



BIOCULTURAL HERITAGE AND SUSTAINABILITY



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Layout - M.Mukesh Cover Photo - Sirgendu Gayan

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Published by
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GIVING BREATH TO DYING WEALTH A COMMUNITY CONSERVATION MOVEMENT FOR SAVING THE VANISHING CROP DIVERSITY OF WAYANAD

Anil Kumar N., Parameswaran Prajeesh* and Smitha K.P.

Abstract

On-farm management of Agrobiodiversity in the Western Ghats, the Biodiversity hotspot and a UN – accredited World Heritage Centre has become difficult due to an array of reasons. Specifically in rice-paddy system, the conversion of rice fields and dwindling diversity of rice landraces are found to be the biggest challenges. This case study describes the case of Wayanad District of Kerala, India, where concentrated efforts have been laid down to study, device and implement Agrobiodiversity management centered on rice-paddy. Seeds are the inevitable part of Agrobiodiversity, the source of life and the foundation of our existence. The selection and growing of seeds performed by our forefathers have contributed to the conservation of immense number of landraces that satisfy our different needs. This case study illustrates a movement that has promoted conservation of seeds of indigenous varieties of small-holders' family farms in Wayanad District of Kerala. Effort has been made to integrate Conservation issues, Cultivation knowledge, Consumption awareness and Commercial aspects into one overarching policy strategy.

INTRODUCTION

Way back in 1983, Prof. M. S. Swaminathan had stressed the need for a conservation continuum, beginning with revitalizing conservation of domesticated plants by farm families in all countries, and extending to the establishment of an international genetic resource repository maintained under permafrost conditions. This has resulted in the establishment of the global seed vault in Arctic Svalbard archipelago to store copies of seeds from all over the world and a

Note: The information and data presented in this paper are substantially drawn from the Annual Reports of M.S. Swaminathan Research Foundation (1998-1999 to 2013-2014).

number of national level gene banks in many countries (Swaminathan, 2009). However, the current global trend in the conservation of Plant Genetic Resources (PGRs) is to work directly with farmers rather than through Gene Banks, and hence In-situon-farm conservation become more important, while ex-situ collections are only as back-ups for PGR management. This is all the more important when on-farm level erosion of genetic diversity of crops, breeds and strains are reported as exceptionally high in many parts of the world and a complete wipe out of such diversity in the near future is predicted. As an adaptation option, in situ on-farm conservation of traditional crops and breeds that cope with wide agro-climatic and agro-ecological conditions is seen as a reliable tool. We present in this paper, the results of M S Swaminathan Research Foundation's (MSSRF) interventions since 1997 to promote on-farm conservation and to save the vanishing crop diversity in the Malabar region of Kerala, where a majority of people depend heavily on the traditionally conserved PGRs for their food, nutrition and income security*.

The Intervention Site& the Context of Intervention

Wayanad District in Kerala: An Agrobiodiversity heritage/hot spot: Wayanad qualifies simultaneously as an agrobiodiversity heritage site and a hotspot of biodiversity. It is a hilly terrain in southern Western Ghats and lies at an average altitude of 750 m. above sea level. The district is unique for its rich wealth of flora and fauna and for the diverse cultures. The adivasi population contributes 18.53%, which is the largest in the state of Kerala (ORGCCI, 2011). They include farming communities, landless agricultural labourers, artisan communities and hunter-gatherer communities. The five dominant adivasi groups of Wayanad are Kurichya, Mullukuruma, Paniya, Adiya and Kattunaikka. Others are Thachanadanmooppan, Karimbalar, Uralikuruma, Pathiyaand Wayanadan Kadar(Gopalan Nair, 1911, IIM, 2006). Wayanad also has the largest settler population in Kerala. The Jains from the neighboring state of Karnataka are believed to have arrived in the 13th century. The Nairs of neighboring districts made an entry in the 14th century, followed by Muslims. There was large-scale migration from southern Kerala in the early 1940s; most of whom were Christians. Wayanad comes under High range agroecological zone, one among the 13 categories given by Kerala Agricultural University (2011). This classification was based on the altitude (Type II - More than 500 m above MSL); rainfall (Pattern I - Both the southwest and northeast monsoons are active and moderately distributed, southwest monsoon with June maximum, south of 11°N latitude/-Or / Pattern II-Poorly distributed rainfall, southwest monsoon with July maximum and concentrated in 3-4 months, northeast monsoon relatively weak, North of 110 N Latitude); soil type (Red Loam) and topography (Model III with narrow valleys, steep gradient hills and steep slopes). Predominantly

