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Ornamental Fish Rearing in Aquariums

Editors

Ananya Khatei
Parvaiz Ahmad Ganie
Sumanta kumar Mallik
Raja Aadil Hussain Bhat
M Junaid Sidiq

ICAR-Central Institute of Coldwater Fisheries Research
Bhimtal-263136, Nainital, Uttarakhand, India

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Training Manual

Three (03) Day Training Programme

On

Ornamental Fish Rearing in Aquariums

(19-21 April, 2025)

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Ananya Khatei
Parvaiz Ahmad Ganie
Sumanta Kumar Mallik
Raja Aadil Hussain Bhat
M. Junaid Sidiq

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ICAR-Central Institute of Coldwater Fisheries Research
Bhimtal-263136, Nainital, Uttarakhand, India

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Cover designed by

Mr M. Junaid Sidiq

Compiled and edited by

Ms. Ananya Khatei, Mr. M. Junaid Sidiq

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Acknowledgment

We express our sincere gratitude to the Director, ICAR-CICFR, Bhimtal, for his unwavering support in developing this training manual on "Ornamental fish rearing in aquariums". This manual is the result of collective efforts, and we extend our heartfelt appreciation to the contributors for providing the necessary material to compile this manual.

A special thanks to this institutions' administrative, finance and store section for their unwavering support in organizing this training program. We also acknowledge the efforts of the in-charge extension cell and technical and contractual staff in rendering their support in organizing the training.

Lastly, we extend our gratitude to the participants for their keen interest in learning and applying geospatial tools for sustainable fisheries resource management. We hope this manual serves as a valuable resource in their professional journey.

(Editors)

ICAR-Central Institute of Coldwater Fisheries Research
Bhimtal-263136, Nainital, Uttarakhand, India

Foreword

ICAR-Central Institute of Coldwater Fisheries Research, Bhimtal, is one of the country's premier institutes for undertaking research, development, capacity building, and extension activities in the Himalayan region, focusing primarily on the Coldwater fisheries and aquatic resources. The Institute has carried out a strenuous exercise towards developing a roadmap for the country's coldwater fisheries and aquaculture, especially trout farming. Through its outreach and extension programs, the Institute has contributed substantially to the development of marginal and weaker sections of the society in the Himalayan region.

Ornamental fisheries play a vital role in enhancing the socioeconomic status of a country like India, where a large section of the rural and semi-urban population seeks sustainable livelihood options. This sector, though often overlooked, holds immense potential for income generation, especially for women, youth, and small-scale entrepreneurs. With minimal land requirement and low investment, ornamental fish farming offers an accessible entry point into aquaculture.

India's rich aquatic biodiversity provides a strong foundation for the development of the ornamental fish trade, for domestic markets as well as export. As global demand for ornamental fish and aquarium accessories grows, India can position itself as a significant player in this niche yet profitable industry. The promotion of ornamental fisheries not only supports rural livelihoods but also encourages environmental conservation through the sustainable use of indigenous fish species. Development of this sector through skill-based training, infrastructure support, and market linkages can contribute meaningfully to employment generation, poverty alleviation, and inclusive growth, aligning with national goals of doubling farmers' income and promoting blue economy initiatives.

I extend my appreciation to the authors and contributors for their efforts in compiling this valuable resource. I hope this manual will empower participants with the knowledge and technical expertise required to harness geospatial technologies for the sustainable development of coldwater fisheries and other natural resource management initiatives.

I wish all the participants a productive and insightful learning experience.

(Amit Pande)

अनुसंधान भवन, औद्योगिक क्षेत्र,
भीमताल–263136, जिला – नैनीताल, उत्तराखंड
Anusandhan Bhawan, Industrial Area
Bhimtal-263136
Distt.- Nainital, Uttarakhand, India

दूरभाष /Phoone : 05942-247280, 247279
ईपत्र /E-mail : director.dcfr@icar.gov.in
dcfrin@gmail.com
वेबसाईट /Website : www.dcfr.res.in

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1. Ornamental FisheriesTrade in India: Role in Socioeconomic Development

M. Junaid Sidiq*, Ananya Khatei, Sumanta Kumar Mallik, Parvaiz Ahmad Ganie, Raja Aadil Hussain Bhat

ICAR-Central Institute of Coldwater Fisheries Research, Bhimtal-263136, Uttarakhand

Corresponding author: mrjunaidsidiq88@gmail.com

1. What is Ornamental Fisheries?

Ornamental fishery means the breeding, growing, and selling of small, colorful fish that are kept in at home, in offices, hotels, and gardens to bring peace and beauty. In Indian Himalayas and Northeaster regions, freshwater ornamental fishes are commonly used in the trade. Common examples of the popular ornamental fishes include goldfish, guppy, molly, swordtail, angelfish, fighter fish, loaches, catfishes., etc.

