

National Workshop on Seed Systems for Climate Resilient Rainfed Agriculture

Organized by

National Rainfed Area Authority (NRAA) and
Revitalising Rainfed Agriculture Network (RRAN)

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Seminar Hall, Indian Habitat Centre, New Delhi



NATIONAL RAINFED AREA AUTHORITY



Revitalising
Rainfed Agriculture
The RRA Network



Imprint

■ Responsible

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RRA Network is responsible for the content of this publication.

On behalf of the

National Rainfed Area Authority (NRAA), New Delhi

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About the Event



BROAD OBJECTIVE OF THE WORKSHOP

To come up the Institutional mechanism for Community Managed Seed Systems for Climate Resilient Rainfed Agriculture with defined public investments and R&D

■ The traditional varieties selected by farmers from landraces over centuries adapted to particular geographies offer greater promise and there is a need to build a differentiated Seed System meeting the requirements of Rainfed agriculture and Natural Farming. The term Traditional Varieties used in this note refers to the selections made over time by farmers from the local landraces.

Participants: *Farmers, representatives of Department of Agriculture, SAUs, ICAR, Civil Societies, MANAGE, RRA Network, NRAA, MoA&FW. (See - List of Participants Pg No. 19)*



Opening Session



The workshop started with welcome remarks by **Dr. Sabyasachi Das**, *National Coordinator of RRA Network* stressing on the need for strengthening local varietal diversity for nutritional security for rainfed agricultural ecosystems. He flagged mainstreaming local varieties into larger seed policies and evolving related operational strategies as the two important aspects for deliberation in the workshop.

Mr. B. Rath, *Technical Expert, NRAA* brought out the contribution of the rainfed agriculture to the economic growth of the country; especially its contribution to the food and nutritional security (40% food grains coming from rainfed areas) and employment and livelihoods to 80% of the small and marginal farmers.



Rainfed agriculture systems hold a considerable diversity in terms of crops and cropping patterns – farmers in this area are growing 35-40 crops in it and 3-4 crops in irrigated area. Expressing concern over the current fragile environment with increasing frequency of extreme weather events like droughts he stressed on the need to increase productivity, production and incomes in the rainfed ecosystems.

Explaining the genesis and mandate of the NRAA, Mr. Rath elaborated on the exercise taken up by NRAA to identify 168 high priority, vulnerable rainfed districts for immediate action. Specific policy for rainfed areas would help in its growth. In view of this NRAA has submitted a draft report to the Government of India in the form of a *Comprehensive Policy for Rainfed Areas* focusing on sustainable growth of production and farmer incomes.

Quality seed of diverse crops, timely availability, markets, pricing, seed chain, biodiversity and its conservation are important elements of a policy on seed systems for rainfed areas. With inputs from the workshop, NRAA would aim to come up with a position paper on seed systems for climate resilient rainfed agriculture.

The workshop **Dr S Rajendra Prasad**, *Former Vice Chancellor, University of Agricultural Sciences (UAS) Bengaluru* provided an overview of the seed system in India. Maintaining that seeds are distinguished by their multi-functionality, he explained that traditional seeds, the knowledge around it and biodiversity are important aspects in the changing climate scenario. He provided a timeline of the growth in the seed industry and the associated policy initiatives. Explaining how seed security helps in achieving food security. ^[1]



Dr. Prasad elaborated on the formal, informal and integrated seed systems that exist today, their limitations and explained the benefits of using technology in public-private-community partnership mode. He shared in detail the processes involved (planning, research, production, quality

control, post-harvest handling, marketing and distribution) in the formal seed system and flagged the points for discussion on the informal seed system.

In spite of tremendous growth in the seed sector, some issues still need urgent attention, such as

- Need for real time data on seed requirement
- Estimation of the requirement and availability of seed of different crops in different parts of the country
- Differentiating the Formal and Informal seed sectors,
- Seed quality assurance and quality-based pricing,
- Interdependence and trust between the public research institutions and commercial seed sector,
- Gaps in the effective implementation of seed legislations and
- Policies and regulations at central and state levels.

At the end he mentioned the use of IT tools for seed marketing and get required real time data; innovative ways of integrating technologies such as Artificial Intelligence, drones, robot, IT-apps like *Beej Adhar* to help in larger outreach to farmers with quality information are some of the IT tools.

Dr. Prasad emphasized on the need to look into the several questions related to bringing land-races into popular seed chains such as –defining the seed standards; how to ensure/ assure quality; process of notification; mechanisms of multiplication and building the value chains – which remain unanswered as yet.



Dr KS Varaprasad, Former Director, ICAR - IIOR and Chairperson of the Working Group on Seed Systems (WGoSS) for Rainfed Areas, RRA Network started his presentation ^[2] on defining the **'traditional variety'**. Traditional varieties / landraces are ecotypes that are naturally selected without specific human intervention and attached knowledge is available. These are generally genetically diverse, locally adapted and associated with traditional farming systems and are developed by farmers over a large period. These are

usually dynamic populations with historic origin, distinct identity / name based on specific traits or area. Traditional Varieties are unique, nutritionally rich and perform in variable climates and are in demand in the local markets. The knowledge on traditional varieties is scattered – it needs a system to support access to knowledge with the Access and Benefit Sharing (ABS) mechanism.

