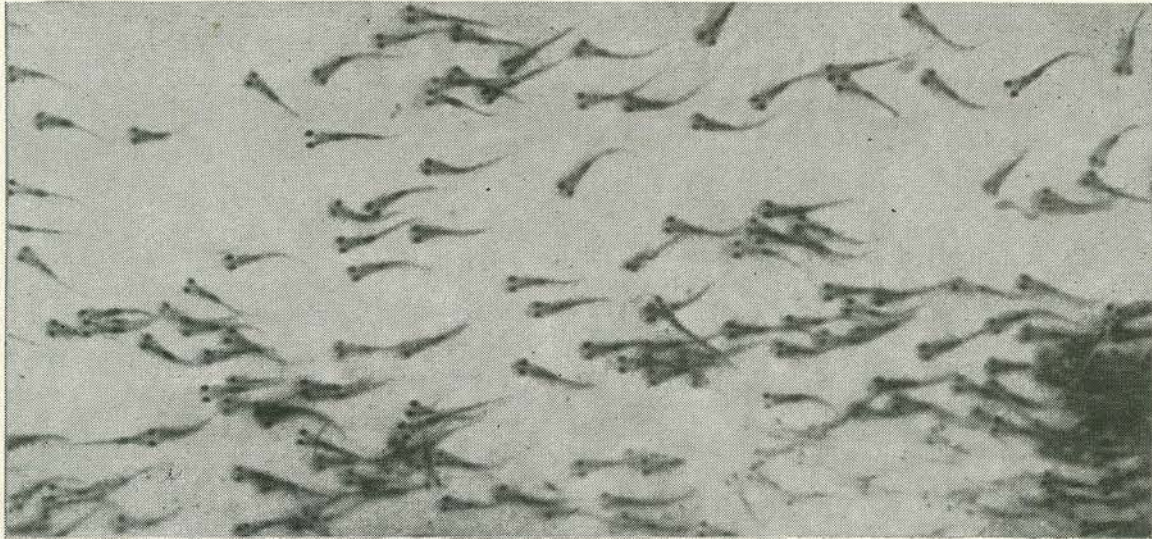




STATUS PAPER ON FISH SEED STANDARDIZATION



CENTRAL INLAND FISHERIES RESEARCH INSTITUTE

(INDIAN COUNCIL OF AGRICULTURAL RESEARCH)

BARRACKPORE • WEST BENGAL

*STATUS PAPER ON FISH SEED STANDARDIZATION**

*Dr A.G. Jhingran
Central Inland Fisheries
Research Institute
Barrackpore
West Bengal
India*

Bull. No. 43

July 1986

*CENTRAL INLAND FISHERIES RESEARCH INSTITUTE
(I C A R)
BARRACKPORE - 743101, WEST BENGAL*

** Paper presented at the Second National Fish Seed Congress
held at Calcutta on July 3 & 4, 1986.*

STATUS PAPER ON FISH SEED STANDARDIZATION

Inadequate knowledge in regard to quality fish seed characteristics has persisted despite the fast rising demand for fish seed in the country. The production of fish seed in the country showed an appreciable increase during the VI Five Year Plan with estimated production of 5,639 million fry during 1984-85 as against the target of 2,120 million. This was possible due to popularization of scientific breeding and hatching techniques and large-scale adoption of composite fish culture technology by different states. There is thus an urgent need to standardize the definitions of certain components of fish seed trade in the country on an all India basis. The presently followed terminology in respects of various stages of fish seed are variable between and within different regions of the country. The present status of knowledge on the terminologies used^{to} designate fish seed stages, their desirable size for stocking in different types of culture operations, identifying characters, quality and methods of transport etc. is reviewed in this paper and recommendations for the standard given.

1 Terminologies for different stages

Fish seed is traditionally classified into spawn, fry and fingerlings. This classification, based on size only, varies widely across seed farms and states of the country. Table-I gives the details about various classifications in practice.