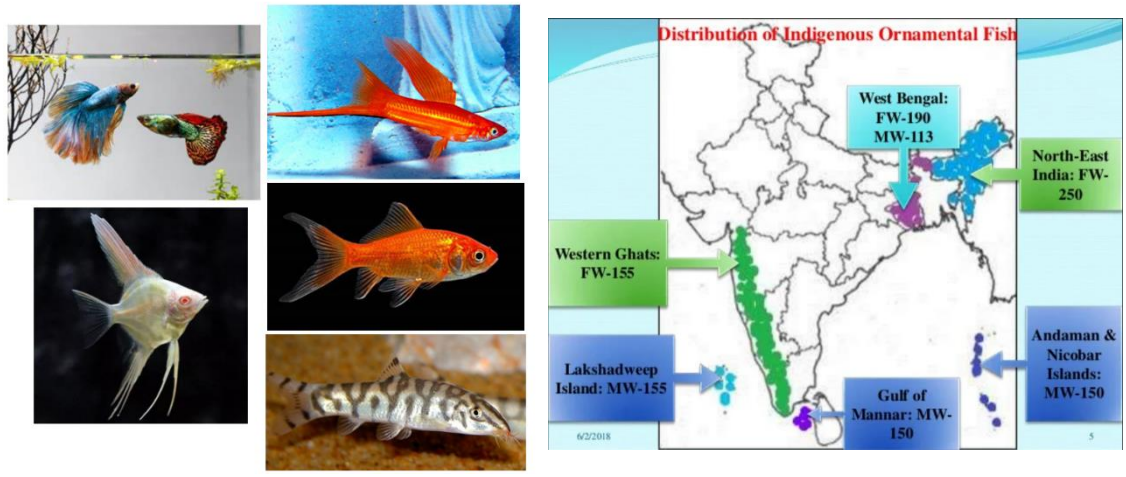

Fig: Commonly used ornamental fishes in freshwater sector

2. Importance of Ornamental Fishery in India

India has many freshwater rivers, ponds, and also coastal areas, which help in growing different types of ornamental fishes. The weather and water in many states are suitable for this activity.

Some key places where ornamental fish farming is growing include West Bengal, Tamil Nadu, Kerala, Maharashtra, Odisha, Assam, and Andhra Pradesh. Kolkata is the leading producer of ornamental.

India is also exporting ornamental fish to countries like: USA, Germany, UK, Singapore, Japan., etc.

3. How Ornamental Fishery Helps in Socioeconomic Development

a. Job Creation

- Small-scale farmers can earn money by breeding and selling ornamental fish.

- It creates work for women and youth in rural areas.
- People can also work in fish feed making, tank building, and fish transport.

b. Extra Income Source

- Farmers with small land or ponds can start ornamental fish farming at home.
- This gives extra income along with farming or other jobs.

c. Low Investment, Good Profit

- Ornamental fish farming does not need big land or costly machines.
- A small setup can start with very little money.
- Proper care and training can give good profit in short time.

d. Empowering Women and Families

- Many women are now taking part in this business.
- It helps in improving family income and lifestyle.
- Even children and old family members can help in feeding or cleaning tanks.

e. Export and National Income

- India is earning foreign money by selling ornamental fish to other countries.
- This helps in building the nation’s economy.

4. How to Start Ornamental Fish Farming (Basic Steps)

1. **Select the Right Fish**: Start with strong and easy-to-grow fish such as guppies, mollies, or goldfish.
2. **Setup a Tank or Pond**: Use cement tanks, plastic tubs, or glass aquariums.
3. **Water Quality**: Keep water clean and change it regularly. Use a filter if possible.
4. **Feed the Fish**: Give proper feed. Don't overfeed.
5. **Breeding**: Many fishes breed easily at home. Learn how to separate baby fish (called fry).
6. **Care**: Keep the fish healthy and safe from disease.
7. **Marketing**: Sell fish in local markets or to aquarium shops. You can also contact online sellers or exporters.

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5. Support from Government and NGOs

- The **National Fisheries Development Board (NFDB)** helps with training and money support.

- **State Fisheries Departments** give subsidies and guidance.
- **Krishi Vigyan Kendras (KVKs)** provide training in local languages.
- Many **self-help groups (SHGs)** are also doing ornamental fish farming successfully.

6. Challenges and How to Solve Them

	Challenge	Simple Solution
7.	Lack of knowledge	Attend free training from Fisheries Department/KVK
	Poor water quality	Change water regularly and use filters if possible
	Fish diseases	Keep tanks clean; isolate sick fish
	Difficulty in selling fish	Form groups, use WhatsApp, contact aquarium shops
	Cost of setup	Start small with household items and grow slowly

Success Stories (Examples)

- In **West Bengal**, many women in villages are earning ₹10,000–₹20,000 per month by breeding guppies and mollies.
- In **Kerala**, small units are exporting betta fish and goldfish to other countries.
- In **Tamil Nadu**, SHGs are using government funds to start ornamental fish farms and help many families.

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8. Conclusion

Ornamental fishery is a small but **powerful business**. It needs little space, small money, and simple care. It helps farmers, women, and youth earn extra money. It improves rural life and also helps India grow by exports.

With proper training and support, even a small farmer can become a successful ornamental fish entrepreneur.

2. Role of water quality in ornamental fish keeping

Raja Aadil Hussain Bhat*, Ananya Khatei, Sumanta Kumar Mallik, Parvaiz Ahmad Ganie, M. Junaid Sidiq

ICAR-Central Institute of Coldwater Fisheries Research, Bhimtal-263136, Uttarakhand

Corresponding author: bhataadil08@gmail.com

Following are the important details of the major water quality parameters in relation with the aquarium keeping for ornamental fishes.

Major Water Quality Parameters in Aquarium Fish Keeping

🌡️ 1. Temperature

✅ **Importance:**

Fish health, movement, and feeding depend on water temperature.

⚠️ **Problems (if too high or low):**

- **Too hot** = less oxygen, fish become slow and stressed.
- **Too cold** = fish get sick and stop eating.

