

## Rural Farmers Can Produce Fish-Seeds to Meet-up Their Requirement: Understanding the Process

The non-availability of the major carps fish seeds for ready stocking in fish ponds was the prime barrier in fish farming as they do not breed in confined waters. Fishes breed in flooded condition of rivers in shallower stretches having beds of aquatic weeds during monsoon when temperature is quite low. Collection of fish spawns i.e. fish babies was the only source of fish seeds-these were the combined varieties of wanted & unwanted species and not found suitable for profitable fish culture. Further, the demand was more than the collection of fish-seeds and ultimately the water areas were under stocking.

To overcome this problem, the “**Induced Breeding / Hypophysation Technique**” has been developed. Initially pituitary glands of mature fishes were used to induce the fish for spawning. The secreted hormones from pituitary gland stimulate growth, development, maturity and ovulation of eggs. Through series of research & development, a good numbers of hormonal products have been identified that are injectable through handy vial form (Ovaprim, Ovatide, Gonopro etc.). These are readily available in the market and make the breeding easy.

### Steps toward Fish Breeding:

#### A. Procurement of materials

1. **Collection of Pituitary Gland/ Injectable Hormones & its Preservation-** Pituitary Glands of immature or spent fishes do not give satisfactory results and hence matured fishes should be used. The best time for collection of pituitary glands of major carps is from the month of May to July.

Immediately after collection, the glands are put in absolute alcohol for de-fattening and dehydration. These are washed 24 hours using absolute alcohol and kept again in fresh absolute alcohol & stored in a refrigerator or in pond mud in case of wax-sealed condition.

The marketed hormones in injectable vials (Ovaprim, Ovatide, Gonopro etc.) are to be procured by May & stored in refrigerators in a darker place.

2. **Keeping Brood Fishes in live condition-** Indian Major carps that 3 years old are to be marked & kept ready in a pond. Proper feeding is to be maintained & periodic health check-up is to be made regularly. The importance for selection of brood fishes on the basis of weight is also to be maintained:

Catla : Not below 2.0 Kgs.

Rohu : Not below 1.25 Kgs.

Mrigala/Kalibasu : Not below 1.0 Kgs.

Bata : Not below 0.4 Kgs.

3. **Breeding Hapa & Outer Hatching Hapa-** At least 3 Nos. of Breeding Hapa are to be made from soft synthetic mosquito net cloth (Size : 9' x 6' x 6', just like a 4 sides covering mosquito net having a slit of 2'ft on top for slipping the injected fishes in) and 15 Nos. of Outer Hatching Hapas made from cotton long/markin cloth (Size : 7'x 5' x 4' ; just like mosquito net) are to be made ready by Mid May. Breeding Hapa for releasing the injected fish to breed and Outer Hatching Hapa is for spreading the fertilized eggs on the inner floor of Hapa to get hatchlings from eggs.
4. **Bamboo poles-** 80 Nos. of size of 9' long & 10" diameter to fix all sorts of Hapas in the pond water.
5. **Jute & cotton threads-**Jute threads are needed for tying up the Hapas in pond water with Bamboo poles (0.5 kgs.) and cotton thread for sewing the slits of Breeding Hapa to prevent the escape of brood fishes from Hapa (1 coarse crochet roll).

