

Composite fish culture

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Carp culture is a highly economic and profitable enterprise. Among many fish farming practices, the composite fish culture is one, which a common fish farmer can easily adopt with comparatively less investment to have more production and income than the traditional farming practice. Efforts are being made through Assam Agricultural Competitiveness Project (AACP) to increase fish production rates to a level of over 4000 kg/ha/yr. than around 1200 kg/ha/yr. as traditionally achieved.

The common practice of composite culture includes 6 species of carps (3 indigenous and 3 exotic fishes) viz. Catla, Rohu, Mrigal, Silver carp, Grass carp and Common carp. Generally, the species ratio is 30-40 % surface feeder; 15-20% column feeder, 40-50% bottom feeder and 5-15% macro vegetation feeder depending upon the depth and productivity status of the pond.

There are 3 management practices generally adopted for table fish production. These are:

1. Pre-stocking management
2. Management at the time of stocking and
3. Post stocking management

PRE-STOCKING MANAGEMENT

(a) Application of Lim:

Lime is an essential component in fish farming practice. When applied in proper dose, it help in releasing primary nutrients and trace elements from the soil to maximize productivity. For effective utilization of lime, ponds are required to be dewatered which help in drying the pond bottom, killing of disease causing parasitic organisms. It is essential to remove predatory fish & weed from the pond. Basal dose of lime is applied to correct soil acidity. The basal of lime is applied to correct soil acidity. The basal, monthly and annual requirement of lime is indicated below:

Basal Dosage of lime (kg/ha)	Month Dosage (kg/ha)	Annual lime requirement (kg/ha)
200	65	800

(b) Application of Manure :

Manure is also essential in fish farming practices to increase pond productivity. Cowdung, the commonly available organic manure in raw form is applied @ 15 tons/ha/yr to enhance natural food productivity. 25% is applied as basal dose atleast 10-15 days prior to stocking of fish. Daily application of manure throughout the pond or atleast in the four corners is advocated as per following rate:

Basal Dosage of lime (kg/ha)	Daily Dosage (kg/ha)	Annual Cow dung requirement (kg/ha)
3750	45	15000

In addition to application of organic manure inorganic fertilizer applied to trigger natural fish food production. Fertilizer is applied on monthly basis at the following rates :

Monthly Dosage (kg/ha)		Annual rate of application	
Urea	Sing Super Phosphate	Urea	Single Super Phosphate
24	30	240	300

However, the monthly dose may be equally divided into daily dose to have regular natural food production resulting in achieving better production of fish.

Stocking of Seed:

Species	SSSH		SSMH		MSMH			
	% Composition	Number/ha	% Composition	Number/ha	1 st phase	2 nd phase	1 st phase	2 nd phase
					% Composition	Number/ha	% Composition	Number/ha
Silver Carp	15	900	10	1000	10	1200	10	300
Catla	25	1500	25	2500	25	3000	25	750
Rohu/ Gonius/ Calbasu	20	1200	30	3000	30	3600	30	900
Grass Carp	10	600	5	500	5	600	5	150
Mrigal	20	1200	20	2000	20	2400	20	600
Common carp	10	600	10	1000	10	1200	10	300
Total	100	6000	100	10000	100	12000	100	3000

Fingerling (125-150 mm ie. 5-6 inches) combination of 6-8 carp species may be stocked at the densities mentioned below:

POST STOCKING MANAGEMENT:

(a) Application of Supplementary Feed:

Supplementary feed is a very essential input in culture fisheries because natural food available in a pond is insufficient for rapid growth and higher production of fish. The supplementary feed comprising rice polish, mustard oil cake, agrimin, vitamin, mineral mixtures etc are provided to the pond by placing in the four corners of the pond or provided in the tray mooring in a bamboo pole placed in the pond, to minimize wastage of feed which covers around 50% of the recurring cost per annum. The feed is provided two times in equal amount-in the morning and in the afternoon@ 2-3% of their body weight. The feeding schedule to be practiced is as follows:

Feeding Schedule: (A)

