M S SWAMINATHAN RESEARCH FOUNDATION

30 SUCCESS STORIES

1988 - 2018

pro-poor, pro-nature, pro-women research and action

M.S. Swaminathan Research Foundation

August 2019

PREFACE

M. S. Swaminathan Research Foundation (MSSRF) is a non-profit research organization established in 1988.The mission of MSSRF is to link science and sustainable and equitable rural development. Since its inception the Foundation has focused on harnessing science and technology options for rural development through pro-poor, pro-women and pro-nature approach. MSSRF carries out research and development in six major thematic areas: Coastal systems research, Biotechnology, Biodiversity, Bio-villages, Food security, and Information, education and communication for knowledge empowerment of resource-poor, largely illiterate and unskilled rural women and men.

The scientific approach of MSSRF includes participatory research with rural and tribal families; anticipatory research to build capacity to face the challenges of climate change, and translational research to convert scientific know-how into field level do-how. Participatory research with tribal families leads to the development of new crop varieties such as *Kalinga Kalajeera, Navara* etc. Research on Ecotechnologies lead to sustainable farming practices and livelihoods. Similarly, the Farming system for nutrition leads to the development of genetic gardens with biofortified plants. Anticipatory research to face problems arising from Climate change lead to the development of Mangrove bioshields, below sea level farming techniques and research on developing abiotic stress resistance in paddy and saline resistant microbial communities.

This publication contains details of thirty success stories. Nothing succeeds like success and hence we should learn both from successes and failures. I hope this publication will be useful to all those who are interested in harnessing science for food and nutrition security and the economic advance of rural and tribal population.

M.S. Swaminathan
Founder Chairman, MSSRF

1 August, 2019

MSSRF's Success Stories

This publication on the 30th year milestone of M S Swaminathan Research Foundation highlights some key successes from the field interventions in the last three decades of our journey. We have listed out 30 such stories with notable outputs and outcomes and contributing to achievement of nine Sustainable Developmental Goals (SDGs).

The integrated mangrove restoration, on-farm conservation of biodiversity especially of farmer's varieties, agro-forestry, discovery of new plant species, and conservation of Rare Endemic and Threatened plants of Western Ghats are some of the stories that have influenced policy at national, state and local levels. Equipping crop species to overcome different stresses including salinity and the promotion of beneficial microorganisms are the biotechnological initiatives that helped to promote rice cultivation in problem soils and to start rural enterprises. Farming systems for nutrition, empowering women farmers and Community Hunger Fighters' programme are instances from the agricultural sector that impacted on food and nutrition security of hundreds of families. Eco-enterprises, farmer-controlled value chain and Rice Bio-Park that contributed to increasing farmers' income are the major cases from the ecotechnology programme. Climate risk management and use of information communication and technology have helped in bridging the rural knowledge divide.

We continue working in these areas with the idea of scaling-up and linking with other mainstream initiatives meant for achieving the SDGs. We take this opportunity to thank all our donors and partners for the support extended to us and their continued involvement in moving forward.

N. Anil Kumar
Executive Director

31 July, 2019

The Coastal Systems Research Programme aims at integrating ecological security of coastal areas and livelihoods security of coastal communities, in a mutually reinforcing manner, to achieve sustainable management of coastal resources.

1 Restoring mangroves, rebuilding livelihoods

The Participatory Mangrove Management Programme along the Coast of India has an impact in the restoration of over 2500 ha of degraded mangrove wetlands, and promotion of Joint Mangrove Management (JMM) programme by bringing in ~10000 mangrove user families and covering ~20000 ha of mangrove forests under conservation and management. The National Mangrove Action Plan s included the JMM as the best available model for mangrove management and the model is also accepted by NABARD as a potential adaptation method to overcome the challenges of sea level rise and other climate change induced disaster.

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/restoring-mangroves-rebuilding-livelihoods/

2 Promoting Fish for All, and Fish for Ever

The post tsunami needs and vulnerabilities of the coastal communities of Tamil Nadu paved the way for MSSRF to establish an exclusive facility: Fish for All Research and Training Centre for promoting sustainable fishery development with active involvement of fishers and their families in Poompuhar village of coastal Tamil Nadu with the support of the Tata Trusts. The centre engages in intensive training for fishermen and women, and fishery sector officials. It has now has emerged as a platform for multi-stakeholders for undertaking both practical actions needed for sustainable fishing, and to influence public policy aimed at sustainable management and protection of marine and coastal ecosystems.

