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KNOW WHY CUSTODIAN FARMERS ARE IMPORTANT IN AGROBIODIVERSITY CONSERVATION

Agrobiodiversity erosion is a threat to sustainable food systems. In this blog, George Thomas explores the importance of custodian farmers in agrobiodiversity conservation.

CONTEXT

Agricultural biodiversity, also known as agrobiodiversity, is crucial for ensuring food and livelihood security. It encompasses the variety and diversity of plants, animals, and microorganisms used directly or indirectly for food, including crops, livestock, forestry, and fisheries. This rich biodiversity results from the co-evolution of natural processes and human activities, spanning thousands of years since the dawn of agriculture. However, modern agricultural practices have led to a significant reduction in agrobiodiversity, threatening the sustainability of ecosystems and food security. This blog explores the importance of agrobiodiversity, the role of custodian farmers, and the various global efforts to conserve these vital resources.

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UNDERSTANDING AGRICULTURAL BIODIVERSITY

Agricultural biodiversity, or agrobiodiversity, refers to the diversity of plants, animals, and microorganisms that are used directly or indirectly for food and other uses, including crops, livestock, forestry, and fisheries. It includes a wide array of resources: commercial cultivars, breeding lines, wild progenitors, and landraces (local or farmer varieties). The Food and Agriculture Organisation (FAO) defines it as "the variety and variability of animals, plants, and micro-organisms at the genetic, species,

and ecosystem levels that sustain the ecosystem structures, functions, and processes in and around production systems and that provide food and non-food agricultural products."

However, agrobiodiversity is under threat due to monocultures, habitat loss, and unsustainable agricultural practices. Since the 1900s, about 75% of plant genetic diversity has been lost globally as traditional local varieties have been replaced by genetically uniform, high-yielding crops. Additionally, 30% of livestock breeds face extinction. This genetic erosion impacts ecosystem services such as carbon sequestration, pollination, water supply, erosion control, and pest management necessitating urgent conservation efforts.

PLANT GENETIC RESOURCES CONSERVATION

Recognising the decline in genetic diversity, various conservation strategies have been developed, mainly categorised into ex-situ and in-situ approaches:

- **Ex-Situ Conservation:** This involves maintaining genetic resources in controlled environments, such as genebanks, seed banks, field genebanks, and in vitro genebanks. There are over 1,750 genebanks worldwide, housing around 7.4 million accessions (distinct samples of seed material). These facilities ensure the preservation of diverse crop and animal species and their varieties and landraces for future use, even if they are lost in natural habitats.

- **In-Situ Conservation:** This strategy focusses on preserving genetic resources within their natural habitats, including traditional farming systems where local cultivars are maintained by resourceful farmers. By growing and using these varieties, farmers actively contribute to conserving within-species genetic diversity. On-farm preservation of agrobiodiversity through custodian farmers is a major opportunity.

Global Efforts in Conservation of Agrobiodiversity

Several international initiatives have been started to conserve agricultural biodiversity around the world by safeguarding seeds and other genetic materials (Box 1).

Box 1: Global Seed Banks for the Conservation of Agrobiodiversity

Notable among these are the Global Crop Diversity Trust, the CGIAR Genebank Platform, and the Svalbard Global Seed Vault.

Global Crop Diversity Trust (Crop Trust): Established in 2004, this nonprofit organisation focusses on preserving crop diversity to ensure global food security. It supports major international and national genebanks that maintain collections of crops and crop varieties under the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA).

Svalbard Global Seed Vault: Located on the Norwegian island of Spitsbergen, this facility provides long-term storage of seed duplicates conserved in genebanks worldwide. With a capacity to store 4.5 million seed samples, it serves as global insurance against the loss of seeds due to natural disasters, equipment failures, or political unrest. The vault currently holds over 1.2 million seed samples from around the world.

CGIAR Genebank Platform: This network, coordinated by the Consultative Group on International Agricultural Research (CGIAR) and the Crop Trust, conserves more than 770,000 crop varieties. Its genebanks support agricultural research and development by providing access to a wide array of genetic resources.