Month	Single stocking single harvesting (SSSH)				Single stocking multiple harvesting (SSMH)			
	Stocking Density	% Body Weight	Feed Quantity kg/ha/day	Feed Quantity kg/ha/Month	Stocking Density	% Body Weight	Feed Quantity kg/ha/day	Feed Quantity kg/ha/Month
1	6,000	2.5	4.00	120	10,000	3.0	7.5	225
2	5,400	2.0	5.50	165	9,000*	2.5	10.5	315
3	5,400	1.5	8.00	240	9,000	2.5	20.0	600
4	5,400	1.5	15.00	450	9,000	2.0	25.0	750
5	5,400	1.5	24.00	720	9,000	2.0	40.0	1200
6	5,400	1.0	26.00	780	9,000	1.5	50.0	1500
7	5,400	1.0	30.00	900	5,500**	1.5	40.0	1200
8	5,400	0.5	18.00	540	5,500	1.0	35.0	1050
9	5,400	0.5	18.00	540	5,500	0.5	20.0	600
10	5,400	0.5	18.16	545	5,500	0.5	20.3	610
	Total feed				5000 kg			
					8050 kg			

* Considering 10% initial mortality ** Sale of 40% fishes attaining a growth of around 400 gm in case of SSMH

Feeding Schedule: (B)

Month	Multiple Stocking-Multiple Harvesting (MSMH) : First Phase				Multiple Stocking-Multiple Harvesting (MSMH) : Second Phase			
	1	12,000	2.5	7.5	225	3000	2.5	2.0
2	10,800*	2.0	11.0	330	2700	1.5	2.0	60
3	10,800	2.0	19.0	570	2700	1.0	2.5	75
4	10,800	2.0	19.0	570	2700	1.0	2.5	75
5	10,800	1.0	26.0	780	2700a	0.5	2.5	75
6	6480**	1.0	23.0	690				
7	6480	1.0	30.0	900				
8	6480	0.5	17.5	525				
9	4860#	0.5	14.5	435				
10	4860	0.5	15.5	465				
	Total feed			5,670 kg				330 kg

* Considering 10% initial mortality *Sale of 40% fishes attaining a growth of around 400 gm
35% Harvesting = approx. 950 kg (1st phase) & Harvesting = 650 kg (2nd phase)

(b) Health care & Pond Hygiene Maintenance:

Before releasing the fingerlings, a dip treatment for 1 minute should be given with 3% KMnO₄ (potassium Permanganate) using water from the stocking pond. Alternatively 2 to 3% common salt solution may also be used. In case of any parasitic infestation like Argulus sp, malathion @ 0.25-0.5 ppm 3-4 times at weekly interval can completely eliminate the parasite. Test netting must be carried out periodically for ensuring growth and health status of the cultured fishes once in a month. CIFAX or WS Sukrena should be used at 0.01 ppm or @ 1 liter/ha-meter in water as prophylactic measure against Eqizootic Ulcerative Syndrome for reducing the stress factors by increasing pH, total alkalinity and total hardness of water. Therapeutic application of CaO @ 100 kg/ha depending upon the pH status of water is effective in checking the spread of disease when initial symptoms of EUS is seen. Application of CaO should follow only after one week of application of bleaching powder @ 1 mg/liter. Application of 2% solution of Common salt (NaCl) not only kills several disease organisms but may also have positive effects on the fish by stimulating appetite and increasing mucus secretion and improving resistance to handling. Excess levels, however, may stress the fish. The three main causes of diseases are:

- I. Improper and insufficient feeding.
- II. Stress through extremes or toxic condition.
- III. Attack by disease organisms.

The points to be considered for keeping the fish healthy are :

- (i) Proper hygienic conditions should be maintained in the farm.
- (ii) Test netting should be done at monthly interval for monitoring disease and growth.
- (iii) Behaviour of fish should be observed every morning.

Control of algal bloom :

To control the bloom, following steps have to be taken to maintain hygiene of the pond:

- (i) Suspension of fertilization.
- (ii) Suspension of supplementary feeding.

- (iii) Prevention of light penetration: Light penetration into the pond is prevented in order to stop photosynthesis of phytoplankton by a temporary vegetative cover on the pond surface. Floating aquatic weeds such as water hyacinth, Pistia etc. are used for this purpose.
- (iv) Reducing nutrients in pond water: Introduction of aquatic macrophytes such as water hyacinth, Pistia etc. can reduce the nutrient level in pond water thus discouraging multiplication of phytoplankton.