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/promoting-fish-for-all-and-fish-for-ever/

3 Mobile App to save lives and livelihoods of small scale fishers

This is the flagship programme of the Fish for All Centre in capture fisheries, and so far it has reached over 50,000 fishers across 66 districts in eight states. The Fisher Friend Mobile App (FFMA) is a decision support facility to fishers to receive relevant information in the vernacular language on wave height, wind speed and direction, sea current, sea surface temperature, potential fishing zone, GPS for safe navigation, marking risk zones, dragging fish net area, emergency contact, and government schemes. It addresses shore-to-shore dynamic information and knowledge needs of small craft resource-poor fishers who live out everyday in fear of failure, loss, and death.

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/mobile-app-to-save-lives-and-livelihoods-of-small-scale-fishers/

4 On-farm conservation of coastal rice based farming systems

Soil salinity is one of the main problems in coastal agriculture further aggravated now by rising sea level as well as the reduction in fresh water flow and rainfall, in draining the salts as a natural process. On-farm management of the saline tolerant varieties such as *Kagga* in Karnataka under *Ghazni* lands has been promoted to restore the agro-ecosystems with rice-shrimp farming systems. About 85 traditional rice varieties collected from the districts of coastal Karnataka such as *Belli Kagga*, *Kari Kagga*, *Mud Pandya* and *Hallaga* show high level of tolerance to salinity.

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/on-farm-conservation-of-coastal-rice-based-farming-systems/

5 Global recognition for the below sea level rice cultivation

MSSRF's effort since 2007 resulted in FAO's recognition of Kuttanad farming systems that practice below sea level rice cultivation in reclaimed wetlands as a globally important agricultural heritage system (GIAHS) in 2013. Kuttanad being a deltaic region where most of its land lies at 1.5 to 2.5 m below sea level, and a part of the Vembanad Wetland System (VWS), are the only sites in the whole Asian region where people practice Below Sea Level Farming. It consists of 1,10,000 ha of lakes, lagoons, rivers, and canals, in which 50,000 ha lies below the mean sea level height.

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/global-recognition-for-the-below-sea-level-rice-cultivation/

PART 2: BIODIVERSITY CONSERVATION & ENHANCEMENT

The Bioversity Programme's goal is to promote conservation of biodiversity and create sustainable livelihoods for the poor and vulnerable communities living in the biodiversity 'hotspots' of peninsular India.

6 Recognizing farmers' varieties

The farming communities of Wayanad cultivate diverse varieties of native rice, fruits and vegetables which are resilient to local climatic variations and serve functionally as food and medicine with strong cultural traditions. The Community Agro-biodiversity Centre maintains 25 lines in Banana, 26 lines in different pulses species, 45 lines in vegetables and 52 different green leafy vegetable species and acts as a resource centre to address malnutrition by strengthening agriculture- nutrition linkages.

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/recognizing-farmers-varieties/

7 Globally important tribal agricultural heritage site

The agro-ecosystem of the Jeypore region of Odisha recognized by Food and Agricultural Organization (FAO) as a GIAHS is famous for its agro-biodiversity and its cultural traditions. The fifty two tribal groups including *Bhumia*, *Paroja*, *Khond*, *Bhatada* and *Bonda* are the dominant communities in this region. The traditional knowledge of the people on plant genetic resources including medicinal plants (nearly 1200 species) and wild food species (more than 50 species of tubers, corms, fruits, vegetables etc) are intrinsically linked to their cultural values vis-à-vis conservation.

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/globally-important-tribal-agricultural-heritage-site/

8 Farmer controlled value chain for Millets

MSSRF is promoting millet cultivation in Kolli Hills in Tamil Nadu and Koraput in Odisha since 1997. The activities involve a holistic value chain approach addressing highly interconnected aspects of conservation, cultivation, consumption and marketing of local produce. About 2300 families (about 1500 in Kolli Hills and about 800 in Jeypore) of tribal farmers are involved in millet cultivation through a network of 15 village seed banks functioning across 7 Panchayats.

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/farmer-controlled-value-chain-for-millets/

9 Agro-forestry with Small orchards

MSSRF has demonstrated site-specific model of small orchards with selected fruit trees among 1000 farmers of Kolli Hills. Several economically useful indigenous forest species were planted as border cover of the orchard to meet the fodder, firewood and timber requirement of tribal families, thereby reducing their dependence on forest. Income generation activities like animal husbandry (backyard poultry, piggery) and non-farm activities were integrated to diversify the production systems and bring integration among different components, to optimally use available resources for maximizing the benefits.

