4 Custodians of tropical fruit tree diversity
Identifying and strengthening the roles and rights of custodian farmers

Bhuwon Sthapit, Hugo A.H. Lamers and V. Ramanatha Rao

Background
The global economy’s heavy reliance on a narrow diversity of crops puts future food and nutrition security at risk. Over the past century, more than 75 per cent of plant genetic resources have been lost and one third of today’s diversity could disappear by 2050 (FAO, 2011). Despite this trend, there are some farmers who continue to actively maintain and employ agricultural biodiversity on their farms, and who possess specialized knowledge about its use and cultivation. We recognize them as the ‘custodians’ of diverse crop species and varieties. These custodian farmers select crop varieties adapted to local conditions and preferences and promote their use and conservation in family and local networks. We as researchers came to discover the role of custodian farmers in rural communities through the process of seeking good practices for diversity management. We were interested in why some farmers were keen to grow and save seeds of a number of crops and varieties, whereas other farmers were either uninterested or have opted to engage in specialized commercial farming using a limited number of varieties. We collected and described 20 case studies of farmers in India, Indonesia, Malaysia and Thailand to understand what motivates custodian farmers to conserve, innovate and disseminate tropical fruit tree diversity, find ways to formally recognize such farmers and create mechanisms to support and expand their management of local crop biodiversity in situ and on farm (Sthapit et al., 2013).

Our research collaboration carried out field studies in 36 communities across the four countries. The studies aimed to: (1) develop a deeper understanding of the roles of custodian farmers in the conservation, use and dissemination of tropical fruit tree diversity; (2) highlight their contribution to the national plant genetic resource system and sustainable agricultural development in general; and (3) raise their visibility and contribute to the longer term development of institutional and policy support for their ongoing contributions to genetic resource management.
Defining custodian farmers

The term ‘custodian’ literally means a guardian, caretaker, protector or warden (www.thefreedictionary.com). A custodian is usually defined as someone who is responsible for looking after something important or valuable. The term ‘custodian’ does not necessarily refer to an individual or to either gender or mean that the people it describes always act solely in the area of conservation (van Oudenhoven, 2011). For the purposes of biodiversity conservation, Sthapit et al. (2013) defined custodian farmers as ‘those farmers (men and women) who actively maintain, adapt and promote agricultural biodiversity and related knowledge at farm and community levels over an extended period of time, and are recognized by community members for doing so’. Often, custodian farmers do not act alone, but rather are actively supported in their efforts by family or household members.

Methodology

Our first attempts to identify custodian farmers found that the concept was not always evident to villagers, researchers or genetic resource specialists of on-farm conservation. Often it was confused with the more widely known terms ‘progressive farmer’ or ‘innovative farmer’. Rather than identifying custodian farmers on the basis of their key functions (such as maintenance, selection and adaptation, promotion), there was a tendency to identify a village leader or farmer who uses modern varieties and technologies, or to pinpoint a wealthier large-holder farmer with strong institutional connections. In order to avoid this inherent bias, the following simple guide for selection of custodian farmers was provided to national partners:

1. Discuss the definition and characteristics of custodian farmers among the implementing partners
2. Identify potential custodian farmers using secondary sources of information such as local records showing farmers who grow unique or a higher number of crops or varieties in a village
3. Conduct focus group discussions with men and women in the community
4. Consult key informants to further clarify the definition and characteristics of custodian farmers before gathering information on potential candidates
5. Depending on the size of the community, shortlist three to ten potential custodian farmers in each community based on the focus group opinions and consultations
6. Validate candidates with personal field visits and informal interviews to assess the profile and characteristics of custodian farmers
7. Use Four Cell Analysis – a participatory method used to assess the richness level of diversity [modified from Sthapit et al. (2006b) and described in Chapter 3 of this book] – for individual farmers to identify the unique traits or characteristics of the genetic resources they maintain, adapt or promote
8. Most importantly, explore and document the rationale and motivations of the shortlisted farmers by identifying triggers or driving forces that prompt them to assume their conservation practices.

Using this method the national partners identified and interviewed 20 custodian farmers. The information they obtained was used to develop custodian farmer profiles using the following structure (Sthapit et al., 2013):

- Introduction: Household, landscape, farm, livelihood activities.
- Maintain: Which crops and landraces, how many?
- Promote: Share knowledge and seeds – which and how?
- Adapt: Improve, evaluate or select seeds – which and how?
- Motivations: Anecdotal stories showcasing why they maintain.
- Unique features: Why is this custodian special or different from the others?
- Continuation: Involvement of younger generation.
- Support: Response to needs and requests.