All the above said terminologies are purely arbitrary and in cases leave size-gaps in between different stages not covered by any of the stage. As such, they do not fulfil

the essentials for being a standard. The suggested standard classification is as under :

1	Hatchling	- upto 8 mm
2	Early fry	- > 8 upto 25 mm
3	Fry	- > 25 upto 40 mm
4	Fingerling	- > 40 upto 100 mm
5	Advanced fingerlings	- > 100 upto 150 mm

The above suggested classification is based on size of attainment of adult taxonomic characters and feeding habit during different stages of development of Indian major carps (Kamal, 1964 & 1967). The details of these stages are as under :

i) Hatchlings

At this stage, the taxonomic characters are only sufficient to classify them to different fish families and into major or minor carps. Adult taxonomic characters are still under development and not fully discernible. Hatchlings depend mainly on yolk for feeding and do not take feed from outside.

ii) Early fry

During this stage all the taxonomic characters of the species are developed and attained by the time the final size is reached. External food is accepted, early fry of all the species being mainly zooplankton feeder.

iii) Fry

All the adult taxonomic characters of the species are present right from the beginning of this stage. This is the intermediate stage as far as feeding habit is concerned. Food comprises zooplankton as well as all the other food constituents of the adult fish, former having the dominance.

iv) Fingerlings

Possess all the adult taxonomic characters. Food composition is the same as that of adult fish.

v) Advanced fingerlings

It differs from fingerlings only in regard to size and is the ideal stage for stocking for culture of table size fish.

2 Identifying characters at different stages

Chakraborty and Murthy (1972) have enumerated certain characters to identify different species of major carps at the hatchling stage. But they are overlapping and thus not tenable. Till date, it is only possible to identify whether the hatchling is that of a carp or not (Fam. Cyprinidae) and if so whether it is of a major or minor carp, by referring to characters given in Table II and Table III respectively.

Species-wise classification is possible during the early fry stage (after 14 mm) onwards. The identifying characters for the same are given in Tables IV & V.

3 Assessment of quantity

Hatchlings are sold in Calcutta fish seed markets in terms of 'Bati' or 'Kunka' (4 'Bati' = 1 'Kunka'). The size of 'Bati' is not fixed, varying from market to market (c 135 ml - c 170 ml), thus causing variation in size of 'Kunka' also. Hatchlings at 'bundh' site in Bankura are sold in terms of 'dibba' the capacity of which is about 2 ml. Likewise, diversities exist in the measure for sale of fry and fingerlings too in different areas of the country. At some place they are sold by number whereas at other places it is by weight.

Perforated measuring cups of fixed capacity (in ml) should be introduced for sale of fish seed upto fry stage throughout the country. Generally, it has been seen that 1 ml contains about 500 hatchlings (6-8 mm). However, it would be desirable if the practice of sample count of each lot for sale is introduced to arrive at the number of hatchlings/fry per ml. For sale of fingerlings number and not the weight may be taken as a standard.

4 Size for stocking and harvesting

For nursery ponds; the age/size of stocking, presently in practice is about 3 days/6-8 mm hatchlings. Since this is the stage when the yolk sac is absorbed, the seed needs food from outside environment and starts free movement, it

may be accepted as a standard. A size of about 35-40 mm may be accepted as harvesting size from nursery ponds.

In traditional fish culture system, generally, no rearing pond practice is followed and the fry is directly seeded into stocking ponds for growing to table size. However, it is remunerative to stock advanced fingerlings for the purpose in the interest of better survival. As such, it is essential to have a rearing pond operation in which fry (c 40 mm) may be stocked and advanced fingerling (> 100 mm) harvested.

5 Quality

Quality fish seed is generally taken as seed of quality fish i.e. Indian major carps.

No genetic standard is available as yet to assess the quality of fish seed. The seed from induced breeding is considered of good quality since it is pure and comes of known parentage of quality fish. However, this concept itself is not generally sound as the results of selection of small number of parents for breeding may bring about inbreeding depression. In the case of riverine seed the standard in vogue is to call the seed collection containing more than 10% major carp hatchlings as desirable (Anon. 1965).