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/agro-forestry-with-small-orchards/

10 M. S. Swaminathan Botanical Garden for saving rare, endemic and threatened plant diversity

MSSRF's work on biodiversity in Kerala has resulted in collection and conservation of many endangered plant species and little-known species and varieties of food, nutrition, and health value found in the Western Ghats. These collections from on-farm to the wild and forests have been brought together in the form of a Botanic Garden named 'M. S Swaminathan Botanical Garden' with distinct components for agro-biodiversity, medicinal plants, Rare, Endemic and Threatened (RET) species of trees etc.

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/m-s-swaminathan-botanical-garden-for-saving-rare-endemic-and-threatened-plant-diversity/

11 Planted over 100,000 seedlings of RET plant species

A project initiated to mark the 80th birthday of Prof. M. S. Swaminathan and to accelerate MSSRF's conservation efforts through a targeted number of 80 RET angiosperm plant species of Western Ghats resulted in relocation of 80 RET species, which were said to be restricted to tiny pockets of localities. As part of this study, a total of 2100 flowering plants were documented, with 52 Red Data Species and 650 endemics of Western Ghats.

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/planted-over-100000-seedlings-of-ret-plant-species/

12 Many new species of vascular plants described

MSSRF team has identified 15 new species of flowering plants from the forests of Wayanad and other parts of Kerala, since the start of its floristic study in 1999 and the study of RET plant species in Wayanad district. MSSRF's study in the Western Ghats of India proves that this global biodiversity hotspot is still an underexplored region even in case of higher plant species. Before the start of this study we had never expected that so many new species would be waiting for discovery in the Western Ghats region, as it is one of the best studied floristic regions of the country.

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/many-new-species-of-vascular-plants-described/

13 Conserving wild food for nutrition

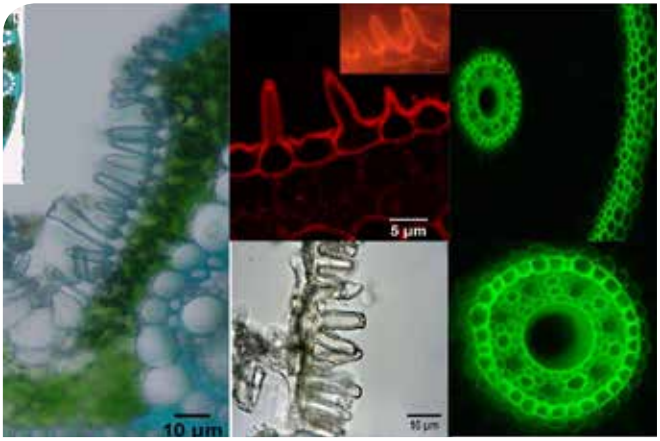
Recent studies in Wayanad district show widespread prevalence of malnutrition among pre-school children, pregnant mothers' and lactating women among tribal communities like Paniya and Kattunaikka with changing dietary practices. MSSRF's study in the district on wild edible species and marginal fruits and vegetables during 2000-2010 showed the existence of about 100 edible roots, tubers and rhizomes, 20 varieties of legumes, 16 citrus cultivars, 343 wild food/ wild relatives of crop plant species, 150 vegetable varieties and about 14 Musa cultivars. Such food baskets with diverse foods had been serving as a 'safety net' ensuring the food and nutritional security of tribal families.

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/conserving-wild-food-for-nutrition/

PART III: BIOTECHNOLOGY

The focus of the Biotechnology Programme is to undertake anticipatory and strategic research in response to severe environmental degradation, changing climate scenarios, such as sea level rise, reduced precipitation and deteriorating soil and water quality and develop relevant products