Annual Work Calendar:

The Annual Work Calendar for proper management under semi-intensive composite fish culture activity is outlined below:

Year round activity Schedule

MONTH	ACTIVITIES	REMARKS
	PRE-STOCKING MANAGEMENT	
FEB to MAR	Weed clearance, Dewatering and removal of unwanted fish.	
MAR to APR	Dyke repairing side slope maintenance, embankment repair, bottom soil correction by application of lime and application of basal dosage of organic manure after 7-10 days of application of lime.	$\frac{1}{4}$ th or 25% of the quantity of lime and cow dung in pond bed as basal dosage. Maintain side slope as per the soil texture.
APR to MAY	Stocking of Seed (fingerlings): Supplementary feeding Liming. Manuring and fertilization. Keep embankment clean. Test netting Fish Health monitoring	Daily supplementary feeding with Rice polish and Mustard Oil cake. Feed chopped grasses to Grass carp.
	POST STOCKING MANAGEMENT:	
MAY to JUN	Liming Supplementary feeding Manuring and fertilization. Keep embankment clean. Test netting. Fish Health monitoring.	Supplementary feeding with Rice polish and Mustard Oil cake on daily basis. Chopped grasses to Grass carp.
JUN to JULY	Liming Supplementary feeding Manuring and fertilization. Keep embankment clean. Test netting. Fish Health monitoring.	Supplementary feeding with Rice polish and Mustard Oil cake on daily basis. Chopped grasses to Grass carp.
AUG to SEP	Liming Supplementary feeding Manuring and fertilization. Keep embankment clean. Control algal bloom. Test netting. Partial Harvesting Fish Health monitoring.	Supplementary feeding with Rice polish and Mustard Oil cake on daily basis. Chopped grasses to Grass carp. Partial Harvesting 40% out of the total fingerling stocked only in case of MSMH
SEP to OCT	Liming Supplementary feeding Manuring and fertilization. Control algal bloom. Test netting. Fish Health monitoring.	Supplementary feeding with Rice polish and Mustard Oil cake on daily basis. Chopped grasses to Grass carp.
OCT to NOV	Liming Supplementary feeding. Manuring and fertilization. Control algal bloom. Test netting Fish Health monitoring. Partial Harvesting	Supplementary feeding with Rice polish and Mustard Oil cake on daily basis. Chopped grasses to Grass carp. Partial Harvesting 40% of the total fingerlings stocked in case of SSMH and 25% of the total fingerlings stocked in case of MSMH

NOV to DEC	Liming Supplementary feeding Control algal bloom. Manuring and fertilization. Test netting. Fish Health monitoring	Supplementary feeding with Rice polish and Mustard Oil cake on daily basis. Chopped grasses to Grass carp.
DEC to JAN	Liming Supplementary feeding Control algal bloom. Manuring and fertilization. Test netting. Fish Health monitoring.	Supplementary feeding with Rice polish and Mustard Oil cake on daily basis. Chopped grasses to Grass carp.
JAN to FEB	Liming Supplementary feeding Manuring and fertilization. Control algal bloom. Test netting. Fish Health monitoring	Supplementary feeding with Rice polish and Mustard Oil cake on daily basis. Chopped grasses to Grass carp.
FEB to MAR	Supplementary feeding Control algal bloom. Fish Health monitoring Final Harvesting.	Harvesting remaining fingerlings stocked in case of MSMH &

Note : Fertilization with organic manure is followed after 7-10 days of application of lime. Inorganic fertilizer is applied after 15 days of application of organic manure. Stocking with required number of fish seed is done after 7 days of application of basal dose of organic manure. There must be a minimum stabilization time of 7 days for neutralization of organic acids released during decomposition of organic manure.

Scheme-wise Expenditure, Production & Income:

Sl	Culture Method	Input Cost (Rs./ha/Year)	Production		Net Profit (Rs.)
			(Kg/ha/Year)	Income (Rs.)	
1	Single Stocking Single Harvesting	79,000/-	4500	2,25,000/-	1,46,000/-
2	Single Stocking Multiple Harvesting	1,14,000/-	5500	2,75,000/-	1,61,000/-
3	Multiple Stocking Multiple Harvesting	1,13,000/-	6000	3,00,000/-	1,87,000/-

It is establish that the fish culture is a highly profitable venture. The unemployed youth of our state may go for fish culture practices to earn their livelihood by adopting improved method of fish farming.