🔍 **How to Check:**

- Use an **aquarium thermometer** (₹150–₹500).

🛠️ **Simple Fix:**

- **If water is cold** – Use a heater.
- **If too warm** – Do a partial water change or shift tank to a shaded area.

💨 2. Dissolved Oxygen (DO)

✅ **Importance:**

Fish need oxygen to breathe, especially during summer.

⚠️ **Problems:**

- Fish come to the surface gasping, become weak, may die.

🔍 **How to Check:**

- Use a **DO test kit** (₹300–₹600).
- If fish are gasping at the surface, it's a warning sign.

🛠️ **Simple Fix:**

- Install an **air pump or air stone**.
- Stir the water or do a partial water change.

💩 **3. Ammonia (NH_3)**

✅ **Importance:**

Comes from fish waste and leftover food. Very toxic if it builds up.

⚠️ **Problems:**

- Fish may look weak, have red gills, float abnormally, even die.

🔍 **How to Check:**

- Use an **ammonia test kit** (₹300–₹500).

🛠️ **Simple Fix:**

- **Change 25–30% of water.**
- Avoid overcrowding.
- Use a **bio-filter**.
- Add **beneficial bacteria powder** (easily available).

🧪 **4. pH Level**

✅ **Importance:**

Shows how acidic or alkaline the water is. Ideal pH is **6.5 to 7.5** for most aquarium fish.

⚠️ **Problems:**

- Low pH = stress and disease
- High pH = gill and skin irritation

🔍 **How to Check:**

- Use **pH test paper strips** or liquid kits (₹100–₹200).

🛠️ **Simple Fix:**

- **High pH**: Add a few drops of lemon juice or peat moss.
- **Low pH**: Add a pinch of baking soda or crushed shells.
- Always make changes slowly.

🌫️ 5. Nitrite (NO_2^-) and Nitrate (NO_3^-)

✅ Importance:

These come from fish waste. Nitrate is less harmful but nitrite is toxic in even small amounts.

⚠️ Problems:

- Fish become dull, breathe heavily, show stress.

🔍 How to Check:

- Use **Nitrite/Nitrate test kits** (₹300–₹600).

🛠️ Simple Fix:

- **Do regular water changes**.
- **Avoid overfeeding**.
- Add **aquatic plants** – they absorb nitrates.

💧 6. Water Hardness (GH/KH)

✅ Importance:

Shows mineral content in water. Helps keep pH stable and supports fish health.

⚠️ Problems:

- **Too soft water** = pH becomes unstable.
- **Too hard water** = stress and gill problems.

🔍 How to Check:

- Use **GH/KH test kits**.

🛠️ Simple Fix:

- **To soften hard water**: Use RO (filtered) water or peat moss.
- **To increase hardness**: Add crushed shells or mineral stones.

📌 Quick Summary Table

Parameter	Ideal Range	Problem (if too high/low)	Simple Fix
Temperature	24–28°C	Stress, disease	Heater or partial water change

Parameter	Ideal Range	Problem (if too high/low)	Simple Fix
DO (Oxygen)	>5 mg/L	Gasping, weak, death	Air pump or water movement
Ammonia	0 ppm	Red gills, floating, death	Change water, bio-filter
pH	6.5–7.5	Acid stress or gill burn	Baking soda / peat moss
Nitrate	<40 ppm	Weakness, dull behavior	Water change, add plants
Hardness	GH 100–200 ppm	Color loss, stress	Shells or RO water balancing

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✅ **Tips for Farmers & Hobbyists**

- **Change 25% of water every 7 days**.
- Don’t keep too many fish – rule of thumb: **1 inch fish per 1 liter**.
- **Feed twice a day**, small amounts only.
- **Test water once a month** (at least pH and ammonia).
- **Use cheap test kits** – available online or in aquarium shops.

3. Fabrication of ornamental fish aquarium

Ananya Khatei*, M. Junaid Sidiq, Sumanta Kumar Mallik, Parvaiz Ahmad Ganie, Raja Aadil Hussain Bhat

ICAR-Central Institute of Coldwater Fisheries Research, Bhimtal-263136, Uttarakhand

Corresponding author: ananya137@gmail.com

Fabrication of an Ornamental Fish Aquarium

Simple Guide for Farmers & Hobbyists

Fig. 3.1. Glass aquarium

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1. Materials You Will Need

Item	Use
4 Glass sheets	For the sides of the aquarium
1 Glass sheet (bottom)	For the base of the aquarium
Silicone sealant	To stick the glass together (waterproof)
Glass cutter	To cut glass (if not pre-cut)
Measuring tape	To measure size
Sandpaper	To smooth glass edges
Masking tape	To hold pieces while drying
Gloves & mask	For safety

Fig. 3.2. Basic preparations and stages in making fish aquarium

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📏 2. Choose the Size of the Aquarium

Tank Size (length)	Number of Fish (approx.)	Water Needed
Small (1.5 ft)	5–6 small fish	20–25 liters
Medium (2 ft)	10–12 small fish	40–50 liters
Large (3 ft)	15–20 fish	80–100 liters

👉 Start small and grow as you learn.

🛠️ 3. Cutting & Preparing the Glass

- Buy **5 mm thick glass** (6 mm if making large tanks).
- Use **glass cutter** if cutting yourself.
- Rub **sandpaper** on the edges (to avoid cuts).
- Clean all glass pieces with **cloth & water**.