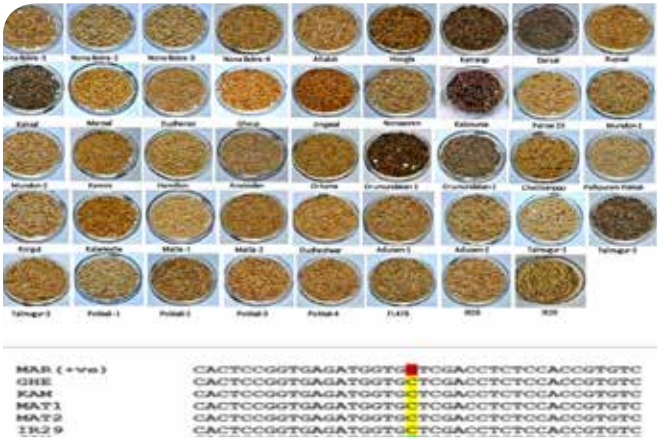


14 Understanding the molecular and morphological mechanism of saline tolerance in rice

Coastal rice (Oryza sativa) landraces that have adaptively evolved in different ecological niches offer a unique opportunity to dissect salinity tolerance traits using molecular and cell biological tools for further breeding with the salinity tolerance in a complex multigenic trait. A comparative analysis of saline tolerant wild rice species with cultivated rice provided the basis in understanding the molecular mechanisms and phylogeny of these plants. Molecular research work has been carried out with respect to 44 saline tolerant rice landraces from different coastal regions of India.

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/understanding-the-molecular-and-morphological-mechanism-of-saline-tolerance-in-rice/

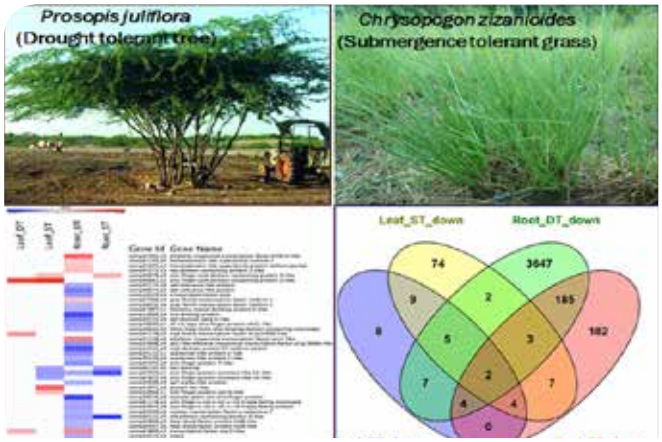


15 Beneficial microbes to enhance soil fertility and crop productivity

The importance of soil biodiversity in maintaining soil fertility, and the interdependence of soil biological activities with physical and chemical characteristics is gaining attention in the context of sustainable agriculture. MSSRF has been involved in identification of potential beneficial strains, exploring their unique properties in soil health management and developing products that can be used by farmers. Currently it has a culture collection of 30,000 bacterial isolates from mangroves and agriculture soils. The in-depth studies in some of the strains resulted in valuable inputs to strengthen its application in soil health management.

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/beneficial-microbes-to-enhance-soil-fertility-and-crop-productivity/

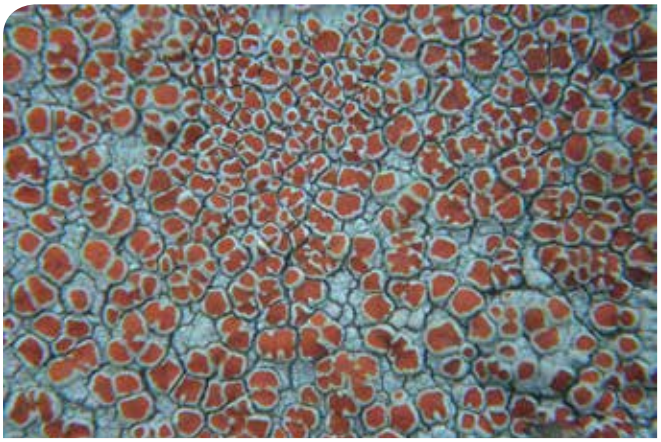


16 Understanding the abiotic stress tolerance pathways for equipping crop species to overcome stress

Bioinformatics tools provide insights on the physiological and molecular mechanisms in response to stress tolerance in model species and the output helps in engineering similar pathways in susceptible crop plants. Identification of stress responsive genes, ion transporters and transcription factors using next generation sequencing approaches and bioinformatics analysis are part of the process.

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/understanding-the-abiotic-stress-tolerance-pathways-for-equipping-crop-species-to-overcome-stress/



17 Therapeutic compounds from lichen cultures

The study on lichen species and its ecology helped to prove the use lichen species composition and density as a potential indicator to assess the health of the ecosystem in certain forest types of Western Ghats. Lichens are a rich resource of pharmaceutically important secondary compounds like polyketides with high pharmaceutical relevance and drug prospecting odds. The bioprospecting work has resulted in screening diverse medicinal plants and lichens. MSSRF is collaborating with tuberculosis and cancer research institutes and has identified molecules with anti-cancer and anti - Mycobacterium tuberculosis properties.

