M. S. Swaminathan
Research Foundation

Pro-nature, Pro-poor, Pro-women and Pro-livelihood orientation to Technology Development and Dissemination
A FRUITFUL JOURNEY

TWENTY YEARS OF MSSRF
An Adventure in Science and Sustainable Development

M S SWAMINATHAN RESEARCH FOUNDATION

LINKING SCIENCE AND SUSTAINABLE DEVELOPMENT

MSSRF @ 20
Our Focus Areas

A pro poor, pro nature, pro women and pro livelihood orientation to technology development and dissemination

The programmes are broadly covered under

- Coastal systems
- Biotechnology
- Biodiversity
- Ecotechnology
- Food security and
- Information, education and communication.
Coastal System Research

An integrated approach in participatory management of natural resources in coastal areas

Ecological rehabilitation of coastal areas of Pichavaram

Focus: Mangrove restoration, sand dune restoration
Non-mangrove bioshield

Strengthening resilience of tsunami affected communities

Focus: Mangrove bioshield, livelihood and VRC and VKCs

Integrated Fishery Farming System

Training and capacity building
Ecological rehabilitation of coastal areas

**Mangrove restoration**

Mangrove restoration in about 48 ha with the participation of fishing community of three villages

Land provided by the Revenue Department, Cuddalore District

2,42,000 Avicennia and 50,000 Rhizophora propagules

Mangrove bioshield 90 ha in Tamil Nadu and 80 ha in Andhra Pradesh; Mangrove bioshield in 60 ha without canal method – first time in TN

**Non-mangrove bioshield**

Multi-species non-mangrove bioshield to a length of about 5 ha

Both ecologically and economically important species *Pongamia, Callophyllum* and Coconut

Pongamia

Casuarina raised by Forest Department

coconut

Fishing Village
Integrated Mangrove Fishery Farming System

A model developed for integrated aqua-agro seawater farms

A fish-for All Capacity Building and Research Centre being established in TamilNadu, addressing from Capture to Consumption.
Integrated Management of Bioresources

- **Conservation** – Quality Seeds, Seed Banks (Traditional and Modern), Seed Networks, Farmer to farmer exchange
- **Cultivation** – Modified method of cultivation, Intercropping, Farmers’ Method of cultivation
- **Consumption** – Processing, Value Addition, Diversification of products
- **Commerces** – Markets, linkages, branding, labeling, product development, marketing preferably in the Organic Farming Sector
Medicinal Plants

9 tribal medicinal plant conservation gardens
347 Medicinal Plant species
Home Herbal Garden- 14 Medicinal Plant species to 806 Households, 27 villages
Student’s Herbal Garden in 12 schools
Herbal preventive drug for Malaria to 2358 tribal people across 16 villages
Planting material of 64 MP species (8790 seedlings)
Traditional Healers Association (Paroja & Bonda)
Capacity Building of PRI in Tamil Nadu on BD Act & PPVFR Act

Conducted in 4 districts of Tamil Nadu

Two Level Training –

Master Trainers 137 from PRIs, Farmer leaders & NGOs

Second level Training: 3802 persons –

1162 women, 1101 panchayat reps. & officials,
1692 farmers, SHG members & 165 members of NGOs & CBOs
Every Child a Scientist

Through Interaction with experts; Multimedia; Camps and fests; Field visits

DNA Clubs have already been established in 10 schools in Kerala and Orissa & this year we will be working with 5 schools from Andhra Pradesh
Biotechnology

Use of cutting edge science and technologies for adding value to bioresources through prospecting for novel genes, compounds and organisms
Biotechnology and Shaping our Agricultural Future

- Genetic Shields for Sustainable Food Security
  Salinity Tolerance, Drought Tolerance, Hidden Hunger
- Tissue Culture, Conservation
- Monitoring Ecosystem Health (using Lichens)
- Bioprospecting for Novel genes, compounds and organisms
Model systems are studied for different purposes……..

**GENES IDENTIFIED AND USED FOR TRANSGENICS**

<table>
<thead>
<tr>
<th>Gene Source</th>
<th>Genes</th>
<th>Functions</th>
<th>Used for</th>
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<tbody>
<tr>
<td><strong>Avicennia</strong></td>
<td>SOD, APX, MDAR, Ferritin</td>
<td>Oxidative stress, Iron Accumulation</td>
<td>Salt Stress, Biofortification</td>
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<td></td>
<td>Transcription factors</td>
<td></td>
<td></td>
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<tr>
<td><strong>Porteresia</strong> (Wild rice)</td>
<td>HKT Na⁺/H⁺ antiporter</td>
<td>Salt Exclusion</td>
<td>Salt Stress</td>
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<tr>
<td><strong>Prosopis juliflora</strong></td>
<td>GST Metallothionein</td>
<td>Oxidative Stress, Heavy metal</td>
<td>Salt/ Drought Stress, Phytoremediation</td>
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<tr>
<td></td>
<td>Polyketide synthase</td>
<td>Secondary metabolite prodn</td>
<td>Anti-microbial compounds</td>
</tr>
<tr>
<td><strong>D.applanata</strong> (Lichen)</td>
<td>Curcin</td>
<td>Seed protein</td>
<td>Seed oil biosynthesis</td>
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<tr>
<td><strong>Jatropha curcas</strong></td>
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</tbody>
</table>
Bioprospecting of selected Lichen and Plant species for product development against Cancer and Tuberculosis

Characterized compounds from Lichen and plant species….