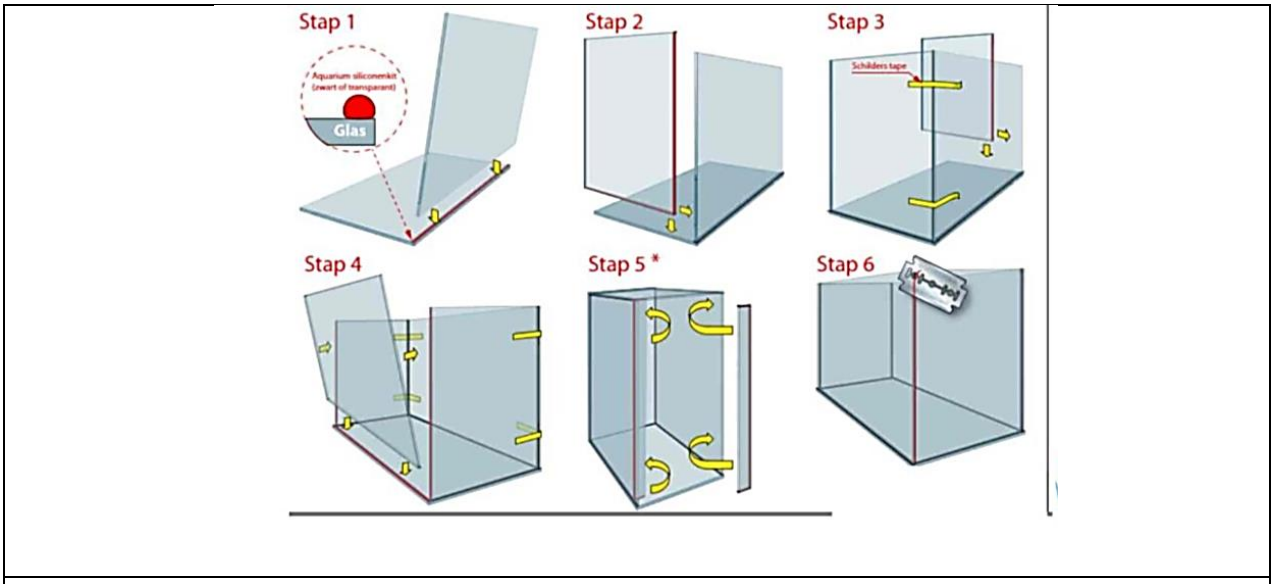

Fig.3.3. Steps in making an aquarium

🧱 4. Joining the Glass Pieces

1. Place the **bottom glass** on a flat table.
2. Apply **silicone sealant** along one edge.
3. Fix **side glass** over it and press.
4. Use **masking tape** to hold the glass in place.
5. Repeat for all sides.
6. Seal all inside joints properly with silicone.
7. Let it dry for **24–48 hours**.

💧 5. Water Leak Test

- Fill the tank with water **after 2 days** of drying.
- Keep filled for **24 hours**.
- Check for leaks – if leaking, empty and reseal.
- If **no leaks**, your tank is ready!

🌿 6. Add Basic Setup Items

Item	Purpose
Gravel/Stones	Makes tank look natural
Plants	Gives shelter, oxygen, beauty
Air Pump	Provides oxygen
Filter	Cleans the water
Light (LED)	Helps fish and plants, adds beauty

👉 These items are low-cost and available at pet shops or online.

🐠 7. Add Fish Carefully

- First add water and let it **stand for 1 day**.
- Add **dechlorinator drops** (if tap water used).
- Add 2–3 fish on Day 1.
- Add more slowly over a week.
- Do **not overcrowd**.

💼 8. Business Opportunity for Farmers

Activity	Earning Source
Sell ready-made aquariums	To pet shops, schools, homes
Keep & sell fish	Guppies, Mollies, Goldfish, etc.
Aquarium cleaning service	Monthly cleaning at homes/offices
Aquarium decoration	Sell plants, pebbles, toys, lighting

👉 With just **₹500–₹1500 investment**, farmers can start a **home-based aquarium business**.

✅ Do's and Don'ts

Do's:

- Always clean your hands before touching tank.
- Keep aquarium **away from sunlight and dust**.

- Change **25% water weekly**.
- Feed fish small amounts **twice a day**.

Don’ts:

- Don’t tap on glass – it stresses fish.
- Don’t use **soap or chemicals** in the tank.
- Don’t add too many fish in a small tank.

4. Accessories used in aquarium fish keeping

Sumanta Kumar Mallik *, Ananya Khatei, M. Junaid Sidiq, Parvaiz Ahmad Ganie, Raja Aadil Hussain Bhat

ICAR-Central Institute of Coldwater Fisheries Research, Bhimtal-263136, Uttarakhand

Corresponding author: skmallikdcfr@gmail.com

Accessories Used in Aquarium Fish Keeping

In ornamental fish keeping, just having an aquarium and fish is not enough. To keep the fish healthy and happy, several **accessories** are required. These accessories help to maintain good water quality, provide oxygen, decorate the aquarium, and support the natural behavior of fish. Let's understand these accessories one by one.

1. Air Pump and Air Stone

Air pumps are very important in any fish tank. They help to mix oxygen in water so that fish can breathe properly. The air pump is connected to a small stone called **air stone**, which creates small bubbles in water. These bubbles not only add oxygen but also make the aquarium look attractive. If there is no air pump, fish may come to the surface gasping for air, which means they are not getting enough oxygen.