In February 2013, a workshop on ‘Custodian farmers of agricultural biodiversity: Policy support for their roles in use and conservation’ was organized to bring together global experts on agricultural biodiversity conservation and the 20 custodian farmers from South and Southeast Asia to share expertise and experiences.2

Through the workshop discussions, we refined our understanding of custodian farmers and identified four broad types of custodian farmers in agricultural communities (see Figure 4.1):

1. Farmers who maintain a rich and unique portfolio of species and varieties
2. Farmers who maintain and promote a portfolio of species and varieties
3. Farmers who maintain and adapt a portfolio of species and varieties
4. Farmers who actively maintain, adapt and promote their portfolio of species and varieties.

‘Maintain’ refers to the number of species or varieties the farmer has. ‘Promote’ refers to the sharing of material (seeds, saplings) or related knowledge about traits. ‘Adapt’ refers to simple selection, breeding involving crossing, or experiments such as trait identification or adaptation to local conditions. Discussions and case studies suggest that the boundaries distinguishing the different types of custodian farmer may be blurred depending on local factors such as crop type, local culture, exposure to new knowledge and settings and environmental conditions. Therefore, the purpose of this categorization is simply to shed light on the diversity of custodian farmer types one may expect to encounter in the field. The custodian farmer role is dynamic; as farmers acquire more knowledge, skills, social connections and recognition, they may choose to take on more functions (Figure 4.1). This change in behaviours has already been noticed with some farmers following the regional workshop,
who have expedited the exchange of germplasm and knowledge among fellow farmers.

**Characteristics of custodian farmers**

Both the term and concept of ‘custodian farmer’ are relatively new in the field of *in situ* and on-farm conservation of agricultural biodiversity (Negri, 2003). Subedi *et al.* (2003) originally called them ‘nodal farmers’ in their studies of social seed networks. The general characteristics of custodian farmers are presented in Table 4.1. As can be seen from the table, custodian farmers may not be progressive or innovative farmers as in the context of modern agriculture, but they are an important component of the rural agricultural scene and command the respect of people in the region for their role in the informal seed system.

The 20 case study custodian farmers and selected profiles of these farmers are illustrated in Plate 1 and Table 4.2. Selected profiles are included because they stand out amongst examples from each country.
Sources of motivation

The 20 case studies revealed that sources of motivation for the custodian farmer role can be diverse: personal, social, economic, cultural, environmental and policy/legal factors all, in varying degrees, drive their approach to farming (Sthapit et al., 2013). Similar findings were also reported by van Oudenhoven (2011), Gruberg et al. (2013) and Sthapit et al. (2015b). A survey of 66 custodian farmers also reported multiple motivations for maintenance of crop and fruit tree diversity. They include personal home use (91 per cent) followed by conservation (86 per cent), heritage (85 per cent), adaptation (74 per cent), income (62 per cent), hobby (52 per cent) and culture (36 per cent). Such a wide array of motivating factors is to be expected given the diversity of local conditions, customs and pre-existing practices. The challenge is how to use

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**Table 4.1 Characteristics of custodian farmers of local crop diversity**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Description</th>
<th>Indicators</th>
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</thead>
<tbody>
<tr>
<td>Driven by conservation ideology</td>
<td>Maintains rich diversity of tropical fruit species (richness in terms of inter- and/or intraspecific diversity) over and above the average farmer.</td>
<td>Diversity richness figure and guardian of at least one unique and rare or very valuable variety that may be difficult to propagate.</td>
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<tr>
<td>Knowledge holder</td>
<td>Holds knowledge on the usefulness of variety traits.</td>
<td>Cited by multiple community members (men and women) as a source of knowledge of diversity, traits and techniques.</td>
</tr>
<tr>
<td>Community recognition</td>
<td>Recognized by community members as someone who conserves local seeds and/or knowledge.</td>
<td>Community members cite his/her contribution in management of unique local crop diversity.</td>
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<tr>
<td>Highly motivated and self-directed</td>
<td>Has strong personal motivation to conserve local varieties without depending on external support for continued conservation and use.</td>
<td>Empowered individual, self-motivated and self-directed, often revealed by the capacity to provide anecdotal stories about his or her motivations.</td>
</tr>
<tr>
<td>Consistent commitment</td>
<td>Grows diverse varieties (even on small plot of land) over a long period even without immediate use or income generation from it. Uses varieties herself/himself and encourages others to do the same.</td>
<td>Personal orchards or home gardens contain relatively high number of crops and varieties compared to the average community member. Evidence of experimentation, comparison, crossing or selections made from existing or new germplasm.</td>
</tr>
</tbody>
</table>