India's Commitment to Agrobiodiversity

India is home to rich agrobiodiversity and has established extensive facilities dedicated to conserving agricultural biodiversity, mainly under the Indian Council of Agricultural Research (ICAR) system. There are five bureaus and one seed vault (Box 2).

Box 2. India's Commitment to Agrobiodiversity

In India, there are five national bureaus and one seed vault for the ex-situ conservation of agrobiodiversity.

National Bureau of Plant Genetic Resources (NBPGR): Located in New Delhi, this facility conserves over 0.45 million accessions of crop genetic resources.

National Bureau of Animal Genetic Resources (NBAGR): located at Karnal, Haryana, its functions include identification, evaluation, characterisation, conservation, and sustainable utilisation of livestock and poultry genetic resources.

National Bureau of Agriculturally Important Microorganisms (NBAIM): This is at Mau (UP) to act as the nodal institute for the acquisition and management of indigenous and exotic microbial genetic resources for food and agriculture.

National Bureau of Agricultural Insect Resources (NBAIR): This facility at Bengaluru engages in collection, characterisation, documentation, conservation, exchange, research, and utilisation of agriculturally important insect resources.

National Bureau of Fish Genetic Resources (NBFGR): Located at Lucknow, its functions include assessment and conservation of fish genetic resources.

Indian Seed Vault in Ladakh (Chang La Vault): Established in 2010, this is the second-largest seed bank in the world. Presently, it houses over 10,000 seeds of 200 plant species, acting as a secure repository for India's agricultural future.

***In vitro* Genebank ©NBPGR**

THE ROLE OF CUSTODIAN FARMERS

Custodian farmers are pivotal in conserving agrobiodiversity, especially on farms. They maintain a diverse collection of traditional crops and varieties, select crops and varieties adapted to local conditions, and promote the use and conservation of local diversity among their friends and neighbours. They are often driven by personal passion, cultural significance, or community pride. These farmers play a crucial role in selecting and promoting crop varieties that are well adapted to local conditions, thereby supporting the in-situ conservation of genetic resources.

Custodian farmers differ from ordinary farmers in their deep knowledge of agricultural biodiversity, commitment to conservation, and the sharing of seeds and knowledge within their communities. However, their numbers are dwindling, and their conservation methods may lack scientific rigour, highlighting the need for institutional support to identify, encourage, and formalise their contributions.

Cheruvayal Raman is a tribal farmer from Kerala who received the Padmashree award for conserving the traditional rice varieties. ©MSSRF

Identifying Custodian Farmers

Custodian farmers are key to preserving crop species and local cultivars while producing high-quality seeds. Identifying and supporting these farmers is crucial, and this responsibility can be taken up by various research and development institutes, the Department of Agriculture, and the Biodiversity Board. Custodian farmers are chosen based on their dedication to conserving local indigenous resources, their experience, and professional expertise. In exchange for their valuable knowledge and willingness to share genetic resources, they may receive monetary or non-monetary rewards or compensation. Research and development institutions can support custodian farmers in the following activities:

1. Facilitating the exchange of seeds and knowledge
2. Supporting the registration of specific crop varieties
3. Providing technical advice and training on agronomy and marketing
4. Offering recognition through awards and certificates
5. Providing financial support
6. Participating in research initiatives

Protocol for Identifying Custodian Farmers

Not all progressive farmers are custodian farmers. The following protocol helps identify true custodian farmers:

1. **Orientation Meeting**: Engage with the farming community to discuss the traits of custodian farmers, who often exhibit rich crop diversity, conservation-mindedness, deep subject knowledge, and a willingness to share information.
2. **Focus Group Discussions**: Conduct focus group discussions or key informant interviews to create a shortlist of 5-8 potential custodian farmers.

3. **Farm Visits**: Visit the shortlisted farms to identify and validate the conservation practices being employed.
4. **Monitoring and Verification**: Continuously monitor whether custodian farmers are maintaining, adapting, promoting, and conserving agricultural biodiversity.
5. **Understanding Crop Diversity**: Discuss with the farmers how they use crop diversity. Utilise the 'Four Cell Analysis' (FCA) method (briefly discussed below) to understand their crop choices and conservation logic.
6. **Motivation for Conservation**: Explore what motivates these farmers to preserve and promote biodiversity.
7. **Unique Characteristics**: Identify what distinguishes custodian farmers from other farmers in the region.
8. **Future Commitment**: Assess the likelihood that these farmers will continue their conservation practices in the future.