- Quality seed access to farmers specific to each eco-geographic region
- Mainstreaming traditional varieties with heritage traits based on traditional knowledge
- Protocols for collection (Seed festivals), Evaluation (BDBs), Release (LRC) and Conservation (CSBs, State Gene Banks) and
- Protocols for all components of seed supply chain

Dr. Varaprasad further shared experiences of the Odisha Millet Mission (OMM). In the participatory varietal trials some of the finger millet landraces performed better than the released varieties under agro-ecological practices; some of these have >40% yield advantage. Several such traditional varieties are on demand due to traits valued by the Communities (taste, nutrition, culinary process, color, religious needs, etc.). The existing formal seed system caters to only the notified and released varieties. He also explained about the approved Standard Operating Protocols (SOPs) for Seed Systems for Landraces instituted by the Govt of Odisha which incorporates answers to questions raised in the earlier presentation by Dr. Rajendra Prasad.

A **State Level Apex** Committee is proposed to be formed by the *Principal Secretary (PS), Agriculture and Farmers' Empowerment Department, Odisha*.

This Committee will consider notification of promising location specific landraces considering the traits of value to the communities with due importance to food, nutrition, organoleptic traits, climate resilience, pest and disease resilience and income of the farm families. Setting up a Sub-Committee in the name of Landrace Variety Release Committee (LrVRC) has been approved.

[2] https://drive.google.com/file/d/1JQfLolJqIcQAbu_Y9Q1cfSpWCODFQkMy/view?usp=sharing

■ **Landrace Variety Release Committee (LrVRC)** will Develop the seed standards, certification protocols; scrutinizes the applications for release of landraces and take measures to mainstreams landraces at par with the CVRC/SVRC (Central or State Varietal Release Committees) and PPV&FRA. No exclusive right on the released landraces / traditional variety will be given to any individuals; they will continue to be in the public domain. Details of the core traits of value, documentation on evaluation, seed standards, package of practices for the identified potential landraces submitted for release and notification have to be submitted along with the application while proposing for notification of a traditional variety/ landrace by the LrVRC.

■ **Quality Seed Production** will be taken up by the Department of Agriculture – Seed Certification Agency will ensure the quality as per approved seed standards. State Seed Corporations procure seed multiplied and facilitate marketing/ distribution throughout the Agriculture Department. Maintenance Breeding responsibility needs to be with institutions with capacities like Agriculture Research Stations/ KVKs.

Institutions like Odisha State Seed and Organic Products Certification Agency (OSSOPCA) may constitute a special cell for following up on certification of notified/ released landraces (as traditional varieties); it follows approved standards for landraces. The Gene bank at the State Seed Testing Laboratory- it will take care of Conservation of baseline collections, Reference sample for identified landraces, In-situ conservation of landraces, nutritional profiling and DNA fingerprinting.

■ **Open Source Digital Platform for Landraces:** All the data related to landraces and operations will be managed through an open source digital platform at SSTL. These platform functionalities will be further developed by the Working Group on Seed Systems. WASSAN is in the process of developing such a platform.

■ **Landraces Seed Centers:** Farmers' Organizations (FPOs) at Block level applies to the State Landraces Seed Systems cell (anchored in the Department of Agriculture) to get registered for taking up seed conservation and multiplication. Evaluation is limited to few eco-geographic regions/ districts from where the landrace cultivated/ collected / originated. Farmers' yields based on the Crop Cutting Experiment (CCE) will be considered. The parameters of nutrition, local preference, cropping system and resilience to climate and biotic stresses value is also considered while assessing the performance.

Dr. Varaprasad concluded his presentation by reemphasizing that the Agroecological approaches are gaining global momentum in view of climate, soil, water and biodiversity emergencies. The Government of India coming up with the National Mission on Natural Farming (NMNF) indicates the prioritisation of agroecology by the Government. Data analysis is showing that Traditional varieties outperform over released varieties in resilience and nutrient density in Odisha. Location specific yield advantages are also demonstrated in the Odisha Millets Mission. Government of Odisha extended alternate seed system from millets to all agricultural and horticulture crops. Alternate Seed System for Rainfed agro-ecological zones are being piloted.



Ms Bhagya Laxmi, Associate Director, WASSAN who is also the Convener of the Working Group on Seed Systems of the RRA network provided an overview of the civil society engagement with traditional seeds conservation, multiplication, crop diversification and their inclusion into the food systems agenda in different states of the country. She provided such examples of passionate individual farmers, farmers collectives who are becoming seed entrepreneurs while promoting conservation, multiplication etc. With such efforts, this area under traditional varieties is also

