RECENT TRENDS IN AQUACULTURE

TROUT CULTURE IN RACEWAYS

National Fisheries Development Board

Department of Fisheries

Ministry of Fisheries, Animal Husbandry & Dairying,

Government of India

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INTRODUCTION

To utilize the cold water resource, number of fast growing and economically viable species have been introduced, which include species of Carp and Trout. The Rainbow Trout (*Oncorynchus mykiss*) is a temperate region (cold water) carnivorous fish species which needs crystal clear and highly oxygenated water, thus well suited for water systems of Himalayan states. Europe, North America, Chile, Japan and Australia are the main producer countries. Rainbow Trout farming has great potential in India since Trout is one of the high value species and having high demand in both domestic and international market. Trout farming is common in the states of Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, Arunachal Pradesh and Ladakh due to the suitable temperature range (5°C to 18°C). These states have established a well-developed infrastructure for Trout production depending on the availability of water in required quantity and quality, i.e. from springs and snow/glacier-fed streams. Trout farming in India is having huge potential. These States have an ample cold water resources and is suitable for the culture of high value cold water fish like Trout.

Trout culture in raceways has been traditionally practised for hatchery production of fish, where a flow-through system is maintained to provide the required level of water quality. Environmental and water quantity parameters are easier to manage in raceways than in pond systems. Flowing water flushes wastes from the culture units and also forces the fishes to exercise thus help in the better survival of the fish. The shallow water in raceways allows visual observation of the fish so that diet and /or disease problems can be promptly corrected. Feeding and harvesting are generally easier in raceway systems. Feeding and disease treatment are easily managed in raceway systems than in open systems or ponds. The present level of activities under this segment is not commensurate with the available potential and opportunities for supplemental fish production, income and employment to the fishermen/ fish farmers in hilly tracks. On the other hand, demand for Trout fish from Himalayan regions is increasing and hence needs to be met through focused attention in order to address the prevailing gap and facilitate enhanced fish production.

Construction of Raceways

The cemented ponds/ raceways are required for the culture of Trout fish. The rectangular tanks are better than the circular cisterns. The economical size of a trout raceway shall be 17 m x 2 m x 2 m with an inlet and an outlet for overflow of water fixed with wire mesh screws to prevent the escape of stocked species. There should be a drain pipe at the bottom of the raceway to facilitate the harvesting as well as the cleaning of tank from time to time. The water depth can be maintained at 1.5m, with a total volume of 50 cum./raceway. The water supply in Trout raceways should be through a filter bed/sedimentation tank. There is a

problem of silt particularly during monsoon when the water is turbid which is not good for Trout culture. The quantity of water required for a Trout farm is related with the stocking density, size of fish as well as the water temperature. Therefore, it is necessary to regulate the flow of water with utmost care. Water flow is regulated in such a way that fish should not assemble at one place and also do not move fast. Temperature and flow of water also play important role in the production of Trout.

Pre-stock management

- The seed rearing tanks should be cleaned before the fry/fingerlings arrived. Once the preparation of the tanks is over, water supply should be checked.
- Trout is sensitive to changes in water temperature, especially when it is from cold to warm. The smaller the fish, the more sensitive they are, and susceptible to thermal shock particularly to warm thermal shock. Therefore, it is important to raise or lower the temperature of the transport water slowly in steps of 0.5 °C/min in order to ensure safety.
- The optimal velocity of water in the raceway is 2–3 cm/sec (1.2–1.8 m/min) for smaller fish and 4–10 cm/sec (2.4–6 m/min.) for larger ones.

Post-stock management

The physico-chemical parameters and hygiene leads to successful culture of Trout fish: -

- **Optimum temperature**: 5 °C to 18°C
- **Dissolved oxygen**: 5.8 to 9.5 mg/l
- **pH**: A neutral or slightly alkaline pH is best for the trout. Optimum pH level of 7-8 is ideal for the growth
- **Turbidity**: Clear water without any contamination is required for culture. However, the turbidity should not be more than 25 cm in the Secchi disc.
- **Hygiene**: The cleanliness is a very important factor in Trout farming. The fish should be cleaned and disinfected either with 10% formalin or 4 ppm $KMnO_4$ solution periodically through Dip treatment. The infected fish should be immediately removed from the tank and due care should be taken to consult some fishery expert regarding the disease, if any.

