings ha⁻¹, inadequate availability of juveniles has restricted these as a component in carp polyculture systems. Considering the high market demand for catfish and the availability of a huge potential resource in the form of swamps and derelict waters, commercial farming of these species is being given important attention at present.

Magur (*Clarias magur*) attains a marketable size of 100-120 g in a period of 7-8 months of culture. Average production of 3-4 t ha⁻¹ magur can be achieved in 8 months culture period. Polyculture of non-air breathing catfishes like *Pangasius pangasius*, *Wallago attu*, *Sperata seenghala*, *S. aor* and *Ompok pabda* is being attempted in recent years.

During 2008- 2010 phenomenal growth was shown in the culture of exotic catfish pangas, *Pangasianodon hypophthalmus*. Production levels of the species ranges from around 15 to 50 t ha⁻¹ yr⁻¹ (Jayasankar and Giri, 2013). Culture of butter catfish *O. pabda* has been successfully practiced in West Bengal and Tripura. Availability of seed is a huge constraint,

followed by high mortality in larval rearing phase, lack of larval and grow-out feed. Aquatic insects and their larvae are the favourite natural feed; supplementary fish meal-based feed needs 30% protein.

Other finfishes Climbing perch (*Anabas testudineus*), murrels (*Channa striatus* and *C. marulius*) and tilapia (*Oreochromis mossambicus* and *O. niloticus*) are other important finfishes which have great potential for commercial aquaculture in India.

A. testudineus has good market demand in states like West Bengal, Tripura, Assam, Manipur, Jharkhand, Bihar, Odisha and Kerala. Climbing perch is a potential species for culture with high economic value and consumer preference. It also has high medicinal and nutritive value. Like pabda, major constraints for culture are nonavailability of seed, high mortality in larval rearing phase as well as lack of larval and grow-out feed. Experiments at ICAR-CIFA showed production up to 1.2 t ha⁻¹ yr⁻¹, with fish attaining marketable size of 50-60 g in one year.

Murrels fetch a high price in many states like Punjab, Haryana, Madhya Pradesh, Bihar, Uttar Pradesh, Andhra Pradesh, Karnataka, Tamil Nadu and all North-Eastern States. They are highly preferred because of the flavour, meaty flesh and less intramuscular bones.

Freshwater prawn Successful breeding and larval rearing of the giant river prawn *M. rosenbergii* and the monsoon river prawn *M. malcolmsonii* provide scope for the farmers to diversify their culture. *M. rosenbergii* is the largest and fastest growing species being farmed and possesses considerable demand both in domestic and international markets. *M. rosenbergii* is cultured either alone or in combination with carps. Monoculture of giant river prawn is mostly confined to earthen ponds with moderate stocking densities of 20,000-50,000 ha⁻¹. Fertilisation and supplementary feeding can result in a moderate yield of 600-1,500 kg ha⁻¹ in 8 months using single stocking and both single/multiple harvesting. Polyculture of freshwater prawn juveniles at 10,000-15,000 ha⁻¹ alongside carp at 3,000-4,000 ha⁻¹ has also been demonstrated to be economically viable.