Fig. 4.1. Air pump and air stone

2. Water Filter

A water filter helps to keep the tank water clean by removing fish waste, leftover food, and dirt. There are different types of filters like sponge filter, box filter, and external filter. Sponge filters are best for small tanks and are very easy to use. Filters are important because dirty water can make fish sick and cause diseases. A clean tank means healthy fish.

Fig. 4.2. Water filters for aquariums

3. Heater and Thermometer (for tropical fishes)

Some fishes like guppy, molly, and angelfish need warm water to survive. In cold weather or during winter, the water becomes cold and the fish can become slow or even die. That's why we use a **water heater** to maintain a constant temperature. Along with the heater, a **thermometer** is used to monitor water temperature. This ensures the water is not too hot or too cold for the fish.

Fig. 4.3.Water heaters and LED lights for aquarium

4. Lighting (LED lights)

LED lights are used in aquariums to make the fish colors appear brighter and more beautiful. It also helps live aquatic plants to grow well. Too much light or no light can disturb the fish's natural rhythm. A soft white or colored LED light for 8–10 hours daily is enough. Lights also help in cleaning and observing the aquarium clearly.

5. Aquarium Gravel and Substrate

Gravel or small stones are placed at the bottom of the aquarium. They provide a natural look and support good bacteria to grow. These bacteria help in breaking fish waste into

less harmful material. The gravel also helps to anchor plants and stop water from getting cloudy.

Fig. 4.4. Gravels/pebbles, decorative plants, and hides for aquarium

6. Decorative Plants and Hiding Places

Plastic or live aquatic plants are used for decoration. They provide a natural environment for fish. Fish feel safe when there are hiding spots. Small pots, plastic caves, or rocks can be added so that shy fish or baby fish can hide. This reduces stress and keeps fish happy.

7. Fish Net

A small fish net is used to catch or shift fish from one tank to another safely. It helps during cleaning or when a fish needs medical attention. Always use a soft net so the fish doesn't get hurt.

8. Glass Cleaner or Magnet Cleaner

Glass of the aquarium often gets dirty from algae or stains. A glass cleaner or magnetic glass wiper is used to clean the inside and outside of the aquarium glass without removing water. Clean glass means better visibility and a neat tank.

9. Water Conditioner / Dechlorinator

Tap water usually has chlorine, which is harmful to fish. A **dechlorinator** or **water conditioner** is used to make water safe for fish. Just a few drops are enough to remove chlorine. It should be used every time fresh tap water is added.

10. Feeding Tools (Auto-feeder or Manual Feeder)

Feeding should be done regularly in small amounts. For people who are not at home all day, an **automatic feeder** can be used. It gives food at fixed times. Otherwise, a manual feeding spoon or tray can be used to avoid overfeeding.

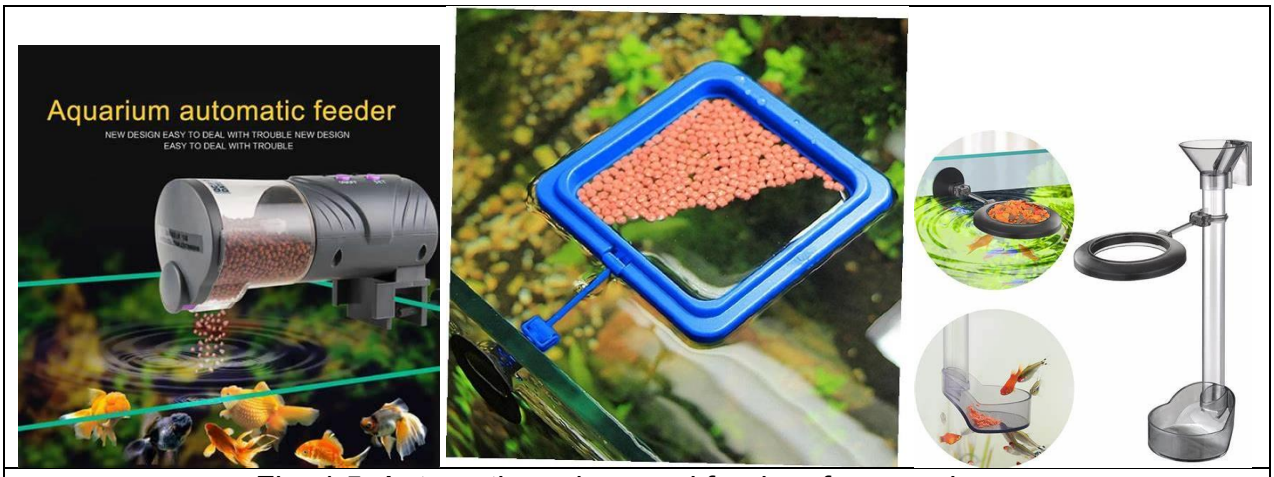

Fig. 4.5. Automatic and manual feeders for aquariums

Summary

Each of these accessories has a special role in making aquarium fish keeping easy, healthy, and successful. Air pumps give oxygen, filters clean the water, heaters give warmth, lights add beauty, and plants make the tank feel like a natural home for fish. These items may seem small, but they are very important for the **survival, health, and happiness** of aquarium fish.