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/therapeutic-compounds-from-lichen-cultures/

PART IV: AGRICULTURE, HEALTH AND NUTRITION

Sustainable food and nutrition security is an important objective that underlies the entire gamut of work undertaken by MSSRF. This is done through research, policy analysis and demonstrating models.

18 Promoting farming systems for nutrition

Keeping the zero hunger challenge in mind, MSSRF has been engaging in advocacy for a Farming System for Nutrition (FSN) approach. FSN is a concept to mainstream the nutrition dimension in the design of the farming system to address prevailing nutrition deficiencies in the population. The concept has been field tested in two states- Maharashtra and Odisha. The approach was appreciated by the Government of Odisha and the term 'nutrition sensitive agriculture interventions' included in the state's agriculture budget for 2018-19.

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/promoting-farming-systems-for-nutrition/

19 Community Hunger Fighters

The Community Hunger Fighters (CHF) Programme is an action, reflection education model wherein communities are empowered to move towards nutrition security through continuous capacity building of representatives, selected by the community itself. So far 100 CHFs have been trained across the states of Odisha and Maharashtra. The participatory action research methods seek to facilitate a process of action and reflection by selected community representatives, both men and women as CHFs, to help them identify, prioritize and take action, at least in areas under their control, to augment food and nutrition security at the household level.

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/community-hunger-fighters-2/

20 Promoting *Navara*- A '2500 years old' medicinal rice

Navara is a medicinal rice variety cultivated only in the state of Kerala. Documents show that it has been under cultivation in Kerala for about 2500 years since the time of Susruta, the Indian pioneer in medicine and surgery. Navara is reported to have multiple uses as a nutritious, balanced and safe food for people of all ages. MSSRF had undertaken detailed morphological survey of this variety and reported for the first time occurrence of four distinct sub-types within Navara, which include awned and awnless black-glumed and yellow-glumed grains. Chemical prospecting has also been carried out to understand its unique properties.

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/promoting-navara-a-2500-years-old-medicinal-rice/

21 *Mahila Kisan Sashaktikaran Pariyojana*: Empowering women farmers

MSSRF started work with widows of farmers who had committed suicide in Vidarbha, Maharshtra in 2006 to promote sustainable agriculture as an option to cope the on-going issues in making farming as viable option to secure livelihoods and household nutrition. The work was extended to cover other women farmers in 2007, organise them into women farmers' groups – Mahila Kisan Samitis and capacitate them in sustainable agriculture practices, aspects of food and nutrition security and awareness about their entitlements under different government schemes.

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/mahila-kisan-sashaktikaran-pariyojana-empowering-women-farmers/

PART V: ECO-TECHNOLOGIES, CAPACITY DEVELOPMENT AND SUSTAINABLE LIVELIHOODS

The JRD Tata Ecotechnology centre was established in 1996, with support from the Sir Dorabji Tata Trust, Mumbai. Persistent poverty and declining agricultural productivity among small holding farmers along with depletion of natural resources are the main concerns with which Ecotechnology Programme was evolved.

22 Ecoenterprises: Mass multiplication of beneficial microbes to agriculture as ecoenterprises

Biological inputs play a major role in practicing sustainable agriculture on field. In spite of several products, use of microbial and insect species in pest management and soil fertility processes assumes great importance in reducing the use of chemical inputs. Timely availability with good quality of such products is a challenge for the small holder farmers. MSSRF has pioneered in appropriating the production technology to the local context, reduced the scale and demonstrated its production as an ecoenterprise managed by women farmers in rural areas with necessary backward and forward linkages.

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/mass-multiplication-of-beneficial-microbes-to-agriculture-as-ecoenterprises/

23 Plant clinics for better plant health

Plant Clinic is an innovative model to provide plant health diagnostic services to men and women farmers. It is being implemented in partnership with Centre for Agriculture and Biosciences International and the model has been appropriated to the context of small farmers. MSSRF runs a network of 21 Plant Clinics in 125 villages and supports 30586 farmers including 4410 women. Since 2013, conducted 1908 Plant Clinic sessions have been conducted and 25564 crop samples were tested. It diagnoses the real time issue of pests and diseases in any crop and renders accurate knowledge to the farmers to understand harmful effects of red labeled/banned pesticides, pest resurgence, resistance to pesticides etc.