Seed stocking

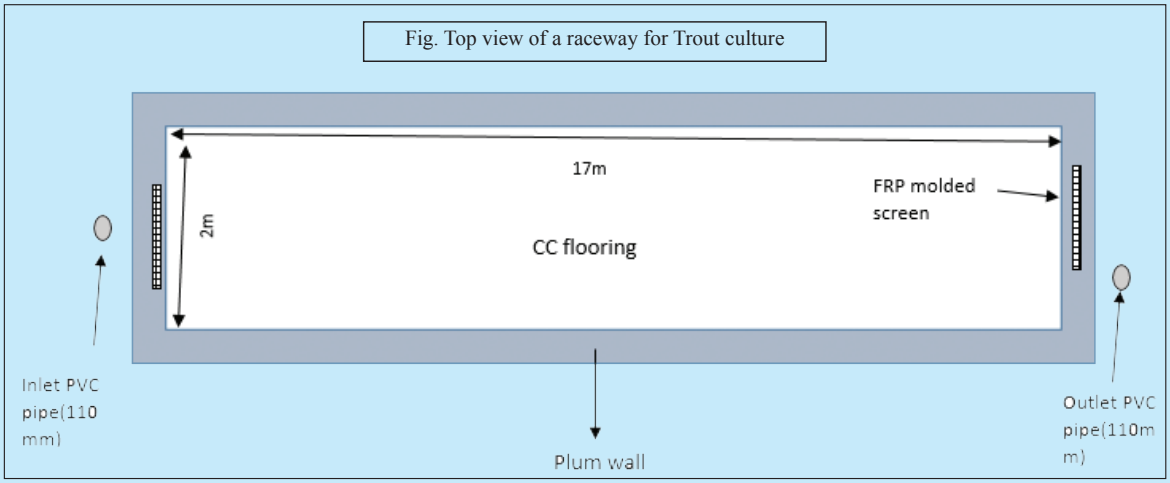
Fish seed must be transported in water with optimum temperature. It is also important to release fish seed after proper acclimatization. Therefore, the bucket or basin in which fish are transferred should be submerged into the water where the fish are released for proper acclimatisation.

Feed

Commercial Trout feed manufactured at Govt./Pvt. is available. Feeding @ 4-6 % of body weight is necessary for the fingerlings for better growth but due consideration should be given to the water temperature for following the feeding schedule. At the water temperature range of 10-12°C, feeding schedule of 6% is optimum but when it increases to 15°C, the feeding schedule to be lowered to 4%. The optimum growth rate per month is 30-40 g.

Design and Layout

Fig. Top view of a raceway for Trout culture



Model Technical Specification for Trout culture in raceways

Title	Description
Name of Species	Rainbow Trout (*Oncorhynchus mykiss*)
Raceway Size	17m x 2m x 2m
Effective water volume	50 m^3/raceway
No. of raceways	4
Effective water depth	1.5m
Stocking size	10gm
Stocking density	100/ m^3
Stocking no.	5000/Raceway
Survival rate	80%
FCR	1:1.5
Culture period/crop duration	8-10 months
Cost of Seed	Rs.10/seed
Cost of feed (crude protein >40%)	Rs.110/kg
Total feed required	6 MT
Size at the time of Harvest	250 gm
Expected Total Biomass	4 MT
Sale price	Rs.500 / kg

Cost Estimation

A. Capital cost				
Sl. No.	**Particulars**	**Qty.**	**Unit cost**	**Total**
1.	Construction of Raceways (17 x 2 x 1.5m): 50 m^3	4	2.00	8.00
2.	Water head work and channel construction from water source up the raceway(20m x0.35mx0.35m): 4.3 m^3	1	1.50	1.50
3.	Bird protection net, Equipment (dragnet, hand net, bucket, tubs, thermocol box etc), Wire/chain link fencing(45 running meter 1.5 high and 14 angle iron poles 2.0m high), inlet, outlet, screens etc	LS	2.50	2.50
Total				**12.00**