5. Construction of small ornamental fish hatchery

M. Junaid Sidiq*, Ananya Khatei, Sumanta Kumar Mallik, Parvaiz Ahmad Ganie, Raja Aadil Hussain Bhat

ICAR-Central Institute of Coldwater Fisheries Research, Bhimtal-263136, Uttarakhand

Corresponding author: mrjunaidsidiq88@gmail.com

Following is a detailed and easy-to-understand account on "Construction of Small Ornamental Fish Hatchery" for low-literate farmers and hobbyists, with emphasis on using locally available materials (like barrels, tanks, and small ponds) to create a low-cost income-generating hatchery.

Construction of Small Ornamental Fish Hatchery

A Guide for Small Farmers and Hobbyists

Introduction:

Ornamental fish hatchery is a place where fish are bred (for producing babies) and reared (raised) in controlled conditions. It is the starting point of ornamental fish farming. Setting up a big hatchery can be costly, but a small hatchery can be made using simple home-available items. Even a small farmer or a rural household can set it up in their backyard, courtyard, or even on the rooftop.

Such a hatchery can produce thousands of baby ornamental fish, which can be sold to aquarium shops, hobbyists, and traders, giving farmers an additional or marginal income source.

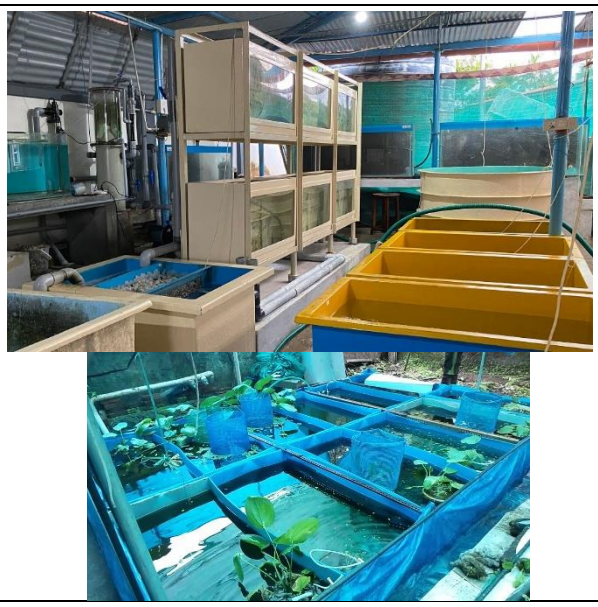

Fig. 5.1. Small scale ornamental fish hatcheries

🛠️ Materials and Tools Required (Easily Available)

Material	Use
Plastic drums / barrels (200 L)	Used as breeding tanks or grow-out tanks
Cement / tarpaulin/ FRP tanks	For rearing or keeping stock fish
Small pond or water tank	Can act as broodstock holding tank
Nets or mosquito nets	Used for covering and harvesting
Air pump + sponge filter	Provides oxygen and water cleaning
Buckets, mugs, pipes	Water handling and cleaning
Bricks and cement (optional)	For making simple cement tanks if space allows

🧱 Step-by-Step Construction and Setup

1. Site Selection

Choose a place that:

- Has some open space
- Gets indirect sunlight
- Is safe from flooding and predators (like cats or birds)
- Has access to clean water (tap, well, or borewell)

2. Tank Setup Using Barrels or Drums

- Use **200-liter plastic barrels** (blue/black food-grade)
- Cut the top open (if closed barrel)
- Clean thoroughly with clean water
- Place them on bricks or stands so water can be drained

You can also use:

- **Cement tanks or FRP** (4x4 ft or 6x4 ft) if space allows
- **Tarpaulin tanks** as cheaper and portable options

3. Water Arrangement

- Fill tanks with **clean, chlorine-free water**
- If using tap water, add **water conditioner or keep it standing for 24 hours**
- Maintain **pH around 6.5–7.5**, and temperature ~24–28°C
- Use **air pump with sponge filters** in each tank to keep water fresh and oxygenated

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4. Broodstock (Parent Fish) Management

- Choose healthy, active **male and female ornamental fishes** (e.g., Guppy, Molly, Swordtail, Platy, Betta)
- Keep them in a **separate broodstock tank** (barrel/tank/pond)
- Feed them good quality food like live feed (daphnia, worms) or high-protein pellets

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5. Breeding Tank Arrangement

- Transfer selected pairs to **breeding tanks or barrels**
- Provide **hiding places** using plants, stones, or plastic decor
- Female lays eggs or gives birth (depending on species)
- In case of live-bearers (like guppy/molly), separate fry immediately after birth

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6. Fry Rearing Tank

- Transfer baby fish (fry) to a **fry rearing tank**
- Feed **infusoria, boiled egg yolk, or powdered feed**
- Use **fine mesh nets** to prevent escape
- Clean water weekly (25% water change)
- As they grow, shift them to **grow-out barrels**

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7. Maintenance and Hygiene

- Daily: Check fish behavior, remove waste, feed 2–3 times in small quantities
- Weekly: 20–30% water change using pipe or mug
- Monthly: Clean sponge filter, check for dead fish or dirt

---

8. Marketing and Sale

- After 30–45 days, fingerlings can be sold
- Sell to:
  - Local aquarium shops
  - Pet markets
  - Online buyers or hobbyists
- Form **Self-Help Groups (SHGs)** for collective marketing
- Attend local exhibitions or fairs to promote fish

💡 Tips for Success

- Start with **easy-to-breed fishes** like Guppy, Molly, Platy, Betta
- Avoid overcrowding — maintain 1 fish per 2–3 liters water
- Maintain **clean water and proper feeding** – these are the keys
- Record the breeding cycles and fish health in a simple notebook
- Take help from fisheries officers or training centers if needed

---

✅ Benefits for Small Farmers

Benefit	Description
Low-cost startup	Uses household items like drums or tanks
Small space requirement	Can be set up in backyard, rooftop, or verandah
Regular side income	Fish fry sell for ₹2–₹10 each
Employment opportunity	Engages women, youth, and elderly
Easy scalability	Can be expanded with more tanks later

🏁 Conclusion

A small ornamental fish hatchery can be a simple and profitable venture for small and marginal farmers, even with limited space and budget. By using household materials like plastic barrels, tanks, or ponds, one can start breeding ornamental fish at home and earn extra income throughout the year. It is a low-risk, high-potential enterprise that also brings joy and learning to the family.