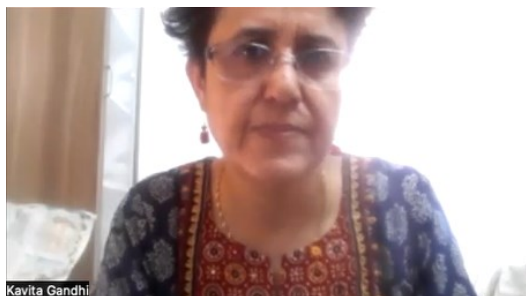
increasing. WASSAN, RRA Network and MANAGE together organized *two national workshops* on seed systems for climate resilient agriculture [3]. A National Convention was also organized by the RRA Network subsequently; the Working Group on Seed Systems (WGoSS) was formed to pursue the agenda. Bhagya introduced the eminent members of the WGoSS and key initiatives taken up by the Working Group. It has been engaging with the Ministry of agriculture and farmers welfare, state departments, NBPGR, PPV&FRA, crop specific institutions and SAUs. WGoSS documented innovative approaches to bring traditional varieties into mainstream by the Department of Agriculture of West Bengal, Odisha, Andhra Pradesh, Madhya Pradesh, Gujarat, Tamil Nadu; these examples may be replicated in other states.

Shri Siva Prasad Raju and Sri Somkrishna Gautham, farmers from Telangana and Himachal Pradesh respectively, shared their experiences with traditional varieties.

Siva Prasad Raju has shared that around 14000 acres area is under traditional varieties in Andhra Pradesh and Telangana together promoted by him. His strategy is to provide traditional varieties to interested farmers under a buyback arrangement in the first season; later farmers are adopting different ways for marketing like seed sales, value added products etc.

Somkrishna Gautham shared his work with 13 farmers groups on natural farming – he has established a biodiversity block and making the seed available to the farmers for seed multiplication – larger quantity seed will be available for coming *Kharif* produced by these groups responding to the demand from farmers.





Kavita Gandhi

Ms. Kavita Gandhi, Country representative of SWISSAID India shares about their work India for the past 60 years. Its focus areas are 1) Sustainable livelihoods and 2) Gender based violence. It is working in partnership with 13 NGOs in 5 states. Under Sustainable livelihoods, it works on agroecology building sustainable livelihoods through promotion of agroecology; they have been

working on farmers' varieties for the past 12 years. At present the groups supported by SWISSAID are working with 6000 farmers from seed collection, characterization and seed multiplication. Under **CROPS4HD**^[■] (*Consumption of Resilient Orphan Crops & Products for Healthier Diets*) project, their focus is on Neglected, Underutilized crop Species (NUS). As per FAO – there are more than 3 lakh edible plants, 150 are in consumption. The project goal is to improve food and nutrition security of smallholder farmers through sustainable use and conservation of farmers' varieties and neglected and underutilized species (NUS) following agroecological approaches. The project is being implemented in Karnataka, Odisha and West Bengal states with the local partners. She has further elaborated on the project strategy as identifying landraces, evaluating them on field using participatory varietal trials, popularizing them and promoting their markets; evolving an enabling policy environment is a key area of focus of the program.

Dr Sanjay Kumar, Director, ICAR-IISS (*Indian Institute of Seed Science*) brought out that there are different crop varieties developed for rainfed areas in the formal research system also. Unfortunately, seed for rainfed areas are produced in irrigated systems – no formal seed production systems are there for rainfed areas and still it is with informal seed systems largely. IISS has undertaken a study of more than 1000 farmers of 126 districts in 25 states – the study brought out that only 37% of the seed was in the informal sector and 63% was with formal seed systems. He observed that these are not matching with secondary data, though trends are similar. Share of the formal seed system with pulses and oil seeds is more than cereals.



Dr. Sanjay Kumar, Director, IISS Mau

Dr Sanjay Kumar emphasized that our approach could be to improve the quality of the farm saved seed with technical backing up on post-harvest handling, seed quality, maintaining buffer and storage. Harmonizing the informal and formal seed systems is important. Varieties which are suitable for mixed cropping systems are required for rainfed areas to cope up with climate change. He said a community seed system is the way forward – NGOs and FPOs are working on seed systems and SOP for ensuring the quality of seed in community seed systems is very much important. He also shared that their institution is open to collaborate with anyone like NRAA and others on strengthening the informal seed systems.

[■] <https://crops4hd.org/project-regions/india/>



Mr. Dinesh Balam also shared about the need for an alternate seed system and has outlined the key processes in the SOP on Alternate Seed Systems for Landraces of Odisha; the roles of various institutions to be involved were elaborated^[4]. He further explained that the Department of Agriculture and Farmers Empowerment, Odisha has taken the decision to map the non-ragi crops landraces / traditional varieties in 255 villages of 17 blocks in 11 districts. Study has been taken up in 15 villages of each block. Mapping of landraces and documenting the knowledge attached to it has been done for 358

traditional varieties- out of them, 129, 149, 63 are millets, pulses and oil seeds respectively. Team along with experts collected information on the villages, remoteness, demographic profile, crop profiles, irrigation and others. Institutional Mapping exercise was also taken up. Crop Calendars were prepared along with crop varietal diversity. A tool - Four Cell Analysis was used for participatory analysis. The traditional varieties seeds collected will be kept in the State Gene Bank.