6 Packing and transport

Before transporting to long distances, hatchling and fry are conditioned in order to rid them of excreta and to inure them to subsist in a restricted area they are

inevitably subjected to during transport.

Various types of conditioning containers are used, namely boxes made of wire meshes, bamboo or cane wicker work; barrel/or boats with perforated bottoms; temporary enclosures made of netting or bamboo matting; cloth 'hapa' etc. Any of these conditioning methods can be taken as standard.

The period of conditioning should depend on the size and distance of transport. About 6 hours of conditioning is required before fry should be packed for transportation (Alikunhi, 1957). Clean natural water with a depth of 30-35 cm is considered good for conditioning.

Two methods of packing are in vogue : (a) open system comprising open carrier, with or without artificial aeration/oxygenation/water circulation, and (b) closed system having sealed air tight containers with oxygen.

Open system : (1) The traditional 'hundi' is an earthen or aluminium vessel of 20 cm or 23 cm diameter of 23 l or 32 l capacity. Fifty grams of finely pulverised red soil is sprinkled over the water surface in each 'hundi'. During transport 'hundi' are shaken periodically.

(ii) Improved open metal containers are increasingly being used. These are round vessels with a wide mouth which can be closed with perforated pressed-in lids. The larger type is c 53 cm in diameter at the base, c 20 cm at the mouth and c 38 cm high. To prevent denting and effect of insulation, woollen covers are used on the metal containers or the vessel is crated and kept wet during the journey.

(iii) An open transport motor van improvised with a small semi-rotary pump, has been devised by State Fisheries Department, Orissa. The delivery tube of the pump carries two rows of holes at 45° to each other so as to produce two oppositely directed sprays over the entire surface of water. By use of this system fish fry can be transported in semi-insulated road vans upto a distance of about 500 km with mortality as low as 5%.

Inspite of being cheaper, open packing system for transport of fish seed is not advisable mainly because it involves constant vigilance and frequent renewal of water on long journeys.

Closed system : In this system the source of oxygen supply is not the open air. Oxygen is supplied into an enclosed space above the water.

(i) Sealed metal containers have successfully been employed for transporting fish seed to long distances. This is made of galvanized iron and measures 45.72 cm X 35.36 cm with two air tight openings on the top, one to let in oxygen and the other to let out the displaced water.

(ii) The use of 18 l kerosene tins, fitted with air tight screw capped lids for filling and provided with tubes for drawing in oxygen from a cylinder and letting out displaced water was introduced by CIFRI.

(iii) "Splashless tank" designed by Mamen (1962) is of a petrol tanker design of 1150 l capacity with an autoclave type lid. It has a built in aeration system for supplying compressed air which works on a belt driven by the engine of the transporting vehicle. Inside of the tank

is lined with U-foam to prevent physical injury to fish seed. A total weight of 250 kg of live fish can be transported at a time in this tank.

(iv) "Patrol's carrier" is double barrel type carrier with two chambers, inner and outer. The top of the inner chamber is provided with an air vent and oxygen valve. Outer chamber serves as storage tank and inner as oxygen holding chamber. Once filled, the oxygen supply of the carrier lasts upto 5 hours and thereafter refilling with oxygen becomes necessary.

(v) Department of Fisheries, Maharashtra gets the credit for introducing polythene bags for transporting fish seed under oxygen packing. Bags are made of polythene and placed in 18 l k. oil tins.

Alkathene bags of 74 cm X 46 cm of 33 l capacity is now widely used in India for transport of fish seed under oxygen. This is the best in all respects. This can thus be taken as standard. The ideal packing density of Indian major carp seed for 12 hour's journey, by this method, is given in Table VI.