Inputs for Trout rearing Units (for 4 units)

Sl. No.	Particulars	Total
1	Cost of Seed (fingerlings) including transportation @Rs.10/ pc for 20,000 nos. (5000 nos./tank)	2.00
2	Cost of Feed @Rs.110/kg for 6 MT (FCR 1:1.5)	6.60
3	Man power @Rs.8,000 per month for 12 months	0.96
4	Electricity	0.20
5	Transport & Miscellaneous	0.24
	Total	**10.00**

Economic Feasibility for 1-year production

S.No.	Particulars	Amount (Rs. In lakh)
1	Capital cost	12.00
2	Operational cost	10.00
3	Total project cost	22.00
4	Gross income from one crop	20.00
5	Depreciation @15% on Capital cost	1.80
6	Interest @ 12% on Total Project Cost	2.64
7	Repayment @1/7th of Total Project Cost	3.14
8	Operational cost for next crop	10.00
9	Net profit after the end of the year (4) - (5+6+7+8)	2.42

Raceway Scheme under PMMSY

Beneficiary Oriented Sub-Components and Activities				
S.No.	**Sub-Component and Activities**	**Unit**	**Unit Cost (Rs. Lakhs)**	**Page No.**
A	**Enhancement of Production and Productivity**			
3	**Development of Fisheries in North-Eastern and Himalayan States/Uts**			
3.2	Construction of Raceways of Minimum of 50 Cubic Meter	(No)	3.00	101
5.2	Inputs for Trout Rearing Units	(No)	2.50	103

How to avail subsidy?

- Beneficiary needs to submit the Self Contained Proposal (SCP) along with required documents including documentary evidence of availability of requisite land (either own/registered lease document to the **concerned District Fisheries Office** for further process. In case of leased land, proper registered lease document for a period of 7(seven) years from the date of submission of Self-Contained Proposal shall be submitted.
- Self-Contained Proposal (SCP) shall be submitted with full justification & Techno-economic details such as the species to be cultured, capital cost and the recurring cost. The proposal should contain details of anticipated direct & indirect employment generation to local population, enhancement of fish production, specific time lines for implementation of project etc. have to be furnished to District Fisheries Officer.
- The governmental financial assistance is restricted to 4 numbers of raceways for individual farmer/entrepreneurs and 20 units for cooperatives, SHGs and other groups/ agencies having minimum 10 members with a production capacity of one MT/raceway/ year.

Training/Technical Guidance:

1. **Dr. Debajit Sarma,**
   Director-ICAR DCFR
   Directorate of Coldwater Fisheries Research (ICAR-DCFR)
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2. **Mr. Rajnath Pandita**
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3. **Mr. S. Pradhan,**
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7. **Mr. M C Adak, Arunachal Pradesh, DFDO**
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8. **Mr. Raja Ameen Lone,**
   Department of Fisheries, Ladakh
   Mob: 9419342851
   E-mail: aminlone31@gmail.com

List of Trout Feed manufacturer

1. **M/s Growel**
   Growel feeds pvt. Ltd.
   R.S. No. 57, Chevuru Village,
   Sriharipuram Panchayat,
   Mudinepalli Mandal,
   Krishna District – 521329,
   Andhra Pradesh, India.
   Mob: 9618763322, 9989453322
   E-mail: customercare@growelfeeds.com

2. **Mr. Dushyanth Kumar,**
   Director, Devee Biologicals Private Limited
   Plot No-1307, Ist Floor, Yell Reddygudda,
   Ameerpet, Hyderabad, Telangana 500073
   Ph:9849122265
   Email: deveebiologicals@gmail.com

3. **M/s BioMar Group**
   Vaerkmestergade 25, 6th floor
   8000 Aarhus C
   Denmark
   Tel: +45 86 20 49 70

4. **M/s Aller Aqua Group**
   Allervej 130, 6070
   Christiansfeld, Denmark

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