Wayanad paddy fields are cultivated by one crop in the southwest monsoon, commencing in July and harvested in December (Nancha). The Punchaseas on is also cultivated with rice in lesser areas, between January and May. The genetic diversity in paddy is also notable with over 20 landraces cultivated presently in the District. Speciality varieties like Gandhakasala, Jeerakasala-two Geographical Indications from Wayanad (Geographical Indication Registry, 2010); medicinal varieties like Navara, Chennellu and a handful of other varieties which are having peculiarities in response to flood, drought, pest and diseases are cultivated and conserved by the rural and adivasifarmers (Anon., 2001; Parameswaran et. al., 2014). Almost the entire district is drained by Kabani River and its three main tributaries viz. Panamaram, Mananthawady and Tirunelli and they carved the present landscape of Wayanad (Vinayachandran and Joji, 2007). The paddy fields of Wayanad are fed by these drainages. The floristic exploration of the district had recorded a total of 2034 species of Angiosperms which forms nearly 49% of the flora of the Kerala State and more than 10% of the flora of India. The study had reported a total of 596 endemic taxa in which 491 are endemic to Western Ghats. 338 taxa are endemic to southern Western Ghats of which 59 are restricted to Kerala and 15, exclusive to the District (Ratheesh Narayanan, 2009). It is believed that the name Wayanad is said to be derived from Wayanad meaning upperland or from Vayalnadu meaning land (Nadu) of paddy fields (Vayal) or from Vananadu meaning land of forests (Vanam) (Gopalan Nair, 1911).

Paddy cultivation all over Kerala, especially in Wayanad, is under tremendous pressure of large-scale conversion to non-food grain cultivation and for commercial purposes. It is evident that the paddy area in the district had dropped by 66% (from 30,000 ha to 10,230 ha) during the period 1980-81 to 2012-13 (DES, 1983; DES, 2013). The ratio between cash crop and food crop in the year 1973 was 30:70. By the end of the 1990s this had reversed to a ratio of 70:30 (Nadesapanicker et al., 2010). M S Swaminathan Research Foundation's study on the native seed diversity had commenced in 1998 with a survey of traditional germplasm and subsequently a case study done focusing the Kurichya and Kuruma communities of Wayanad. The Kurichya and Kuruma are two major adivasi communities practicing rice cultivation in the district. Rice is integral part of the culture and traditions of these communities. Cultivation of certain traditional varieties is central to following the rituals. For example, a rice variety called Chennellu is an inevitable offering to God; and another one named Veliyan is for community feasts. It was studied that the family structure and socio-cultural patterns of these communities (Suma, 2014), their rituals and ceremonies and taste preferences, favour the cultivation of traditional rice varieties. They also have developed a management system based on the specialties of rice fields and rice varieties and follow the basic principles of organic farming. They cultivate rice irrespective of the economic benefits, for their own consumption and a few specialty rice

varieties for treating their special guests. They pay special attention to cultivate traditional rice varieties for multiple needs that include food, Incider, medicine, fuel and thatching as well as to satisfy their cultural sentiments (Anon., 2001). Their folk songs have connotations with their agricultural practices, especially the cultivation of rice, which indicates their long association with rice cultivation. They have developed apathy towards high yielding varieties and the varieties brought to the region by the settlers. Irrespective of the drastic fall in rice cropping area for the years since 1970s, these communities were conserving about 20 traditional rice varieties (Anon., 2001; Girigan et. al., 2004). Malabar region—the northern half of Kerala and some coastal regions of present day Karnataka— is considered as one of the centres of origin of crops like pepper (Willis, 1966) and diversity of rice. Rice cultivation here dates back to 3000 BC (Manilal, 1990). Wayanad district of this region was endowed with a number of traditional rice varieties with wide range of unique characters. The rural and adivasi farmers of Wayanad used to cultivate hundreds of traditional rice varieties which satisfy their dietary, economic and other requirements. Most of these varieties have either disappeared or are on the verge of disappearance because of poor profitability, lack of quality seeds, low yields, paucity of pragmatic research and extension support (Nadesapanicker et al., 2010).