The above set of standards for fish seed terminologies, size for stocking, quality and transport etc. have been proposed after careful consideration of prevalent practices, biological and other variables. It is intended to explain the present state of knowledge on the subject and to suggest adoption of a uniformity of standards for discussion and consideration at the Central and State Government levels, for a nationwide adoption on a priority basis. Fish seed production and consumption centres, situated wide across the country, need have a common standards

for production and trade. A national standard would be in the interest of popularisation of scientific fish culture and would be of great use for producers, consumers and planners.

Literature cited

- Alikunhi, K.H. *Fish Culture in India. Fm. Bull. Indian Coun. agri. Res., 20 : 144 p.*
1957
- Anon. *Report on Fish Spawn Prospecting Investigations, 1964. 1. Uttar Pradesh and Gujarat. Bull. Cent. Inl. Fish. Res. Instt., Barrackpore. 4 : 191 p.*
1965
- Chakraborty, R.D. & D.S. Murthy. *Life history of Indian major carps, Cirrhinus mrigala (Ham.), Catla catla (Ham.) and Labeo rohita (Ham.). J. Inland Fish. Soc. India, 4 : 132-61.*
1972
- Jhingran, V.G. *Fish and Fisheries of India. Second Edition. Hindustan Publishing Corporation (India), Delhi : 66 p.*
1983
- Kamal, M. Yusuf *Studies on the food and alimentary canal of Indian major carps. I. Food consumed and differentiation of the alimentary canal and associated structures in Catla catla (Ham.). Indian J. Fish., 11(1) : 449-64.*
1964
- _____ *Ibid., II. Labeo rohita (Ham.) and Cirrhina mrigala (Ham.). Indian J. Fish. 14 : 24-47.*
1967
- Mamen, T.A. *Live fish transport using modified splashless carrier with compressed in aeration. In : Training Course on Live Fish Transport, Hyderabad, Fisheries Extension Unit, Govt. of India : 5 p.*
1962
- Srivastava, U.K. *et al. Inland Fish Marketing in India. Fish Seed Production and Marketing. Concept Publishing Company, New Delhi. 167 p.*
1985

TABLE-I : CLASSIFICATION OF FISH SEED ACCORDING TO VARIOUS SOURCES*

(Unit : Size in mm)

Size classification	Fish Seed Committee	NCA	Jhin-gran	Fish seed syndicate	Private trade in West Bengal	U.P. State	Maharashtra State	Srivastava <i>et al.</i> (1985)
Spawn/Hatchling	0 to 8	0 to 8	0 to 8	-	0 to 8	-	-	Upto 10
Fry	> 8 to 40	8 to 25	9 to 25	8 to 25	8 to 110	-	15 to 25	20 to 25
Semifingerling	-	-	-	25 to 30	-	-	25 to 50	-
Fingerling/Standard fingerling	> 40 to 150	120 to 150	26 to 40	31 to 150	41 to 100	10 to 25	50 and above	45 to 50
Large fingerlings	-	-	-	-	-	-	-	90 to 95
Advance fingerling	-	-	above 40	-	-	-	-	120 to 150
Young fish	-	-	-	-	100 to 230	-	-	Above 155

* After Srivastava *et al.* (1985).

TABLE-II : IDENTIFICATION OF HATCHLINGS OF DIFFERENT FISH FAMILIES*

1	Yolksac round in shape	4, 5
2	Yolksac oval in shape	12, 13
3	Yolksac oblong in shape	11
4	Round yolksac without oil globules	6
5	Round yolksac with oil globules	7, 8
6	Unsegmented yolk, barbels absent, anal opening near about the middle of the body	Fam : Gobiidae
7	Segmented yolk, barbels absent	9
8	Unsegmented yolk, barbels absent	10
9	Anal opening situated in the posterior $\frac{1}{3}$ of the body	Fam : Clupeidae
10	Anal opening near about the middle of the body	Fam : Anabantidae
11	Barbels absent	Fam : Channidae
12	Yolksac posteriorly elongated	14
13	Yolksac not elongated posteriorly	15, 16
14	Barbels absent, anal opening in the posterior $\frac{1}{3}$ of the body	Fam : Cyprinidae
15	Barbels present	17
16	Barbels absent	18
17	Anal opening near about the middle of the body	Fam : Siluridae
18	Anal opening near about the middle of the body	Fam : Mugilidae