He also shared that Agro ecology diversity blocks and open learning centers for biodiversity conservation. OMM has an engagement with University of Groningen and Frankfurt Institute of Anthropology and IIT and Tribal leaders to understand community culture linkages. Taking up Biodiversity and culinary communication initiatives - documentation was done on culture, agriculture and food systems. OMM has engaged interns/ fellows for this work.

At the end of his presentation, Dinesh Balam has shared the **way forward for millets** that consists of -

- [1] Release of 4 Finger Millet landraces in 2023-24
- [2] Seed Multiplication from 2023 onwards and including traditional varieties in seed chain from 2024 onwards
- [3] Trial of another 4 potential Finger millet landraces and little millet landraces in 2023 including germplasm from the National Gene Bank.
- [4] further releases in 2024/2025 and
- [5] Multiplication and seed chain from 2025 onwards.

And for Pulses & Oilseeds -

- [1] Mapping in 2022 and 2023. Identification of landraces by 2023,
- [2] Trial and Release by 2025. Multiplication and Seed Chain from 2026,
- [3] Crop Diversity Blocks will be established in all districts by 2023.

Department of Agriculture, Odisha may take up larger initiatives for other crops including vegetables, tubers and others in process.

Case Examples on Release and Wider Dissemination of Traditional Varieties by Agriculture Departments

Sri Chakradhar Panda, Department of Agriculture shared the experiences of registering farmers' varieties with PPV&FRA. The Department started collecting traditional varieties in 2010. Around 900 of them were collected along with passport data and stored in the Seed Testing Laboratory. The Department involved 19 NGOs in the DUS characterization of these traditional varieties. Dr SR Dhua, Principal Scientist at CRRRI provided technical guidance. Chakradhar chanced upon the *Kalachampa* variety in an adjoining field when he was organizing CCE for MTU- 7029. He then conducted CCE for both the varieties along with other officials; the yield was at 16 kg and 23 kgs with MTU-7029 and Keonjhar *Kalachampa* respectively; *Kalachampa* outperforming the released variety

Looking at the performance, the Director, Department of Agriculture decided to release the variety for wider use. *Kalachampa* has different genotypes at the time of collection (some having an awn). The team selected good panicles from the field and multiplied the seed. SVRC released it in 2014 and Govt of India notified it in 2015 as Keonjhar *Kalachampa*. At present 40,000q of certified seed is produced every year. OUAT maintains and provides the breeder seed for multiplication; this year about 68q of Breeder Seed was supplied to the Department.

Kalachampa gives less yield with application of fertilizers; it shows resistance to BPH; fisher folk say water in *Kalachampa* rice fields is good for fish growth, are the other observations made by Sri. Chakradhar Panda.



At this point, Dr P L Patil, Dr Ashok Dalwai and Dr S Rajendra Prasad have released the case study titled "*Kalachampa - The Story of a registered variety derived from a landrace that raced into the mainstream*",^[5] documented and published by the RRA Network.



Sri Anupam Paul, Deputy Director Agriculture (Retd.), ATC, Fulia, West Bengal narrated the story of 'folk rice' as he termed the traditional varieties in which he was involved for 20 years and conserved many traditional varieties with organic agriculture practices. For the past 12 years, ATC has been declared as an organic agriculture farm – and now it is a natural farming farm of the Government of West Bengal.

Sri. Anupam Paul was able to collect 400 traditional varieties, analyzed, assessed and distributed seed to the farmers in addition to their conservation. The Department of Agriculture (West Bengal) expanded this work to 16 blocks in 16 districts supported by a RKVY project on characterization, cultivation, promotion and value addition of folk rice. This has been a game changer helping West Bengal to stand out in cultivating folk rice in a large area. Nutrition analysis of Kaladhan taken up by National Institute of Nutrition (NIN) identified the presence of Beta Carotene in the variety which is rare in rice in general.

Department of Agriculture (West Bengal) gave rubber hullers to interested groups for making unpolished rice, helping in local consumption and sale, retaining nutritive values. Department fixed the sale prices for rice seeds in different quality standards – bold, fine, aromatic, special rice like *Black*, *Jugunu*, *Hathy Dhaan* enabling easy price discovery by farmers.

Folk variety called *Dashuria* of Khagaria District of Bihar is resistant to floods and drought, attains 7ft height and can withstand inundation over 2 ft. Such diversity of varieties are useful in the current changing climate scenario where weather has become unpredictable.

There are 30 farmers' seed groups in the state which are maintaining the seed and also selling the rice commercially, one of them came up with ready to eat food item with black rice and obtained FSSAI registration; an example for further value addition.

In West Bengal, red rice was used to broadcast in pre-kharif season – now it has changed to single seedling transplantation in Kharif season. Few folk varieties like Kerala *Sundari*, *Bahurupi*, *Keshav Shal*, *Thal Bhumi*, *Meghadumru* from Odisha are high yielding at 6 tons per hectare with natural farming and without chemicals. Soils with a good microbial population helps in improving the yield.



Following the presentation of Sri. Anupam Paul the document **'Fragrance in the Field – a case study from West Bengal'** ^[6] published by the RRA Network was released by Dr P.L. Patil, Vice Chancellor, University of Agricultural Sciences (UAS), Dharwad, Karnataka in the workshop.