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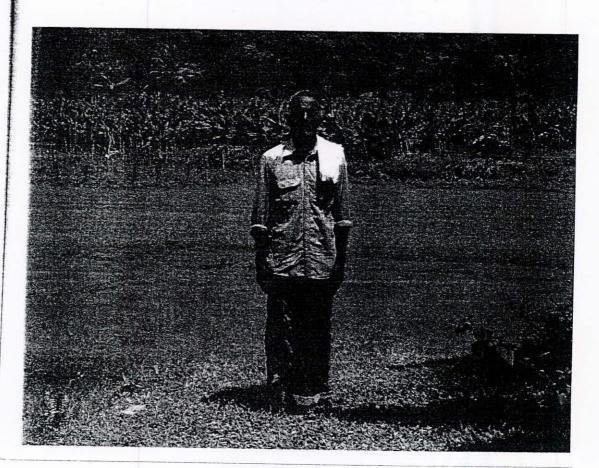
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Grassroot initiatives for a Seed care movement

Recognizing the importance of paddy fields in terms of ecological, food and livelihood security provided by them, MSSRF launched a rice conservation programme in 1998 in Wayanad district and a Seed Care Movement was an essential part of it. This movement has been facilitated since 1998 by involving the major farming groups of Wayanad, especially the communities of Kurichya, Kuruma, Pathiya and Wayanadan Chetty to promote the conservation and sustainable use of the indigenous crop varieties and was taken up by 4 Grassroot Institutions in course of time, under the umbrella of MSSRF. Wayanad District Tribal Development Action Council (WDTDAC) and SEED CARE are the institutions which spearheaded the movement focusing rice, Wayanad Agricultural and Rural Development Association (WARDA) and JEEVANI being the others who supported with the programs centered on other agricultural crops and medicinal plants. In this case study, focus has been given to the former two organizations which are registered under the Societies Registration Act, 1860, XXI and are actively involved in the programs related to agrobiodiversity management along with MSSRF.WDTDACis a community based organization which had started its operation in 2004 and registeration in 2007. WDTDAC has been visualized as a platform for Adivasi people irrespective of political and other community entities to work for securing and sustaining their privileges and rights and it has a 20-point objective as built-in to its by-law, including the conservation of traditional agricultural system and the conservation of indigenous varieties of agricultural crops. SEED CAR Estarted its operation in Wayanad in the year 2009 and represents the farmers of Wayanad who conserve and cultivate indigenous varieties of plant genetic resources. The society has got a 15-point objective as built-in to its by-law, including the protection of the Intellectual Property Rights (IPRs) of the cultivators.

The activities of the seed care movement were in to four areas, called a '4C Continuum' including Conservation, Cultivation, Consumption and Commercialization of plant genetic resources as visualized by Prof. M S Swaminathan. The 4C framework includes (i) enhancement and sustainable use of biodiversity that comprises in-situ, on-farm and ex-situ conservation involving seed bank and community gene banks of varieties; (ii) promotion of

low arternal input sustainable agriculture; (iii) food security and nutrition through revitalization of traditional food habits; and (iv) creating an economic stake in conservation for concurrently addressing the cause of conservation and livelihood security through value addition and marketing methods. The experience of MSSRF shows the 4C approach helps effective engagement of local communities in several villages to continuing their agrobiodiversity conservation and cultural traditions (Table 1).



Table L. Activity chronicle - 4C Continuum in promoting the conservation and enhancement agrobiodiversity of Wayanad (Source: MSSRF Annual Reports, various years).