* After Jhingran, 1983

TABLE-III : IDENTIFICATION OF CARP SPAWN INTO DESIRABLE AND UNDESIRABLE SPECIES*

Length 5.0 to 5.5 mm

Yolksac absent, eyes pigmented, mouth formed, dorsal fin differentiated and with or without fin supports. Undesirable

Yolksac vestigial, disappearing, mouth formed, embryonic fin-fold continuous Undesirable

Yolksac narrow anteriorly, embryonic fin-fold continuous, eyes pigmented. Undesirable

Yolksac wide anteriorly, embryonic fin-fold continuous, eyes pigmented, mouth formed. Desirable

Length 5.51 to 6.5 mm

Yolksac disappearing, rudimentary or absent, embryonic fin-fold discontinuous, rudiments of dorsal fin with or without fin rays indicated, mouth formed, eyes pigmented. Undesirable

Yolksac wide or narrow anteriorly, embryonic fin-fold continuous, dorsal fin not indicated mouth formed, eyes pigmented. Desirable

Length 6.51 to 7.5 mm

Yolk absent, dorsal fin with rays well differentiated, rudiments of anal fin visible, embryonic fin-fold discontinuous. Undesirable

Yolk rudimentary or absent, dorsal fin indicated but without fin supports, embryonic fin-fold continuous, anal fin not indicated, mouth formed, eyes pigmented. Desirable

* After Jhingran, 1983.

TABLE-IV : DIAGNOSTIC CHARACTERS OF EARLY FRY OF CARPS*

a) Carp fry

i) Major and minor carps

Major carps Number of undivided dorsal fin rays > 11 -
Catla catla, Labeo rohita, Labeo calbasu, Labeo
genius, Cirrhinus mrigala.

Minor carps (Number of undivided dorsal fin rays (a) 11 or
(b) 11) - (a) Labeo pangusia; (b) Labeo bata
Labeo angra, Cirrhinus reba and Puntius sarana.

ii) Fry (size 14 mm to 25 mm)

Catla catla Large head. Dorsal profile convex and the ven-
tral profile concave. No distinct spot on the
caudal fin or at the caudal peduncle. Margins
of the dorsal and caudal fins darker. Ist ray
of the dorsal fin black. Opercular region bri-
ghtly reddish. No barbels. Lips thick but not
fringed.

Labeo rohita A dark diffused transverse band present at the
caudal peduncle. A pair of whitish or light
greyish maxillary barbels present. Lips fringed.

Labeo
calbasu At the earlier stages the fry are darker in
colour. A semilunar yellow band appears on the
nape and gradually the body gets the appearance
of having alternative yellow and black bands.
The basal portions of the fins are black which
gradually spread over the fins. Two pairs of
thick black barbels (maxillary and rostral)
present. Lips are fringed. Mouth narrow.

Labeo bata A bright caudal spot more or less semicircular
in shape is present at the caudal peduncle.
This spot gradually becomes more or less cir-
cular in outline. No barbels visible. Lips
are not fringed.

Contd... 2.

Labeo
fimbriatus

The head is small and mouth terminal. All the lines are practically formed. A conspicuous caudal spot present. It can be distinguished from L. kontius, L. rohita and L. calbasu by the absence of lateral band. It can be distinguished from catla, with which the young ones resemble very much, by their relatively small head, terminal mouth with thick lips, more uniformly distributed dark pigment on the dorsal fin and more conspicuous caudal spot.