Preliminary Screening has been done with 60 different cell lines

(Lung Cancer, Breast cancer, Human Embryonic Kidney cell line)

Compounds of *E. agallocha* exhibit 100% mortality against 20 different cancer cell lines tested.

Lichen compounds are also being tested against cancer cell lines and tuberculosis
Bioprospecting of potential microbes from different ecological niches

Biological control of blast disease of finger millet

Diversity of Nitrogen fixing and phosphate solubulising microbes in mangrove ecosystems.

Screening for biomolecules from microorganisms collected from different ecological niche

Field testing of liquid formulations

Of the 1600 cultures; 64 positive HITS for anti cancer; 3 and anti-inflammatory
Harnessing Science and Technology and need based Capacity Building for Promoting On-Farm and Off-Farm Livelihood Opportunities for rural communities
ON-FARM ACTIVITIES

- More than 500 farmers have adopted Integrated Farming systems
- SRI adopted in more than 100 acres
- 21,500 kg of biological software’s have been produced by women Self help group members
- More than 1000 families have adopted Integrated Dairy Management
- Approximately 15,000 households have established kitchen garden
- Soil health cards have been adopted by farmers
Our interventions has resulted in.....

- Cultivation of 14 vegetables - 152 acres - 7 villages - 243 HHs
- Groundnut, Spices & tubers cultivation - 210 acres – 276 HHs
- Five plant campaign (Papaya, Drum stick, Lemon, Chilli & Yam) - 468 HHs - 6 villages
- Backyard nutritional garden in 327 HHs - 6 villages
- Cultivation of Pulses & Finger millets – 89 acres - 126 HHs
- Fish cultivation in 26 ponds - 102 HHs - 7 villages.
- 20 pedal pumps provided for lifting water for vegetable cultivation
- Establishment of 21 Low cost poly houses.
- Large-scale cultivation of *Piper longum* in 16 acres.
- Mobilization of fund for irrigation - 55 acres
- Mango & cashew plantation in 50 acres
Vulnerability Assessment & Enhancing Adaptive Capacity to Climate Change in the Semi-Arid Regions of India

MSSRF is working toward creating a cadre of local level ‘Climate Risk Managers’
FOOD SECURITY

Interventions for improving food and nutrition security status of the communities
The second part of the Report examines the major public food delivery systems – PDS, ICDS, MDMS and makes suggestions for effective delivery.
Community Food and Nutrition Security

Household Entitlement Card listing food and nutrition schemes printed in Tamil and Oriya.

Manual on setting up Community Food-grain Banks

Monthly growth monitoring of children (0-3yrs)

Village Health Committees formed to train community nutrition workers

Backyard kitchen garden activity promoted as nutrition initiative.
Working on the NUS in five states to promote the cultivation, conservation and consumption.

The focus is on **finger millet, little millet, foxtail millet, barnyard millet** and **grain amaranth**

3372 kg seeds of different varieties were produced in participation with farmers.

Production and marketing groups formed. Trademark established for millets from Kolli Hills and new packaging carton for **ragi** malt released.
NUTRITIOUS MILLET VALUE ADDED PRODUCTS

Ragi malt,
Ragi flour,
Ragi murukku,
Nipputtu
Ragi Laddu
Little millet Rice,
Little millet flour,
Little millet uppuma mix,
Little millet Rava Dosa Mix,
Little Millet Cookies
Foxtail millet Rice,
Foxtail millet flour,
Foxtail millet ladu,
Millet Diabetic Mix

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Information, Communication and Education

To promote sustainable rural livelihoods through digital empowerment based on a pro-poor and pro-women orientation to technology choice and dissemination, and human resource development.
Dissemination: What ever it works

Wired / Wireless / GSM based Public Address System

Community Newspaper
Dissemination: What ever it works

Advisories through Reliance Fixed Wireless Phone –
Closed User Group

INCOIS – Electronic Display Board
Mobile Applications

SMS Server

Strategic Partners

Content Providers
MSSRF VRCs – IKSL Content Manager

Audio Advisories

Queries / Clarifications

Audio Advisories through IKSL-AirTel Network

GREEM
SIM Card Subscribers
Farmers

IFTICO
Fisher Friend Mobile Application

Wave height, Weather, Potential Fishing Zone, Flash News, Government Schemes / announcements, Market, Rural Yellow Pages
Knowledge on Wheels

Soil and Water Testing Laboratory Mobile Van

Mobile Tele-Ophthalmology Services

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National Virtual Congress on Celebrating Women’s Contributions to Safeguarding and Strengthening Ecological Security
International Collaborations