Time Line	Area of Intervention - 4C Continuum	Activities Involved
1998 onwards	Conservation	 Survey and documentation of PGRs (on-farm) (especially indigenous and specialty rice varieties, medicinal plants, leafy greens, yams and taros - digitalized, video, and printed versions); germplasm collection maintenance (Fig. 1.)
		 Awareness raising programs based on the training materials prepared.
		 Awareness on Farmers' Rights (Starting in 2001)
		 Documentation of Farmers' Varieties.
		 Promoting Seed Villages for the production of quality seeds of indigenous rice varieties (Starting in 2011)
2000 onwards	Consumption	Formation of farmer cluster groups.
		 Participatory genetic purification of medicinal and specialty rice varieties, production and distribution of their quality seed for extending the area of cultivation.
		 Community gene and seed banks programme.
2005 onwards	Commercialization	Market survey and study.
		 Exploring on-farm/off-farm enterprising opportunities and promoting value added products from PGRs and establishing marke linkages.
		 Promoting farmer –owned marketing ventures.

depletion of resources. Since the resilient capacity of many of the local communities is evident from the studies, even a small policy intervention from the State's side can be beneficial in the sustainability point of view. Integrating nutrition security in farming system is now gaining serious attention at policy level in India, which was taken as a motive to influence the general public, especially the youth to adopt conservation and cultivation for improving health and longevity.

Involvement of women is an integral part of seed care movement. Under various forums like Women SHGs, Village Knowledge Centers and Community Seed Banks, hundreds of women were able to come forward to engage in farming by giving thrust to vegetables, fruits and paddy. The movement has also taken much strength from the MSSRF's community level education and training programs for women and children. The initiatives like Community banking, Every Child -A Scientist and DNA clubs (Department of Biotechnology Nature Awareness Clubs) are some of them. The initiative to train Climate Risk Managers (1 woman and 1 man from each Panchayath) for sustainable agricultural development was also capitalized towards the goal. Technological and skill empowerment training for home-makers, women of local bodies and tribal councils under the Kerala Kudumbasree Mission are also streamlined via this movement in the areas related to the conservation and sustainable and equitable use of agrobiodiversity. The nearly 15 years of experience in promotion of sustainable utilization of the indigenous and traditional agricultural seed wealth in Wayanad district shows that focusing on improving the capacities of the small and marginal farmers of society would result in improved agro-ecosystem governance. This has been experienced even amongst the most vulnerable communities like Paniya, Adiya, and Kattunaikka in the adivasi sectors. This has equipped the communities to freely express their concerns and to negotiate for the sustainable improvement of their lives and livelihoods. It has also resulted significantly in raising the necessary support towards eradication of poverty and hunger through sustainable agricultural intervention, education for all. improved maternal and child health - the key Millennium Development Goals (MDGs). Linkages were also established with various poverty eradication programs of local self, state and national governments. The gained capacity and confidence amongst the people have also paved the way for community asset-building activities in the intervention locations in all the four areas of action - conservation, cultivation, consumption, and commerce with both economic and environmental benefits.

The anticipated ultimate impact for the movement is achieving some of the key MDGs by the most vulnerable communities in the Malabar region. Although Kerala is well ahead in achieving many of the global targets, the vulnerable in the society- the adivasi community- lag way behind in most of the MDGS. The movement focused this issue by developing and sustaining capacity of the indigenous community of Wayanad district and concurrently

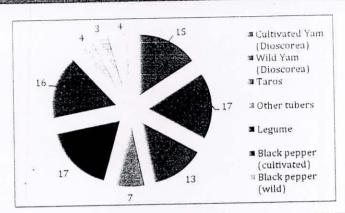


Fig. 1. Number of Crop varieties maintained ingermplasm garden of MSSRF and conserved through the seed care movement (excluding paddy varieties)

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Conservation issues, cultivation knowledge, consumption awareness and commercial aspects were integrated into one overarching logical strategy for creating sustainable livelihoods by this initiative. This resulted in getting at least 1,000 families from the Kurichya-Kuruma-Pathiya-Wayanadan Chetty communities in to a model of improved nutrition and sustainable livelihoods. The homesteads of these four communities sustained diverse food crops, medicinal and fruit trees, sacred groves and other alternate life-saving crops (the crops which stand over the adverse environmental conditions like drought, flood etc). The Coffee, Pepper, Ginger, Turmeric and Areca nut from their farms were contributing to their income needs in a good way. MSSRF's core programme, the Livelihood Enhancement, Agriculture and Food Security initiative (2011-2016), supported by Department of Science and Technology, Govt of India is another partnership with the rural and adivasi communities of Wayanad, for which the pilot efforts for over a decade have contributed in a large way.

