

## Accomplishments

### 1. Integrated Farming system models

RARS Kumarakom is a pioneer in developing IFS models for both wetland and garden land systems of Kuttanad.

- **The wetland integrated farming system model** christened as '*Oru Nellum Oru Meenum*' (one rice and one fish) developed by the centre was adopted by the neighbouring farmers and gradually spread to similar wetland situations like kole lands of Thrissur, where year-round availability of water is ensured. The protocol was accepted by the state government in 1997.
- **Multi-level integrated farming model**

Rice-fish-duck-buffalo integrated farming system including vigova broiler duck and Kuttanad buffaloes.

- Broiler ducks (Vigova) in cages set above the water body reach culling size in 45-50 days
- Kuttanad buffaloes, fodder and intercrops on the dykes
- Buffalo reach culling size in 12-15 months for meat purpose
- Grass carps are ideal fish component
- Four-fold increase in farm income

### 2. Conservation of agro-biodiversity of Kuttanad.

Survey and collection of rare and endangered species was conducted and about 210 numbers of flora were scripted for information and future follow up. As a part of the programme, a land area of 2.5 ha was marked for the formation of biodiversity museum. Indigenous mango and jackfruit were also collected from Kuttanad tract and is maintained as germplasm. This included two continuous bearing mango genotypes.

- **Rehabilitation mangroves**

A mangrove belt was created along the shores of Vembanad lake, the western boundary of the RARS, Farm by planting saplings of *Rhizophora* & *Bruguera* species.

- **Establishment of a well-equipped biotechnology laboratory**

Molecular characterisation of indigenous flora and fauna (28 mango selections, 6 jack selections, 30 superior garcinia accessions and 28 nutmeg selections) were conducted using molecular markers.

- **Mushroom Cultivation**

Two new mushroom genotypes (Milky mushroom - *Calocybe indica* and *P.opuntiae* were identified and production technology standardized. Germplasm of cultivated and new species of edible mushrooms in Kuttanad are also maintained at RARS Kumarakom.

- **Model rain water harvesting system**

Model rain water harvesting system of 7.76 ha and a water purifying plant established at this centre is a live example of low-cost drinking water unit utilizing local water resources.

#### • **Environmental surveillance centre**

The Centre has a well-equipped laboratory with facilities to study the hydro biological sample analysis. Sediment and water samples were collected from 11 different locations of Kuttanad at monthly intervals: Vaikom, Thaneermukkam, Pathiramanal, 24000, Pallathuruthy, Punnamada and Kumarakom (Kayal area), Veeyapuram, Kallissery, Meenachil & Manimala (Riverine samples) and estimation of pesticide residues (Organochlorines, Organophosphates, Synthetic pyrethroids) and heavy metals are carried out.

A well-developed floating research laboratory- Gaveshiny (the first of its kind in the State for any lake ecosystem) is operational for the environmental surveillance of Vembanad lake. A well-equipped pesticide residue and heavy metal analysis laboratory with GC-MS/MS, HPLC, and AAS etc. has been established for the continuous monitoring work. Detailed studies on the extent and cause of contamination of pesticides in fresh water bodies, sediments, grain, straw and drinking water, aquatic organisms like fish and clam and heavy metals during cropped and non-cropped seasons in the region was also taken up and documented at the centre.

#### **8. Conservation and utilization of beneficial bio-organisms**

Establishment of a bio control laboratory for the mass production of parasitoids and biopesticides for the management of major pests of rice, vegetables and fruit crops is another major intervention by the station aimed at promoting eco-friendly methods of agriculture in Kuttanad.

- Production of biocontrol agents like Beauveria, Lecanicillium and Paecilomyces for vegetable pest management
- Parasitoids like Trichogramma japonicum and T. chilonis for Rice pest management.
- Pheromone traps for control of fruit flies of Mango & vegetables.
- Mass multiplication of Arbuscular Mycorrhizal Fungi (AMF).

#### **9. Soil testing laboratory**

A full-fledged soil testing laboratory is functioning for soil and plant analysis. Soil health cards are given to farmers for adopting soil test based fertilizer recommendations.

#### **10. Agrometeorological Observatory-**

Agro met advisory unit giving biweekly weather forecast and advisories to more than 6000 farmers by SMS.

#### **11. Hydroponics protocols for open water vegetable farming**

Short duration crops like red amaranthus, OP Melon etc using Coir pith compost as growth media was found more suited for open water culture. Cultivation using Eichhornia alone using bamboo pole to demarcate is standardized. The performance has been tested in farmers' plots.

#### **12. Live gene banking of endemic animals and fishes.**

Induced breeding of manjakoory (Horabagrus brachysoma) is successfully carried out and manjakoory fries are propagated. Manjakoory fries are stocked into pond at the block of fisheries. Karimeen seeds are collected from karimeen ponds with the help of karimeen traps (Oliveppu) and propagated. A

novel technology -raceway system- is introduced for controlled breeding of pearl spot (Karimeen) under controlled conditions.

Brood fishes of *Horabagrus brachysoma* (local name Manjakoory), *Channa diplograma* (local name Pulivaaka), *Eetroplus suratensis* (local name Karimeen) and *Labeo dussumieri* (local name Thooli/Pullan) etc are maintained in the ponds of fisheries.

### **15. Production of Meenoot**

A fish feed having 20% protein produced using different agro-based by-products like rice bran, oil cakes, fish meal, atta and mineral mix for Karimeen is being marketed as "Meenoot".

### **Research activities**

#### **Thrust areas for research:**

- Integrated farming involving crops, livestock and fish
- Climate changes impacts on Kuttanad agrarian economy.
- Reclamation and management of problem soils.
- Women's role in the agrarian economy of Kuttanad.
- Testing and popularising improved farm implements.
- Collection, evaluation and characterisation of indigenous and underexploited fruit plants.
- Biocontrol of plant pathogens and characterisation of *Trichoderma*.

#### **Ongoing Projects**

- Centre of Excellence in below sea level farming
  - Establishment of pests and disease surveillance and forewarning units in Kerala.
  - Network Centre for Planting Material Production -strengthening production of quality planting materials and bio inputs.
  - Long term dynamics of organic farming practices in banana variety- Nedran.
  - Research on mangosteen and rambutan.
  - Development of mechanical farming technology for small farms.
  - AICRP project on Biological control of crop pests
  - IMD project on agromet advisory services
  - MIDH project on spices and aromatic plants.
  - Climate change vulnerability and impacts on farmers.
-