6. Formulation and preparation of farm-based ornamental feed

Parvaiz Ahmad Ganie*, M. Junaid Sidiq, Ananya Khatei, Sumanta Kumar Mallik, Raja Aadil Hussain Bhat

ICAR-Central Institute of Coldwater Fisheries Research, Bhimtal-263136, Uttarakhand

Corresponding author: parvaiz.ganie@icar.gov.in

Following are the accounts for the formulation and preparation of farm-based feed for ornamental fish using commonly available ingredients for small farmers & hobbyists

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🌾 Introduction

For healthy and colorful ornamental fish, nutritious feed is essential. Market feed is often expensive. But farmers and hobbyists can prepare low-cost, nutritious feed at home using easily available farm ingredients like rice bran, wheat flour, groundnut oil cake, etc.

This helps reduce costs and ensures the fish grow well. Below is a step-by-step guide to prepare fish feed, including formulation, mixing, dough-making, pelleting, drying, and packaging – all manageable for farmers with low literacy and limited tools.

Fig. 6.1. Farm made fish feed equipment

✅ Commonly Available Ingredients

Ingredient	Role in Feed
Rice bran	Carbohydrate source, easy to digest
Wheat flour	Binder and energy provider
Groundnut oil cake	Rich in protein
Mustard oil cake	Adds protein and fat

Ingredient	Role in Feed
Soybean meal (optional)	Protein source
Fish meal (optional)	Improves growth & color
Mineral mixture	Supports bone & scale health
Vitamin premix	Boosts immunity and color

📊 Sample Feed Formula (100 kg batch)

Ingredient	Quantity (in kg)
Rice bran	40
Wheat flour	20
Groundnut oil cake	20
Mustard oil cake	10
Mineral & Vitamin mix	5
Salt (common)	0.5
Garlic paste (optional)	0.5
Water (for mixing)	As needed

🔹 **Tip:** Quantities can be reduced proportionally to make 10 kg or 5 kg batches.

🛠️ Tools & Items Needed

- Weighing scale
- Mixing basin / tub
- Grinder / mortar & pestle (to crush oil cakes)
- Sieve (optional)
- Hand pelletizer (manual)
- Old bedsheet or drying tray
- Jute / plastic bags for storage

🔄 Step-by-Step Preparation Process

1. Ingredient Preparation

- Crush oil cakes (groundnut or mustard) to fine powder.
- Sieve rice bran and wheat flour to remove lumps.
- Mix all dry ingredients in a large clean basin.

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2. Dough Formation (Mixing with Water)

- Slowly add clean water to the dry mixture.
- Mix well with hand or paddle until it becomes **soft and sticky dough**.
- Let the dough rest for 10–15 minutes to set.
- Steam-cook the dough in a pressure cooker for a period of 20-30 minutes

✔ Dough should not be too watery or too dry. It should easily pass through the pelletizer.

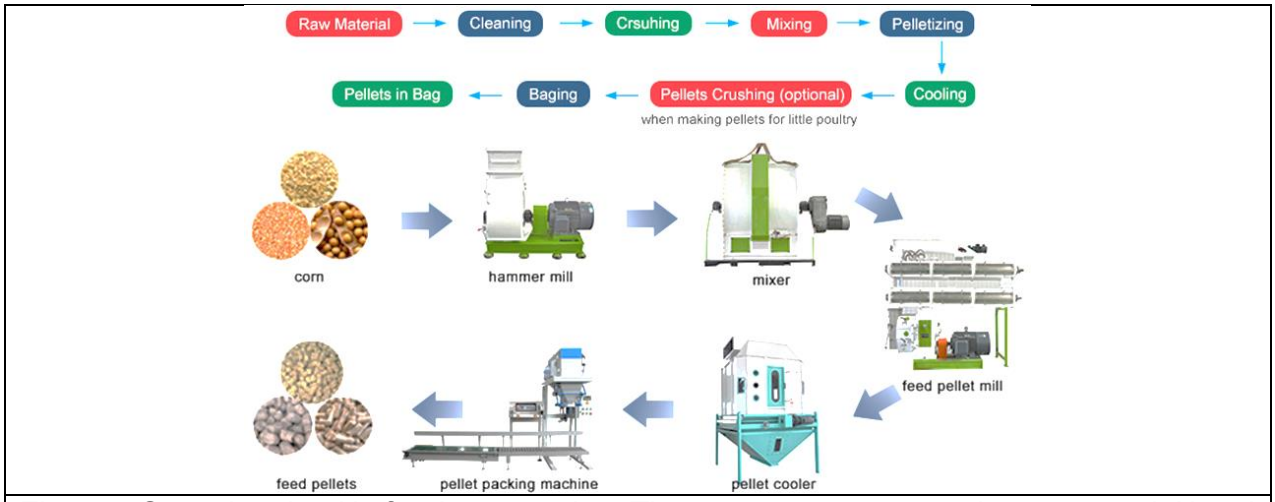

Fig. 6.2. Steps involved in feed preparation. The process represents the commercial level feed preparation. This can be customized to simpler methods at small farm level.