Cirrhinus
mrigala

Small head and slender body. A more or less triangular dark spot at the caudal peduncle. No barbels visible. Lips are thin, not fringed. Tip of the lower lobe of caudal fin has a reddish tinge in larger size fry. Fry of C. mrigala are very often confused with those of L. bata. Fry of C. mrigala can be distinguished by the shape of the caudal spot. Whereas the posterior edge of the caudal spot is slightly concave in C. mrigala, it is more or less straight in case of L. bata. In larger fry the lower tip of the caudal fin of the former has a reddish tinge while the latter has a whitish tip.

Cirrhinus
reba

Slender body. Presence of three distinct spots; two on the caudal fin and one at the base of the caudal peduncle. Pigment spots on the lateral line which gradually take the shape of the dark lateral band. Mouth terminal. No barbels. Lips thin.

the caudal

Puntius
carnaticus

A dark, rounded and conspicuous spot present on the caudal peduncle. Two pairs of barbels present which are visible to naked eyes. Pectoral and ventral fins are colourless and transparent.

Puntius
sarana

Body is deep and moderately compressed. Possess a small black vertical band extending from the point of insertion of the dorsal fin. An oval dark spot present at the caudal peduncle. Lips are thin and not fringed. Maxillary barbels are present. The first ray of the dorsal fin is blackish.

* After Jhingran, 1983.

TABLE-V : DIAGNOSTIC CHARACTERS OF FRY AND FINGERLINGS OF CARPS (30-100 mm in length)

<u>Catla catla</u>	Large head. No distinct spot in the body or at the caudal peduncle. Dorsal, caudal and anal fins are dark greyish in colour. No barbels. Lips thick but not fringed.
<u>Labeo rohita</u>	Dark band at the caudal peduncle persists. Reddish tinge present in the dorsal, pelvic, anal and caudal fins. Both the lobes of the caudal fin have reddish tinge with dirty grey colour along the margins. Lips fringed. Maxillary barbels are prominent. A pair of small rostral barbels also appears.
<u>Labeo calbasu</u>	The body colour gradually turns blackish. The fins especially the dorsal and caudal fins have the basal portion black while the remaining portions are white. As the fry grows, all the fins turn completely black. Lips fringed. Prominent black barbels (2 pairs) present.
<u>Labeo bata</u>	The caudal spot more or less circular in outline persists. Dark spots present on the 5th and 6th scales or the row just above the lateral line on either side of the body. Barbels not prominent. Lips not fringed. The caudal fin lobes have yellowish tinge.
<u>Cirrhinus mrigala</u>	The spot on the caudal peduncle becomes diamond-shaped. Barbels are faintly visible. Lips are not continuous. A few longitudinal lines are visible on the body due to the pigments on the scales. This is more conspicuous in preserved specimens. The tips of the lower lobe of caudal fin is vermilion red in colour.
<u>Cirrhinus reba</u>	The spot on the caudal fin is indistinct. The lateral dark band is conspicuous and extends from the base of the caudal peduncle to the tip of the snout. Rostral barbels present. The scales are hexagonal in appearance.

Contd.....ii.

Contd.. Table-V

Puntius
sarana

The dorsal profile is arched. The lower portion of the vertical band becomes indistinct but the portion adjacent to dorsal fin becomes more distinct and slightly oval in shape. Oval spot in the caudal peduncle persists. Maxillary pair of barbels prominent. The rostral pair also appears.

* After Jhingran 1983.

TABLE VI - PACKING DENSITY OF FRY/FINGERLINGS OF INDIAN MAJOR CARPS FOR 12 HOURS' JOURNEY IN STANDARD PLASTIC BAGS OF 16-18 l CAPACITY *

<i>Fry or fingerlings to be packed</i>		
<i>Size (cm)</i>	<i>Number per plastic bag</i>	
	<i>Range</i>	<i>Average</i>
1	1,000-10,000	5,500
2	500-5,000	2,200
3	200-1,000	600
4	100-500	330
5	75-300	225
6	50-200	80
7	25-100	70
8	25-50	40

* After Jhingran, 1983