Ms. Anitha Reddy, Director of CROPS4HD program from Sahaja Samrudha presented the research experimentation trials taken up in Odisha, Karnataka, West Bengal in *Kharif, 2022*; mother & baby trials, demo plots and pilot trials were taken up under the CROPS4HD program with traditional varieties following agroecological approaches for crop management. She elaborated on the processes of setting up trials, data recording, tagging at maturity stage, scoring/ ranking by farmers and others.^[7]



Ms. Anitha also explained the experimental design – collection of 30 cultivars of amaranth from the states of AP, Odisha, West Bengal and Karnataka. 1/4th of acre was allocated for Mother trials with three replications with foxtail millet as separator. Each block is 50 square feet and the total blocks are 90.

Participatory Varietal Trials were conducted – men and women farmers participated in tagging their preferred varieties. About 8 varieties were chosen from the 30 varieties in the Blocks. While common traits from men and women were yield, branching, taste, local adaptability, good looking, late maturity and non-lodging. Women have additionally listed the traits like multi-cut,

disease resistant, less fibrous, tender stem, while men listed more leaves and thick stem as their additional preferences. Keshav cultivar collected locally from Karnataka got more score and topped among farmers preferred cultivars for tenderness and it will not become fibrous if cutting is delayed. Cooking quality and taste are identified as critical traits as it helps in marketing. The promising ones selected, cleaned and multiplied in the process need to be made available at large.



Dr Sudhir Pal Ahlawat, *Principal Scientist, ICAR-NBPGR* presented their experiences of mainstreaming the agrobiodiversity conservation and utilization in the agricultural sector to ensure ecosystem services and reduce vulnerability. The program is implemented in six states, 17 Districts and 20 agroecological regions. The project is in rainfed areas that have high diversity. They have taken core, buffer and control villages to see the impact of the project.

As a first step, the project had taken up identification of traditional varieties and seed multiplication – seeds collected from project areas and a total 2000 accessions collected from the same area since 1974 have been taken out from the National Gene Bank for field trials. Farmers did trait specific accession selection for multiplication. Farmers preferred the dual purpose barely having good grain and fodder yields and is of short duration.

To increase the genetic diversity – 4279 native varieties of 20 crops brought to the farmers' fields. 759 were in PVS and 5021 baby trials were conducted. Dr. Ahlawat shared that farmers preferred *Moonch Bali Bajri* (Bajra variety having an awn) to resist crop damage by birds and also it has low rancidity. In sesame- kala till and others are on large scale production. Field melas, cross visits, biodiversity fairs are used for capacity building. Farmers were also trained to make single plant selection under PVS. Few landraces were identified for value chain and market linkages like *Lal dhan*, *Local Bhat*, *Bura Gahat*, *Madua*, *Safed chua*.

The project also collected 395 accessions from Assam and did nutritional profiling – some farmers' varieties have high protein, high oil, low phytate, low phenol rice and rare combination of low amylose with high oil category. Dr. Ahlawat shared that value added products are introduced into the market with 7 brands in different states.

He also shared about In-situ conservation and management of wild rice – they have identified the location and the Government has announced it as a Biodiversity heritage site. Appreciating the collaborative work done by NGOs, he shared that all this is not possible without their partnership.

With the above the sessions on experience sharing have concluded providing a rich background for further reflection and analysis of various issues.

INPUTS FROM THE PARTICIPANTS AND DISCUSSIONS

Dr P L Patil, *Vice Chancellor, UAS- Dharwad* shared that traditional varieties/ landraces are important in the rainfed ecosystem but releasing them faces administrative difficulties at national level. Traditional varieties perform better in certain ecosystems. As organic agriculture or natural farming is taken up at a large scale, systematic evaluation should happen at specific geographical levels with organic/ natural farming practices. Evaluation should be done at certified organic fields practicing Natural farming continuously. He reiterated the need to bring guidelines with protocols to mainstream traditional varieties. He recommended the NRAA to form a committee to work on such protocols. As traditional varieties are low yielders, farmers producing seed should be incentivized; necessary budget allocations be made in this regard.

Dr Ravi Hunje, *Director (Seeds), AICRP, UAS-Dharwad* said that Karnataka has a good diversity in crops; there are traditional varieties, community varieties, farmers varieties and landraces. He observed that traditional varieties perform better in some localities. He shared details of some of the traditional varieties under different crops, geographical areas and trait attributes that were documented. UAS-Dharwad submitted the applications for registration of a few traditional varieties in wheat to PPV&FRA. He emphasized that there should be laid out processes for identification, purification and bringing the traditional varieties into the seed chain.

Dr. R B Deshmukh, *Former Vice Chancellor, MPKV, Rahuri* presented that the country has a good public seed system where Breeder seed responsibility is with research stations and foundation & certified seed with national and state corporations. Though the public seed system has some draw back; it works for developed and released varieties and would not consider the traditional varieties / landraces. Private sector mostly deals with hybrid and high value and low volume crops. There are varieties for rainfed areas also, but in tribal and hilly areas these are not available and seed cost has also gone up even in the public seed sector – it's out of reach to the poor farmers.