Various land legislation of independent India and the intra-regional farmer migrations from 1940 to 1950s to Wayanad had triggered many conflicts. With the introduction of strict forest laws, shifting cultivation was also stopped. The Green Revolution started in 1960, had also made its own pressures on their system. Though with great constraints, these farm families have been remaining as conservators of native seed varieties and breeds. Recent studies also reveal that the ecosystem management system of some of these communities like Kurichya and Kuruma offers high degree of Socio-ecological resilience in the changing scenario (Lydia et. al., 2014). The Seed Care movement has helped the local communities in many ways to adapt well with the ecological, economical and cultural vulnerabilities. For instance, the farmers revitalized their practicing of agriculture in all the three forms of land they have, the water logged valleys in the foothills, the homesteads and the hill slopes between these two as an adaptation to climate variabilities like shifting monsoons, fluctuating day temperature and humidity. The ecosystem management that the communities adopt is based on the science of recycling with zero

improving the accountability, transparency and efficiency of delivery mechanisms of the state and other key civil society institutions. One of the major social impacts of the intervention was improved knowledge base of the adivasi communities in the most relevant legislation like (i) Right to Information, (ii) Right to Education, (iii) Farmers' Rights, (iv) Forest Rights, and (v) Biological Diversity Act-2002. The movement has helped in conserving the genetic base of many of the crop diversity of the region from the verge of disappearance. The kind of indigenous rice varieties which were conserved have ensured the ability to withstand pest and disease emergence and water pressures. Conserving the wetlands along the valleys in its natural form itself is contributing to the water security of the region. Conservation of different species of trees in their homesteads reduces the impact of climate change on a micro-environment. The innovations in this movement in keeping the heterogeneity of landscapes, conserving water bodies and reducing chemical pollution has also helped the farm families to potentially adapt to a wide range of climate vulnerabilities including reduced yield and productivity.

Table 2. Major outputs/outcomes of the seed care movement

On-farm conservation of 25 indigenous varieties of rice and 15 varieties of Yams and Taros.	 Increased awareness about the value of heterogeneity and diversity in landscapes and landraces.
Recognizing the conservation efforts of rural and adivasi communities.	Genetic erosion checked.
 Legal recognition to 25* (6+19*) rice varieties as Farmers' Varieties by the Government of India and their wider cultivation through 10 Seed Villages by involving 250 farm families. 	 Ensured conservation of the provisioning and regulating ecosystem services of socially and ecologically productive landscapes.
Education about the need of consuming diversity by reaching out over 1, 00,000 families, and establishment of 500 home nutrition gardens for the most vulnerable indigenous communities.	Increased awareness on the cultural and spiritual dimension of resource management by the rural and adivasi communities.
* applications under consideration	

The results: Kurichya and Kurumaadivasi communities bag 2nd Plant Genome Savior Community recognition (2008)

Kurichya and Kurumaadivasi communities were recognized with the Second Plant Genome Savior Community Recognition in 2008 under the provisions of The Protection of Plant Varieties and Farmer's Rights Act, 2001. These communities have been conserving 20 traditional rice varieties with unique characteristics like flood/drought resistance, pest/disease resistance, medicinal and aromatic properties. The Protection of Plant Varieties and Farmer's Rights Act, 2001 (Gol, 2001) is meant for providing the establishment of an effective system for protection of plant varieties, the rights of farmers and plant breeders and to encourage the development of new varieties of plants. Protection of Plant Varieties and Farmers' Rights Authority (PPV & FR Authority) which was established under the provisions of this Act has launched the Plant Genome Savior Community Recognition Award in 2007 and Plant Genome Savior Award in 2010 as a mark of recognition and reward to the agrobiodiversity conservers and protectors of the country. (Fig. 2).