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/plant-clinics-for-better-plant-health/

24 Rice Bio-Park in Myanmar

MSSRF in partnership with the Department of Agricultural Research, Yenzin, Nay Pyi Taw, Myanmar has established a Rice Biopark at Nay Pyi Taw. The rice biopark initiative is part of the Indo-Myanmar Friendship Project, funded by the Ministry of External Affairs, Government of India. The rice biopark concept was conceived by Prof M S Swaminathan, Founder of MSSRF. Rice is the major livelihood supporting crop of Myanmar. However, farmers have been largely using only the rice grain and were wasting the other rice biomass.

The straw at 1:1 grain to straw ratio is either burnt

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/rice-bio-park-a-pathway-to-use-the-rice-biomass-adopting-circular-economy/

25 Women participation in dairy value chain

Small holder women farmers face gender based constraints at micro level (individual, household and community) and meso-level (institutions and services) to move up in the dairy value chain in spite of their contribution of up to 90 per cent of work in production phase of value chain. Their access to productive resources such as technical support to improve the productivity by enhancing their skills on animal nutrition and care, institutional linkages to input and output services, reaching the scale of economy by collective action and financial services supported them to move up in the dairy value chain.

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/women-participation-in-dairy-value-chain/

26 Alternate seed systems in pulses

The yield gap in pulses is about 30 to 40% of its potential yield in Villupuram district in Tamil Nadu. The main reason was lack of use of quality seeds as well as the suitable variety. Commercial seed production by the farmers is very low and private seed companies are also not actively engaged in pulses seed production. Department of Agriculture has been producing seeds of pulses and distributes them among farmers. However, the seed replacement ratio is lower in pulses which are one of the reasons for lower productivity.

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/alternate-seed-systems-in-pulses/

27 Climate information services for effective risk management

Increasing variability in weather and climate is a major production risk for farming, especially among smallholders, in particular women farmers. Advances in forecast development at finer spatial and time scales as well as communication modes offer greater scope to reduce such risks in farming. MSSRF works on understanding the gendered traditional knowledge on risk and coping measures and strategies, facilitating access to seamless weather and seasonal climate forecast, communicating and building the capacity of men and women farmers to understand and use the information as an adaptive measure in farming.

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/climate-information-services-for-effective-risk-management/

28 Farmer collectives for small holders' competitiveness

MSSRF has been adopting a collective approach to promote small farmers competitiveness in input and output marketing services, technical support, credit and insurance services. Eight FPOs have been promoted across field sites and are working with 8900 farmers. The FPO's intervention in the market as aggregator helps to reduce the market intermediaries at one or two levels and directly make a link with either processing firms in case of pulses, maize and cotton in southern states and retailers in vegetables.

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/farmer-collectives-for-small-holders-competitiveness/

29 *Grameen Gyan Abhiyan* for bridging the knowledge divide

Information Village model for knowledge empowerment of marginalised sections of the community was demonstrated in early 2000 by adopting modern Information Education and Communication technologies such as internet, mobile telephony, social media, audio and video tools. It adopted a hub-spoke model approach later transformed into Village Resource and Knowledge centre network in reaching about 25000 men and women. Subsequently, it was scaled-up through a consortium as Grameen Gyan Abhiyan with multiple stakeholders.

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/graeem-gyan-abhiyan-for-bridging-the-knowledge-divide/

30 Transforming public libraries as life long knowledge learning centres

MSSRF is spearheading the repositioning of public libraries across India and South Asia as Lifelong Knowledge Learning Centres by capacitating public librarians as Community Innovative Trailblazers, since 2015. The International Network of Emerging Library Innovators (INELI India and South Asia) a global libraries adapted model was initiated in 8 regions across the globe propelling community development through their respective public libraries, 37 public libraries are now an active knowledge hub, using technology, and delivering community need based services for building inclusive, safe and resilient communities.

for more reading...

https://www.mssrf.org/mssrfthirtyyearsnew/transforming-public-libraries-as-life-long-knowledge-learning-centres/

M S SWAMINATHAN RESEARCH FOUNDATION
3rd Cross Street, Institutional Area, Taramani
Chennai - 600 113, India
Tel: +91 (44) 22541229, +91 (44) 22541698
www.mssrf.org