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3. Pelleting (Making Feed Balls or Sticks)

- Use a **manual hand-pelletizer or noodle maker**.
- Press the dough through small holes (2–3 mm) to form **sticks or small round pellets**.
- Collect the pellets on a clean tray or old cloth.

🛠 You can also make small balls by hand if no pelletizer is available.

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4. Drying the Pellets

- Spread pellets thinly over **a clean cloth or tray** under **shade (not direct sun)**.
- Let them dry for **6–8 hours**, or until hard and dry.
- Turn them occasionally to dry evenly.

🔶 Ensure the feed is **completely dry** before storage to prevent fungus.

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5. Packaging and Storage

- Store the dry feed in **clean, dry, airtight plastic or jute bags**.
- Label the bags with **date of preparation**.
- Keep in **cool and dry place**, away from moisture and pests.

🕛 Feed can be stored safely for **30–45 days**.

🐟 How to Use This Feed

- Feed fish **twice a day** in small amounts.
- Feed only what fish can eat in 5–10 minutes.
- Remove uneaten feed to avoid water pollution.

📌 Benefits of Farm-Made Feed

Benefit	Explanation
Low cost	Made with home/farm materials
Customizable	Ingredients can be adjusted as needed
Improves fish health & color	Balanced nutrition
Reduces feed dependency	Less reliance on market pellets
Easy to make at home	Simple tools and no machines needed

🔚 Conclusion

Homemade farm-based ornamental fish feed is a simple, cost-saving, and healthy solution for farmers and fish lovers. With a little effort and local ingredients, you can prepare feed that supports fast growth, vibrant color, and fish health, all while saving money and possibly creating small business opportunities.

7. Packaging and transportation of ornamental fish

Parvaiz Ahmad Ganie*, M. Junaid Sidiq, Ananya Khatei, Sumanta Kumar Mallik, Raja Aadil Hussain Bhat

ICAR-Central Institute of Coldwater Fisheries Research, Bhimtal-263136, Uttarakhand

Corresponding author: parvaiz.ganie@icar.gov.in

This section discusses the step-wise, simplified, and scientific guide on packaging and transportation of ornamental fish, specially crafted for low-literate farmers or hobbyists who want to safely sell or move ornamental fish.

✅ Step-wise Guide: Packaging and Transportation of Ornamental Fish

🐠 Step 1: Prepare the Fish for Transport

- **Stop Feeding**:
  - Small fish: No food for 12-24 hours.
  - Medium fish: No food for 48 hours.
  - Large fish: No food for 72 hours.
- **Why?**: To reduce waste in water, avoid pollution and stress during travel.

🩺 Step 2: Separate Sick or Weak Fish

- Only select **healthy and active fish**.
- Remove fish with dull color, clamped fins, or wounds.
- **Why?**: Weak fish may die or spread disease during transport.

🛁 Step 3: Use Clean and Safe Water

- Use **clean tap water** or **pond water**.
- You can use **anti-chlorine drops** or **rock salt (2–3 g/L)** to treat water.
- **Why?**: Clean water ensures fish safety and reduces stress.

□ Step 4: Prepare the Packing Bag

- Use **thick transparent polythene bags** (double-bag for safety).
- Fill **1/3rd with water** and **2/3rd with oxygen gas**.
- Use **oxygen cylinder** to fill oxygen.
- **Tie tightly** with rubber bands or sutli (jute thread).

📦 **Step 5: Use Outer Box for Safety**

- Place the bag inside **thermocol (Styrofoam) box** or **cardboard box**.
- Keep box in cool place or **add ice packs** (in hot weather).
- **Why?**: Keeps temperature low and prevents overheating.

🚚 **Step 6: Transport Carefully**

- Use **bike, auto, or small truck** depending on quantity.
- Do not shake or drop the box.
- Try to **reach the destination in shortest time possible**.

🌡️ **Step 7: On Arrival – Acclimatization**

- **Float the bag** in the tank for 15–30 minutes.
- Match water temperature inside the bag with tank water.
- Open bag carefully and **transfer fish using a small net** (don't pour bag water into tank).



Fig. 7.1. Accessories required for fish packaging

⚠️ **Important Tips:**

❗ Mistake	😟 Problem
Feeding before transport	Dirty water, fish may die
Too many fish in 1 bag	Stress, injury, low oxygen
No oxygen used	Fish suffocate and die
Fast temperature change	Fish get shocked
No acclimatization	Fish fall sick

🧪 **Useful Additions:**

- Add **few drops of mild anesthetic** (like clove oil) to reduce stress.
- Use **rock salt (1-3%)** in water to prevent infections.

This guide can help a small-scale farmer or hobbyist earn extra income by safely selling and transporting ornamental fish to nearby shops, markets, or customers.

ICAR-CENTRAL INSTITUTE OF COLDWATER FISHERIES RESEARCH,
(Indian Council of Agricultural Research)
Anusandhan Bhawan, Industrial Area, Bhimtal-263136
Distt. Nainital, Uttarakhand
Tel: (05942) 247279/247280, fax: (05942) 274693
Email: dcfrin@gmail.com; director.dcfr@icar.gov.in;
www.dcfr.res.in