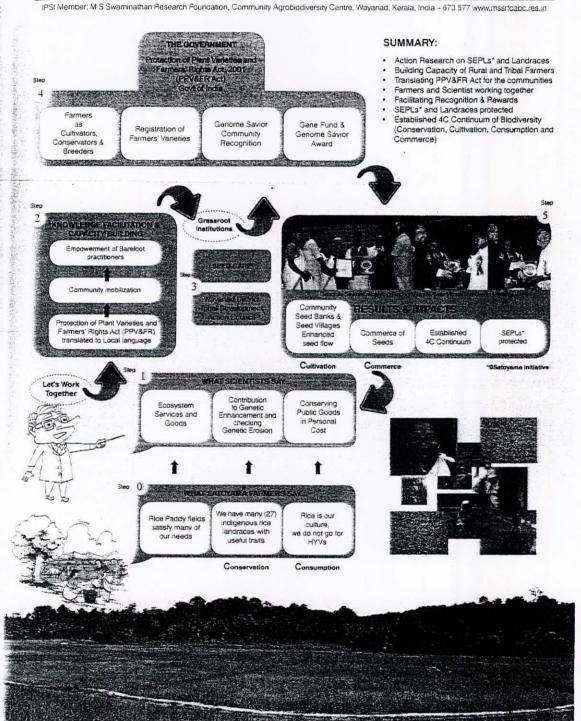
The results: Wayanad District Tribal Development Action Council bags 2nd Plant Genome Savior Community Award

MSSRF has been extending support for all the preliminary actions and activities of WDTDAC including financial, technical, managerial and training needs. MSSRF has also played fair role to help the council in establishing linkages with like-minded organizations and Govt departments. MSSRF was doing the part of a facilitator between WDTDAC and PPV & FR Authority for submitting the successful application for the Plant Genome Savior Community Award (2010-11). WDTDAC has the objective of strengthening the community conservation efforts in agrobiodiversity utilizing the award money and by giving emphasis to 20 existing traditional rice cultivars in the district.

The results: SEED CARE registers Farmers' Varieties

SEED CARE, which is actively involved in advocating farmers' rights and protection of plant varieties has forwarded 27 applications for Farmers' Varieties of rice to PPV&FR Authority, Govt of India in which 6 were got registered in 2013, viz., Veliyan, Thondi, Chennellu, Chomala, Gandhakasala and Jeerakasala(Reg. nos: 56 to 61 of 2013). The provision of registration of farmers' varieties allow the farmers to register a variety which has been traditionally cultivated and evolved by the farmers in their fields; or it is a wild relative or land race of a variety about which the farmers possess the common knowledge. As per the registration, given under the provision of Protection of Plant Varieties and Farmers' Rights Act of India, 2001, Wayanad farmers have the exclusive right to produce, sell, market, distribute, import or export the registered Farmers' Varieties for a specified period (Fig. 2)

Recognizing Farmers for their Efforts in the Conservation of Landscapes & Landraces - A case from The Western Ghats, India



The results: MSSRF launches its SEED VILLAGE program in partnership with WDTDAC and SEED CARE

Starting in 2011, the movement has mobilized rice farmers from ten villages of Wayanad district, clustered them into seed villages, mainly serving as seed, grain and gene banks. SEED CARE has been spearheading the processes of community mobilization, awareness generation for PGR management, quality seed production and management of seed and gene banks of traditional paddy varieties. There are 105 household, spread across 10 selected seed villages in the district. The intervention is now spread across 74.8 hectares of wetland. Every seed village has taken up the cultivation of 2 to 8 traditional varieties of paddy. The farmers of the seed villages are able to sell-off their excess produce every year in a rate which is much higher than the rate in local market. During the year 2013-14 only, 2.15 tonnes of seeds of traditional rice varieties have been produced and distributed from the seed villages. Traditionally seeds were handled by men in the adivasi communities but now women has an important role in the decision making process regarding the selling of produce being the member of seed bank management committee. There is an exclusive women group belonging to Kuruma community undertaking the cultivation and marketing of traditional varieties. Due to changes in the climate and unpredicted floods and drought, now more farmers have moved to traditional varieties which are more hardy and tolerant to climate vagaries. Hence there is an increased demand for the seeds of such varieties, provided the quality of the seeds is maintained. To overcome the issue of contamination/mixing of seeds, one hectare of paddy land is maintained for purification of the selected ten verities (Chennellu, Chenthadi, Chomala, Jeerakasala, Gandhakasala, Mullankaima, Thondi, Adukkan, Veliyan, and Kalladiyaryan). Participatory purification methods were adopted for selection and purification of seeds sourcing the expertise of lead farmers. Purification techniques like rouging of weeds and removing off-types were performed and the purified seeds were brought in to the distribution chain, every year. Trainings were also provided on purification techniques, seed and grain management, mechanization etc for helping the community in their efforts to conserve speciality varieties (Smitha, 2014).

