

**SIX MONTH SKILL DEVELOPMENT PROGRAM ON AQUACULTURE**  
**Conducted at ICAR-CIFE CENTRE, ROHTAK**

**SDR-101: Principles of fresh water aquaculture and hatchery management**  
**(Credit hours 2+3)**

**Theory:**

**Basics** of aquaculture-definition, scope and history; Present global and national scenario.

**Systems and types** of aquaculture - pond culture, pen culture, cage culture, running water culture, etc. Extensive, semi-intensive, intensive and super intensive aquaculture.

**Principles** of organic aquaculture.

**Carrying capacity** of pond. Criteria for selection of major candidate species for aquaculture.

**Monoculture and polyculture.** Non-food aquaculture. Pearl culture, mussel culture, seaweed Culture

**Fresh water aquaculture-** commercially important candidate species ( Indian major carps, exotic carps, pangasius GIFT tilapia, air breathing fishes, prawns, trout and mahseer); Pre and post stocking Nursery, rearing and grow out ponds; Management of mono and poly culture of carps and prawn; feed and feeding management; Common diseases in fresh water aquaculture-identification and control; harvesting, Transportation and marketing

**Breeding and hatchery management-** Construction of hatchery , concepts of hatchery operation( including preliminary engineering aspects); Brood stock management techniques; Induced breeding techniques with different agents like pituitary gland, HCG, and synthetic hormones( stress on synthetic hormones and its feasibility)

**Integrated culture systems** – principles, types of integrations, advantages and dis advantages

**Modern approaches to aquaculture:** biofloc etc

**Practicals:**

1. Identification of commercially
2. Collection, identification and control of aquatic weeds,
3. Identification of insects, predatory fishes, weed fishes and eggs and larval forms of fishes.
4. Algal blooms and their control.
5. Preparation and management of nursery, rearing and grow-out ponds.
6. Estimation of plankton.
7. Practices on pre-stocking and post stocking management.

**SDR-102: SOIL AND WATER QUALITY MANAGEMENT (Credit hours 1+3)**

**Theory:**

**1) Water quality parameters.**

- Physical parameters: Temperature, Transparency, Turbidity.
- Chemical parameters: pH , Conductivity ,Dissolved oxygen, Free carbon dioxide, Alkalinity, Hardness, Salinity.
- Macro and micro nutrients in water: Nitrogen, Potassium, Phosphorus, Calcium, Magnesium, Sulphates, Chlorides, Iron.; ionic manipulation with special reference to potassium, calcium and magnesium
- Organic and inorganic gases.
- Primary and Secondary productivity.
- Collection and preservation of water samples
- Calculations for different treatments-liming, fertilizers, KMnO<sub>4</sub>, salt etc.,
- Management of water quality: during different climatic conditions.

**2) Soil quality parameters**

- Types of soils and its distribution.

- Soil texture, PH, Organic Carbon, Available Nitrogen, Available phosphorous, Potassium
- Soils suitable for aquaculture, prevention of water seepage
- Soil pH correction, management of acidic and alkaline soils,
- Acidic and alkaline soils.

### **Practicals:**

#### **Water:**

- Preparations of Molar, Normal solutions
- Preparations of ppm, ppt, percentage(%) solutions
- Measurement of Temperature, Transparency, Turbidity .
- Estimations of  $pH$  , Conductivity ,Dissolved oxygen, Free carbon dioxide, Alkalinity, Hardness, Salinity.
- Estimations of Total Nitrogen, Nitrite, Nitrate, Phosphate, Potassium, Sodium Calcium, Magnesium, Chlorides, Iron
- ionic manipulation with special reference to potassium, calcium and magnesium
- Estimations of Primary productivity.
- Record keeping of water quality parameters.
- Chlorination.

#### **Soil:**

- Collection and preservation of soil samples
- Soil texture, Water retention capacity.
- $pH$ , Organic Carbon, Organic Matter
- Available Nitrogen, Available phosphorous, Potassium

### **SDR-103: MANAGEMENT of FARM MACHINERY (Credit hours 0+3)**

#### **Practicals:**

1. **Aerators** –principles, classification, placement and maintenance
2. **Pumps** - types, total head horse power and maintenance.
3. **Filters** – types, Description, construction and maintenance
4. Generators- types and maintenance
5. Power sprayers-
6. Boats and onboard motors
7. Feeders (automatic and demand) and their maintenance
8. ICTs use in farm management-GPS,

### **SDR-104: INLAND SALINE AQUACULTURE (Credit hours 2+2)**

1. Site selection and design of farm
2. Important cultivable species- finfish-Milk fish, Grey mullet, Sea bass, Pearl spot, Cobia, Silver pompano and GIFT tilapia. shellfish-P. monodon, P. indicus, P. merguensis and SPF L. vannamei and crabs.
3. Pre-stocking pond management: drying, ploughing , filtration of water and filling , manuring
4. Stocking procedures: procurement, transportation, acclimatization, calculation of stocking numbers and stocking
5. Post-stocking pond management: estimation of survival, feeds and feed dosage calculations & application methods, phased manuring for live feed production , growth sampling, survival rate assessment
6. Harvesting methods, production and marketing
7. Common diseases of brackish water finfish and shellfish-identification and their control measures (bacterial, viral, parasitic and non-infectious)
8. Bio-security system , its importance and establishment of bio-security system
9. DAH & DF, Govt. of India guidelines for inland states
10. Better management practices

**Practicals:**

1. Identification of commercially important finfishes- Milk fish, Grey mullet, Sea bass, Pearl spot, Cobia, Silver pompano and tilapia
2. Identification of commercially important shellfishes- *P. monodon*, *P. indicus*, *P. merguensis* and SPF *L. vannamei* and crabs (*Scylla serrata* and *S. tranquibarica*).
3. Survival estimation and biomass calculation.
4. Biosecurity measures (Bird netting and crab fencing)
5. Collection and preservation of disease samples
6. Disease identification- microbial and viral
7. Calculation and application of chemical/probiotic/medicine
8. Disinfection and sanitation measures