Spending at least two days in the fields with these farming families can provide valuable insights into their systems. Formulate a checklist of questions and document conversations using audio or video recordings. Capture photographs of promising farmers, their families, and surroundings, and look for anecdotes that highlight the farmers' conservation efforts, motivations, and unique characteristics.

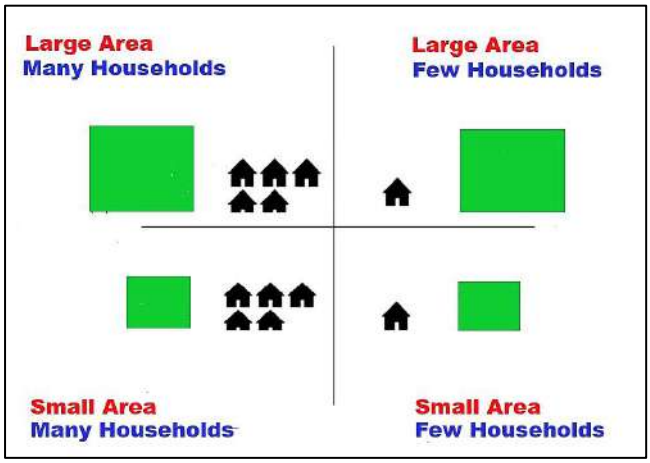
Documentation

The collected information from interviews is used to create a detailed profile of each custodian farmer. The profile structure includes:

- **Introduction**: Details about the farmer's household, landscape, farm, and subsistence activities.
- **Maintenance**: Information on crops and landraces maintained by the farmer.
- **Promotion**: How the farmer shares seeds and knowledge.
- **Adaptation**: Details on seed improvement, evaluation, and selection processes.
- **Motivations**: Anecdotes that reflect the farmer's reasons for conserving biodiversity.
- **Unique characteristics**: qualities that set the farmer apart from others.
- **Continuity**: efforts to involve younger generations in conservation practices.
- **Support Needs**: Specific needs and requests for support.

Four-Cell Analysis: A Tool for Assessing Agrobiodiversity

Four-cell analysis (FCA) is a rapid assessment method used to evaluate the extent and distribution of crop diversity among farming communities. This approach categorises crop species, landraces, and cultivars (cultivated varieties) based on abundance and distribution, helping researchers and policymakers understand the current status of agrobiodiversity and develop targeted conservation strategies.



A four-cell analysis can begin by conducting a focus group discussion (FGD) among farmers from a particular village. The group should consist of men and women who have knowledge of the local species, cultivars, and landraces of various crops. It can be used to assess genetic diversity within a species (intra-specific) or species diversity within a genus (inter-specific). Once done and repeated every 3-5 years, FCA can highlight the rate of biodiversity loss, providing critical insights for future interventions.

CHALLENGES AND FUTURE DIRECTIONS

While custodian farmers help in conserving agricultural biodiversity, their work is often driven by non-economic motivations such as cultural pride or personal interest. To ensure the sustainability of their efforts, it is vital to provide support that goes beyond financial incentives, including technical training, access to resources, and community recognition.

Moreover, there is no guarantee that subsequent generations will continue the conservation work of today's custodian farmers. Thus, integrating conservation education into community practices and involving younger generations is crucial. Efforts should also be made to transfer valuable seed samples to formal conservation centres with specialised facilities for ex situ conservation to safeguard against potential loss.

Landraces conserved by tribals in Koraput, Odisha.

CONCLUSION

Agrobiodiversity is a cornerstone of sustainable agriculture, supporting food security, ecosystem health, and cultural heritage. Custodian farmers play a unique and invaluable role in preserving this biodiversity through their dedication and traditional knowledge. Recognising and supporting these farmers, alongside global conservation efforts, will be crucial in safeguarding the genetic resources that underpin our food systems for future generations. By embracing a holistic approach to agricultural biodiversity conservation, we can ensure a resilient and sustainable future for all.

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