There are varieties like sorghum M 35-1 variety released in 1935 and around 80 years old, still farmers are cultivating them in larger areas. Indrani is a rice variety released in 1987, still farmers are preferring to have it in their fields. Chickpea – Vijay variety released in 1993 and is widely cultivated even now. As per the Government of India rule, incentives given by the state are applicable only to the varieties which are released in the last 10 years. Many of the widely preferred varieties are going out of seed chain as no one does maintenance breeding – for that budget and assigning the responsibility is required.

He also shared that the RRA networks' Working Group on Seed Systems has developed the protocols and procedures for identification, evaluation, certification, production, procurement and distribution for Odisha. There should be a formal body which takes the responsibility of identification and screening and takes that to the stage of release. Developing varieties through AICRP trails are done where Agriculture Research Stations (ARS) are there. There is a probability of leaving out the rainfed areas as very few ARSs have covered rainfed areas; and those may not be representative. Varietal trials can be done in those areas. For this a policy is needed at national level. Mainstreaming does not mean to centralize at national level. Dr. Deshmukh recommended that under the state Commissioner, Agriculture the seed production system can be institutionalized with an objective of farmers getting the seed as per their choice.



Ms. Kavitha Kuruganti, ASHA Network joining online – flagged a few aspects which normally comes in this kind of discussion. She observed that the seed sector is not really dependent on release, notification and registration with PPV&FRA systems. As much of the seed is supplied either in the informal or private sector such registrations may not be a prerequisite. It is the public sector's formal seed system which has rigid protocols. In the case of rainfed agriculture, climate change context, organic farming / natural farming context, we are talking about bringing back the diversity in the field. Soil health and resilience depends on crop diversity and related seed diversity.

She further suggested a few points of discussion. State departments do not always depend on deviating the protocols; they seem to be having a way of upholding the science and also breaking the rigidities that are built by the scientific establishment to formalize the informal seed system (two examples were presented earlier); these initiatives need to be looked at to get the diversity back. There are more than 2000 farmers' varieties registered with PPV&FRA – it means they passed the DUS test and may not have passed VCU. Need to find a way to mainstream these farmers' varieties if they are popular in the farming community. Registered varieties with PPV & FRA can be looked at and complete what is needed to bring them into a formal seed supply system. The diverse set of presentations today suggests the possibility of instituting diverse institutional mechanisms. Kavitha requested NRAA to initiate a process of piloting an end to end intervention (identification of traditional varieties, characterizations, multiplication of seeds and maintenance breeding etc.) to set up seed supply chain in the 168 rainfed districts that were prioritized.



Dr Sudhiranjan Dhua, Retd. Principal Scientist from ICAR- CRRI (Center for Rice Research Institute, Cuttack. explained the observations on seed biome. The Department of Agriculture (Odisha) collected more than 1000 traditional varieties and stored them in the State Gene Bank; a sample of 5kg each when he was working at CRRI. Later scientists of the CRRI decided to assess the microflora association with those seeds, that might indicate the microflora within the soils. They found mycelium growth of *Dendrophilia* (fungus) in some of the traditional varieties after they were kept in aseptic conditions for 15-20 days. These are in symbiotic association in nature with the traditional varieties found in salt affected areas. Traditional varieties performance was good if endophyte presence is there in seed and plant. This is another important aspect in coming years for people who are working on traditional seeds to appreciate.



Dr Hanuman Lal Raiger, from the AICRP-Center for Potential Crops shared that less attention was given to the traditional varieties, especially NUS crops; bringing them into the seed chain is important. NUS crops like grain amaranth are replacing mustard and wheat in Gujarat in some areas with low rainfall; it was in 15000 ha in three districts of the state. Similarly, Spine Gourd is good for diabetic patients and its cost ranges from Rs. 200-300 per kg. Seed purpose watermelon also has good value in the market – seed is very rich in nutrients as Cashew. It is growing in Bikaner and other places where rainfall is very low.

In tribal areas, Rice bean is another crop which is neglected and rich in nutrition – areas like Uttarakhand and Odisha have it. Buckwheat used to be in a larger area of HP and now farmers are forgetting this crop. He also shared that Center for Potential Crops is ready to work and share the information and technical inputs with organization working on NUS.



Dr R B Sinha, from *FAO India* shared that PPV&FRA is complicated and is beyond the capacities of tribal or smallholder farmers. NBPGR has done wonderful work of collection and storage of them in NGB from different agro-ecological zones. As climate is changing, edaphic characters are also changing due to various human interventions like soil quality and soil depth. With this, the accessions in NGB, might not perform well in the same agroecology zones. Testing of these accessions need to be taken up. NRAA and NBPGR together need to take up such an initiative.

He suggested that Agrobiodiversity parks in PPP mode & agri-tourism may work for conservation giving it an economic opportunity. Differential pricing policy for mixed cropping / traditional varieties are important – it will help increase in nutrition intake along with conservation as India is in the list of nutrition deficient countries. Need to think on incentives and dis-incentives required to discourage crops that are not suitable to particular agro-ecological zones.