The results: The seed care movement launches its Community Seed Fest

The movement has launched its first district level Seed Fest in February, 2015. The Wayanad Community Seed Fest was an initiative supported by National Bank for Agricultural and Rural Development (NABARD) and Kerala State Biodiversity Board (KSBB) with the following objectives:

- Creating awareness among farmers and other local communities about Famer's Rights and community rights on biodiversity.
- Equipping the Biodiversity Management Committees (BMCs the committee formed at the Local Self Government level under the Biological Diversity Act, 2002) to take lead role at local level for a 4 C (conservation, cultivation, consumption and com mercialization) management approach in agrobiodiversity conservation;.
- Encouraging farmers who conserve biodiversity on-farm and creating a platform for traditional farmers and new generation farmers to exchange seeds, for farmer- buyer meetings, and for traditional and scientific knowledge exchange on agrobiodiversity management.

Standing true to the spirit and ethos of the event, guardians of traditional seeds were felicitated in the event. Community Agrobiodiversity Awards, 2015 instituted by Wayanad District Tribal Development Action Council were also given away to Kurichya and Kuruma Adiyasi farm families (MSSRF, 2015a, 2015b).

Conclusion

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The whole exercise behind the seed care movement was to transforming knowledge towards a sustainable and gender-equitable use of agrobiodiversity through a multi-lateral approach of action, research and policy advocacy (The Thazhava Plan of Action, 2009; Thiruvananthapuram Declaration, 2010) in a partnership mode. The key learning is that the active integration of agrobiodiversity into the overall issue of sustainable development is necessary, giving equal consideration to all the three dimensions of it: economic, ecological and social sustainability. Even though the Governments of India and Kerala have enacted various Acts and implemented various schemes for promoting agrobiodiversity conservation, these measures could not gather the desired results due to an array of reasons. The cultivation and conservation of traditional plant genetic resources is mostly confined to the adivasi and rural areas of the state. They conserve and preserve these valuable plant genetic resources irrespective of economic benefits. Their efforts need to be recognized and properly acknowledged for continuing their services towards humanity. In this backdrop, the seed care movement in Wayanad was instrumental to lead the farmers of the district for agrobiodiversity management. The members of Wayanad District Tribal Development Action Council and SEED CARE have become the ambassadors for this prompt and sought-after action. The relevance of this case is so important at the juncture, where the conversion of agricultural land and dwindling diversity in PGRs have become the biggest challenges in conserving agrobiodiversity at the farm level. Such an initiative is also important in view of the likelihood of climate change impacts, as many of these varieties hold innate characteristics to combat stress including that of drought.

and flood. It is also widely accepted that the variability in diversity, which assures the stability of the population must be conserved and used in appropriate ways in order to provide source materials to realize future demand for new varieties. In the given case of community agrobiodiversity management, steps have also been taken to ensure the equitable sharing of benefits arising out of the conservation and utilization of plant genetic resources.

Acknowledgement

Authors gratefully acknowledge Prof. M. S. Swaminathan for his vision and guidance in establishing the Community Agrobiodiversity Centre in Wayanad and for his continuous mentoring. The guidance provided by Dr S. Balaravi, Former Advisor to MSSRF and Ms Mina Swaminathan, Advisor to MSSRF is also acknowledged. Sincere thanks to Dr M. Geetharani, Principal Scientist & Gene Bank Manager, MSSRF for her unconditional support to the activities. The Executive Directors of MSSRF and other colleagues are gratefully acknowledged for helping in bringing out the biodiversity programme of MSSRF. The support from Swiss Agency for Development and Cooperation, Government of India (Department of Science and Technology, Department of Biotechnology, National Medicinal Plants Board) and UNDP's Global Environment Facility is also acknowledged.



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