6. **Bucket & Mug-** 2 Nos. buckets of 17.0 litres & 2 Nos. Mugs of 0.5 litres are needed for shifting eggs from Breeding Hapa to Outer Hapas.
7. **Weighing Balance** - 1 No. to weigh the Brood fishes.
8. **Jute Gunny Bags to prepare a bed-** 2 Nos. Gunny bags are needed to prepare a bed for fish by folding the bags against the foam bed as it is needed when the fish is injected.
9. **Hand nets-** 6 Nos. are required for weighing the brood fishes & releasing the same in Breeding Hapa.
10. **Pituitary Gland weighing & extract tools-** Chemical Balance :1 No. to weigh Pituitary Gland, Tissue homogenizer : 2 Nos., Centrifuging Machine : 1 No., Centrifuge Tubes : 6 Nos.
11. **Injection Syringes & needles-** 3 Nos.
12. **Enamel Tray-** To keep samples of fertilized eggs to examine the % of hatchings
13. **Magnifying Glass-** To identify the stages of development of fertilized eggs & hatchlings.
14. **Torch-** 1 No.
15. **Glass Beaker-** 10ml- 1No. , 20ml – 1 No. , 50ml -1 No.
16. **Distill water-** 5ml. Ample-2 Nos.
17. **Aluminum Hundi-** 35-40 litres, 3 Nos.

## B. Breeding Process

Generally the pond needs be of bigger water area having airy, shaded area, clear water, no debris/silt & odorless. During monsoon days when rain is continuing & temperature goes down, the induced breeding program of Major Carps is taken up.

1. **Selection of Brood Fishes-** In general, females having a bulging belly of a round shape and soft but not loose with swollen pinkish vent are chosen so that eggs will ooze out with the application of a little pressure. The inner surface of pectoral fins will be very smooth & oily. Do not take loose bulging belly female, take soft bulge belly.

The Male one is easily identified by the roughness of the inner surface of pectoral fins and milts are freely oozing with the application of slight pressure.

2. **Calculation for requirement of Pituitary Gland Hormone & preparation of extract-** Stored preserved pituitary glands are weighed considering the weight of the brood fishes after two minutes of evaporation of the alcohol.

Weighted glands are ground in Tissue Homogenizer to make a fine paste. Distilled water is added in a dilution ratio of 1: 1- 4 (distilled water in ml. and pituitary gland in mg), considering the size & weight of the fish.

The total homogenized suspension is transferred into centrifuge tubes which are kept in Centrifuge machine and rotated to get inject-able extract of clear fluid. This is again transferred in a small beaker to draw into a hypodermic syringe for injection. The stock extract needs be stored in a refrigerator or in ice.

3. **Dosage of Pituitary Extract-** In general 2 doses are given to female at an interval of 4-6 hours; in general the 1<sup>st</sup> one i.e. Provocative Dose @ 2-3 mg./kg and 2<sup>nd</sup> i.e. Final Dose @ 5-9 mg. of body weight in

case of female . For male only on dose at the time of 2<sup>nd</sup> dose to female is given @ 2-4 mg/body weight of fish. But, a slight alteration in dose is made considering the condition of maturity of brood fishes. The dilution of Pituitary Gland in distilled water is to be done considering the weight of fish i.e. for below 1.5 Kg - 10mg in 1.0 ml Distilled water & above 1.5 Kg - at least 20 mg in 1.0 ml.

Pituitary Gland to prepare Extract:

	<b>Female : 1<sup>st</sup> dose</b>	<b>2<sup>nd</sup> dose</b>	<b>Male</b>
Catla	3 – 4 mg/kg	10-12 mg/kg	4 – 6 mg/kg
Rohu	2 –3 mg/kg	6 – 9 mg/kg	3– 4 mg/kg
Mrigal	2 mg/kg	4 – 6 mg/kg	2-3 mg/kg
Kalibose	2 –3 mg/kg	5 -8 mg/kg	2–3 mg/kg

Doses of Ovaprim: Only single dose for both male & female

Catla	0.40 to 0.50 ml/kg
Rohu	0.30 to 0.40 ml/kg
Mrigal	0.25 to 0.30 ml/kg
Silver carp	0.50 to 0.70 ml/kg
Grass carp	0.50 to 0.70 ml/kg
Big head carp	0.50 ml/kg
Bata	0.30-0.40 ml/kg
Fringe-lipped carp	0.40-0.50 ml/kg

4. **Method of injection:-** Generally Intra-muscular injection is very much common and is given on the soft upper regions of the body at the caudal peduncle .The needle is inserted under a scale keeping it at a 60 degree angle to the body of the fish. In general a 2 cc syringe is graduated in 20 divisions measuring 0.1 cc each. Further, the size of the needle / syringe depends upon the size of the brood fishes.
5. **Releasing the Injected Brood fishes in Breeding Hapa:-** Both injected male & female brood are released immediately inside the breeding hapa and the slit is stitched. Both males & females are stimulated and initiated into sex play. This creates a pressure on females to release eggs & on males to release milt (sperm). The eggs are fertilized in the water media. In all it takes 4-6 hours.