Dr Shalini Bhutani, *Legal Expert Consulting with FAO India* and others, shared her views on the policy note circulated as a background note to the workshop. Resilience building to climate change in rainfed areas needs developing adaptive capacities of the system. It has two aspects viz., recovery from shocks and how to respond / adapt to the changed situation. To design the location specific seed systems defining its rationale is important. Landraces come well in certain micro climates – these are also bioindicators which determine the change if someone tracks it. Resilient seed systems should be accessible to farmers which provides safety nets for food, asset levels and livelihoods.

'Seed System' is a set of principles and procedures on which it operates. Traditional varieties seed systems are unorganized- it doesn't mean that they are disorganized. Lawmakers of the country acknowledged that these systems are working with some fundamental principles while drafting PPV&FRA and BDA.

Dr Bhutani then shared the principles as **3Ds viz., Diversity –diverse organizations and procedures; Differentiated – from the existing formal seed systems; Decentralized –locale specific genetic material** which is indispensable for adaptation. She emphasized on the need to look into farmer breeders, build their scientific intellect, promote seed enterprises and evolve the legal and policy landscapes.

Dr. Bhutani also raised the following questions

- What is the legal status of traditional varieties in the current law of India? Further explaining this question she quoted the example of FAO's standard material transfer agreement with 15 International Gene Banks – there it was mentioned that traditional varieties are designated as International Public Goods (IPG) – on which no proprietary rights are there. Unfortunately, under PPV&FR Act – applicable to the traditional varieties registered by the PPV&FRA and. Many of the traditional varieties are not yet registered but they are farmers' varieties.

As in the case of forest & wildlife protected areas or archeological protected monuments, traditional varieties should be designated as protected varieties irrespective of whether they are registered or not – these are essential tools for building climate resilience.

- What are the legal provisions for ‘seed freedom’? India is one among the leaders in this regard. Section 39 of PPVFRA and article 9 of International Treaty respects the seed freedom and gives the legal space to farmers and farmers collectives to exchange seed in an unorganized seed system.
- What kind of IPRs are needed? Do we need a non-IPR approach to the seed system? SOP on Alternate seed systems in Odisha was developed on the idea of open source seed system. There are examples in other countries like In Europe, conservation varieties catalog under a different criterion. In Africa, polity declares seed, where farmers can seed multiply and exchange the seed – We can look into it
- What kind of controls are required from the state? How can state enter into quality assurance and what kind of certification with differentiated seed system principles be instituted?
- Who can access it and on what terms? Formal and Informal seed systems can always operate in the legal framework to produce the seed and supply?

Shalini further suggested to do an exercise on legal mapping to understand the provisions and hurdles in the

- PPV&FRA
- Seed legislations (– there is ample freedom for farmers on traditional/ farmers’ varieties under Section 24, need to protect it from amendments)
- Biological Diversity Act for ABS, how State Biodiversity Boards and state departments can work together
- Seed Order
- Forest Rights Act.



Dr B Renuka, Deputy Director (NRM), MANAGE has shared that there are good examples on traditional varieties conservation, multiplication etc. in the mainstream and outside; a wide variety of traditional varieties are spread across the country. It is important that mapping and documentation of the traditional varieties and nutritional profiling be carried out for increasing demand from consumers.

In rainfed areas, at present focus is on intensification and diversification of cropping systems under Natural Farming. It is useful to come up that what kind of seed can be used, how diverse seed can be produced, mechanisms of its – these are critical in promoting Natural Farming.

Renuka further explained that MANAGE is the nodal agency for capacity building in the National Mission on Natural Farming. MANAGE has been working with the RRA Network; together it has submitted a proposal to the Ministry on traditional varieties and climate resilience through NRAA.



Dr. Gunasekaran, Deputy Director, Seeds from MoA&FW shared the need to firm up the definition of the 'traditional variety' and it should be distinct from other categories as defined in various conventions.. SOPs can be prepared by a sub-committee constituted for the purpose. Odisha initiative was going on the right track as they are using the existing system for release of traditional varieties. He also observed that states can also recommend and release the variety for specific districts. Dr. Gunasekharan suggested that under the Bio Diversity Act, there is a need to take permission from NBA to do research on, or to use landraces. He suggested that a pilot initiative can be taken up to generate experience/ data which would help in evolving the system. He also informed that the PPV&FRA is providing financial assistance for gene banks.

Dr. Gunasekharan also shared that any committee that is not formed as per guidelines in Seed Act 1966 is not legal and hence their recommendations are invalid unless approved again by SVRC. Who will define Traditional Varieties and in which context; is an important question along with deciding upon the system recommended for seed standards and Package of Practices for commercial sale of such Traditional Varieties.

Asking if the protocols followed in Odisha Millets Mission violate any legalities, **A. Ravindra** from WASSAN suggested that if Dr Gunasekaran or experts in the subject critically look at the SOPs on Alternate Seed Systems for Landraces , Odisha keeping the legal frameworks in the view and giving the feedback for further compliance will be highly useful as GoO has moved ahead on this agenda.