Fertilized eggs are water hardened & become swollen measuring 2.2 – 2.5 mm in diameter (Catla is larger) transparent, shining with yellowish-green dots. The unfertilized eggs are dull in all respect. The Major carps eggs are non-adhesive & non-floating. This is the Natural process of breeding.

Further, the Stripping or artificial insemination can also be done to initiate more than 95% fertilization of eggs. When the female brood fish after sex play start to ooze & holds its head slanting upwards and tail down; give a slight pressure on belly facing the Enamel tray where eggs are collected. Then take a ripe oozing male fish in the same fashion as the female and give a slight pressure to get milt/sperms on the eggs collected already.

Add slight water & continue to stir the tray/ Bucket/ Hundi to mix well i.e. to help the sperm to fertilize the eggs. Or the eggs can be mixed with milt as soon as possible by means of a quill feather to allow fertilization.

The fertilized eggs are washed twice using clean water to remove excess milt and allowed to stay undisturbed in freshwater for 25-30 minutes at least. The eggs are ready to be release into the hatching hapas.

6. **In general the fecundity** per kg.of body weight of female brood fish is approximately 3.1 lakh in rohu, 1-3 lakh in catla and 1.5 lakh in mrigal.
7. **Shifting of fertilized eggs in Outer Hapas-** The Outer Hapas are fixed in pond using bamboo poles in tight fashion allowing 10-12" above water level & rest are under-water ; the inner floor of the each hapa is tied with poles to maintain even surface.

The fertilized eggs are spread evenly on the underground inner floor of outer hapa. In practice the eggs are collected from the Outer hapa using a mug and transferred into a bucket with a small amount of water.

The total volume of eggs is calculated from Nos. of Mug/Bucket & Nos. of eggs by measuring the quantity per 20 ml. and number of fertilized eggs is also assessed by conducting random sampling before and after spawning.

The Hatchlings get food which is stored up in their yolk sac.

*\* At initial period, Inner Hatching Hapa made of round mosquito net is also fixed within the Outer Hatching Hapa; the fertilized eggs are spread on its lower floor. The hatchlings come out by bursting the egg shells & reach the Outer Hapa through the mosquito net holes leaving the egg shells on the inner floor of inner Hapa. As the depth of the said Hapa is too short, the eggs become spoiled due to rise of temperature and to avoid this, direct release of fertilized eggs in Outer Hapa has to be initiated with an even spread on its inner floor.*

8. **Harvesting of Spawn (5-6mm.) from Outer Hapa to raise Fish Fry**- By the third day the mouth is formed and the hatchlings start movement in search of food. During this stage they are carefully collected from the outer hatching hapa and are stocked into well managed nursery pond to raise the fish fry.

### C. Raising Fish Seed:

1. **Stocking of Fish Spawn in Nursery Tank to raise Fish Fry (25-30 mm)** - Generally this pond is smaller in size i.e. 4-6 kathas (0.026 – 0.039 ha.) having depth of 1.0 – 1.5 meter and free from aquatic weeds. Unwanted & predatory fishes/insects are eradicated by applying 295-335 Kgs Mahua Oil cake per Bigha.

After 15 days Lime is applied @ 60-80 kgs/ Bigha

Pond is fertilized by applying animal dung @1000-1400 kgs/ Bigha, 14 days before the stocking of fish babies i.e. fish spawn.

3-4 days ahead of stocking of fish spawns, Kerosin oil is applied @ 0.5 – 0.8 liter per Bigha.

10.00 lakhs of fish babies i.e. fish spawns are stocked per bigha maintaining the ratio of Catla:Rohu: Mrigal =3:4:3

If the plankton density is in a declining order, apply decomposed mixed manure (40 kg. Cow dung + 40 kg. Poultry litter + 4 kg. Mustard oil cake).

Supplementary feeding (fine rice bran dust: finely dusted Mustard oil cake = 1:1) is to be done regularly for proper growth /vigor and the doses are (per lakh):

1<sup>st</sup> 5 days = 280-350 gm daily

2<sup>nd</sup> 5 days=480 -650 gm daily

3<sup>rd</sup> 5 days=780 – 950 gm daily

Netting is to be arranged on 10<sup>th</sup> day to drive fish sole only.

Survival: 70-75% at least i.e. 7.0 – 7.5 lakhs per Bigha and the water can be used 5 times for production of fish fry.

2. **Stocking of Fish Fry in Rearing Tank to raise Fish Fingerlings**: The pond size 0.1 – 0.15 ha. having water depth of 1.0 – 1.5 meter and the management practices i.e. for eradication of unwanted & predatory fishes/insects, liming, fertilizing are same as Nursery management.  
Stocking of fry: 0.5 – 0.6 lakh per Bigha

Supplementary feeding (fine rice bran dust: finely dusted Mustard oil cake = 1:1) is to be done regularly for proper growth /vigor and the doses are (per lakh):

1<sup>st</sup> 20 days = 4.0 kg. daily  
 2<sup>nd</sup> 20 days=6.5 kg. daily  
 3<sup>rd</sup> 20 days=9.0 kg. daily

Netting is to be arranged on every 15<sup>th</sup> day to drive fish sole only.






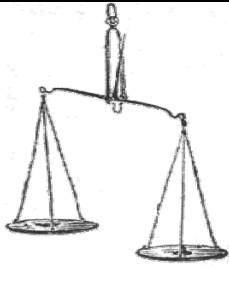

Survival : 80-85% at least i.e. 0.45 – 0.5 lakhs per Bigha and the water can be used 2 times for production of fish fingerlings.

C. Photos Gallery :

1. Induced Breeding Equipments/ materials:

		
Chemical Balance	Tissue Homogenizer	Centrifuging Tube
		
Centrifuging Machine	Glass Beaker	Injection Syringes
		
Sterile Distilled water for preparation P. Gland Extract	Magnifying Glass	Ovatide Hormone Injection vial
		
Plastic Mug	Plastic Bucket	



			
Fish Pituitary Gland	Ovaprim Hormone Injection	Other Hormone Injection vials	
			
Spring Balance	Hand Net	Hand Balance	Aluminum Hundi

## 2. Induced Breeding practices:

	
Netting for catching the Brood Fishes	Closing the net to select the brood fishes
	
Netted Fishes to select Brood fishes	





**Selection of Brood fish ( Female)**



**Selection of Brood fish ( Male)**



**Weighing Brood fishes**



**Injecting Hormone**



**Releasing injected Brood fishes in Breeding Hapa**



**Fixing Outer Hapa**



**Stripping of oozing Female**



**Stripping of Male to have milt**





**Water hardened fertilized eggs (Stripping Process)**



**Collected fertilized**



**Fertilized Eggs like pearl**



**Fertilized Eggs in a dish**



**Collected fertilized eggs from Breeding Hapa**



**Transfer of fertilized eggs in Outer Hapa**



**Transfer of fertilized eggs in Outer Hapa**



**Outer Hapas with fertilized eggs**





**Development of embryo**



**Development of embryo**



**Fish Spawn**



**Fish Spawn**



**Netting in Nursery Tank**



**Harvested Fry**



**Netting in Rearing Tank**



**Harvested Fingerlings**



**Selling of Fingerlings**



**Fingerlings**