Dr Ashok Dalwai, CEO, NRAA said in his closing remarks that we need agrobiodiversity – rainfed areas have been subjected to discrimination and inappropriate systems developed for irrigation. Green revolution technologies are imposed into rainfed areas resulting in greater loss of soil health, increased cost of crop production, and productivity remains one third of what we achieve in irrigated areas. The first step towards Sustainability is not technology, it is the laws of crop geometry – he observed.

There is a need to reduce the pressure on irrigated areas as yields are stagnating in those areas. Focus on rainfed areas is increasing as it has untapped potential. Rainfed areas with proper technology can contribute well to food grain production. Rainfed areas are facing the challenges with climate change – for that integrated approach is important i.e animal, agriculture and allied activities; to do so, we need good quality suitable seed / plant material – food crops like Millets, pulses and oil seeds which are growing in rainfed areas are neglected in R&D and policy level.

He advised constituting a group for developing agro-ecology based Standard Operating Procedures for alternate seed systems for traditional varieties/landraces (e.g. the one approved by the High-power committee, Government of Odisha) rather than having rigid standard protocols. He suggested developing a flexible protocol and to study the provisions and laws towards conservation, biological diversity, seed act, PPV&FRA, etc., that are constraining towards the promotion of traditional varieties/ landraces for production and distribution.

He further emphasized that while promoting traditional varieties, we need to consider productivity, resistance to biotic and abiotic stresses, and nutrition. Developing protocols focusing on documentation and for the *in-situ* conservation of traditional varieties is necessary.

■ Workshop Proceedings

Dr Dalwai suggested that the observations/ issues identified from the workshop can go into three groups viz., Policy, Research and Development and action in the field i.e. seed conservation and seed multiplication etc., for detailed discussion and recommendations. He reiterated that the existing legal framework for seeds needs to be assessed to understand the constraints and to come up with possibilities of promoting traditional varieties under the current policy regime. He further suggested having a pilot proposal for developing seed production protocols by considering 50 vulnerable rainfed districts in the country as an evidence-based recommendation.



THE FOLLOWING ARE THE SUMMARY ACTION POINTS EMERGING FROM THE WORKSHOP:

1. Developing agro-ecology based Standard Operating Procedures for alternate seed systems for traditional varieties/landraces
 - a. Assess the SOPs developed for Odisha and approved by the High Power Committee by a group of experts - considering the legal frameworks existing on seed, and suggest necessary modifications
 - b. NRAA will constitute a Committee to come up with a Policy Paper on the existing provisions for popularising traditional varieties, their limitations and suggest policy changes.
2. A Pilot Program can be taken up in selected 50 vulnerable districts- mainstreaming landraces/ traditional varieties that includes - documentation; testing of conservation, seed multiplication and distribution protocols. Such pilot program can generate experiential evidence based recommendations. Such pilot may also include the initiatives related to Neglected and Underutilised species (NUS crops).
3. Rework on the propositions related to seeds in the recent Draft Comprehensive Policy for Rainfed Areas Policy document in line with the discussions in this workshop Incorporating the text on Community Managed Seed Systems for Climate Resilient Rainfed Agriculture.



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Presentations and Case Studies



[1] Overview of Seed Systems in India

Dr. S. Rajendra Prasad, Former Vice Chancellor, UAS, Bengaluru

Click: https://drive.google.com/file/d/14y5mwitMbLgD3sg36NcpuqyW17g_FAb1/view?usp=sharing

[2] Seed Systems for Climate Resilient Rainfed Agriculture

Dr. K.S. Varapasad, Chairman, WGoSS, RRA Network

Click: https://drive.google.com/file/d/1JQfLoLJglc0Abu_Y9Q1cfSpWCODF0kMy/view?usp=sharing

[3] National Workshop on Decentralized Seed Systems for Climate Resilient Agriculture in Rainfed Areas (March 2018)

Ms. Bhagyalaxmi, Convenor, WGoSS, RRA Network and WASSAN

Click: <https://www.rainfedindia.org/published-page/resources?id=5f69db22b2778b000aede05b>

Operational Modalities and Process Guidelines for a National Pilot Program - Evolved from the Brainstorming Workshop, MANAGE, Hyderabad (7th November, 2014)

Click: <https://drive.google.com/file/d/1BZsAyaqAdMqsuzfh-3BSpGrDWGJYPd8FV/view?usp=sharing>

[4] Seed Systems for Landraces under Odisha Millets Mission (OMM)

Dinesh Balam, Associate Director (WASSAN)

Click: https://drive.google.com/file/d/1ZZkULRuMLJhvdVYe9SsGHnw298qA_02d/view?usp=sharing

[5] Kalachampa – The Story of a registered variety derived from a landrace that raced into the mainstream

Click: <https://www.wassan.org/case-studies/>

[6] Fragrance in the Field – a case study from West Bengal

Click: <https://www.wassan.org/case-studies/>

[7] Participatory Cultivar Trails for Neglected and Underutilized Species - CROPS4HD

Ms. Anitha Reddy, Sahaja Samrudha

Click: <https://drive.google.com/file/d/1tCK0P6MiubxxixWP0831mWLi4aquno4w/view?usp=sharing>



National Workshop on Seed Systems for Climate Resilient Rainfed Agriculture

Organized by

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