Source: Sthapit et al. (2013).
Table 4.2 Selected profiles of custodian farmers from south and southeast Asia

<table>
<thead>
<tr>
<th>Region, country</th>
<th>Custodian farmer*</th>
<th>Richness (varieties/species)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sirsi, India</td>
<td>Dattatreya Hedge</td>
<td>52 mango varieties and 4 <em>Garcinia indica</em></td>
<td>Cultural and personal hobby driven by passion of local diversity. He is a custodian of 12 unique ‘appe’ mango of the Western Ghats, India. Major source of income is commercial orchard of arecanut, banana, cardamom and pepper but also fruit crop nursery or fruit tree nursery.</td>
</tr>
<tr>
<td>Sirsi, India</td>
<td>Vishweshwar Ganapati Hedge “Eshanna”</td>
<td>25 mango varieties including 14 ‘appe’ mango</td>
<td>A master grafting expert and barefoot breeder of local ‘appe’ mango varieties. Personal zeal to look for best scions of good pickle making varieties from wild as his wife is known expert for pickle making. He also maintains unique <em>Varate Giduga</em> mango variety (see Chapter 28).</td>
</tr>
<tr>
<td>Malihabad, India</td>
<td>Chhote Lal Kashyap</td>
<td>135 mango varieties including seedling types</td>
<td>Limited resources and poor sandy soils led farmer to search and test portfolio of seedling and grafted mango varieties, resulting in highest number of mango varieties in his 2 ha orchard. <em>Tukmi Heera, Deshi Lambui</em> and <em>Tukmi Surkha</em> are unique types.</td>
</tr>
<tr>
<td>South Ahmad Kalimantan, Kusasi Indonesia</td>
<td>6 <em>Mangifera</em> spp. with <em>Kasturi, Rawa-rawa, Kuini</em> and <em>Hambawang</em> unique types</td>
<td>Custodian of six species of <em>Mangifera: casturi, griffithi, odorata, applantat, foetida</em> and <em>indica</em> and three varieties of <em>M. foetida</em> (Hambawang) in his orchards.</td>
<td></td>
</tr>
<tr>
<td>Papar, Malaysia</td>
<td>Palin Along</td>
<td>16 species of tropical fruits; 2 varieties of aroi aroi</td>
<td>Despite small size of orchard, he is custodian of underutilized tropical fruit species as personal hobby. He learned to appreciate diversity from his father. He maintains unique aroi aroi (<em>Garcinia forbesii</em>) that has a thick rind used in local cuisine.</td>
</tr>
<tr>
<td>Bukit Gantang, Malaysia</td>
<td>Razali Yahya</td>
<td>4 Cultivars <em>Garcinia atroviridis</em> (Asam gelugor), 1 mangosteen and 3 rambutan with 6 other species</td>
<td>He maintains nine species of tropical fruits in his orchards and is known guardian of Asam gelugor. He domesticated planting of wild Asam gelugor in agroforestry systems and promoted in the village.</td>
</tr>
<tr>
<td>Chiang Mai, Thailand</td>
<td>Suradech Tapuan</td>
<td>21 varieties of mango and 4 wild relatives</td>
<td>A champion of side-grafting and custodian of unique mango diversity. He developed unique side-grafting technique suitable for rain-fed conditions. He has a passion for grafting and cultivating multiple varieties of mango in a single tree.</td>
</tr>
</tbody>
</table>

Source: Sthapit et al. (2013).

*The project worked specifically with the head of the household, who in these cases was always male. It should be noted, however, that many custodian farmers reported that their custodian role is carried out jointly with their wife and other family members.*
knowledge about the motivating factors to create conducive environments for fostering such local innovations. The UNEP/GEF project for the on-farm conservation of tropical fruit trees has shown that custodian farmers are a useful entry point within a community when planning interventions that strengthen on-farm conservation and use practices. Starting with a thorough understanding of their motivations, characteristics and knowledge will enhance the effective, efficient and sustainable adoption of such practices, and thus the implementation of community biodiversity management projects.

Responsibilities and rights of custodians

De facto responsibilities assumed by custodian farmers

The study confirmed that custodian farmers exist in all of the countries examined and play a distinct and important role in those countries’ agricultural systems (Sthapit et al., 2013; 2015a; Dinesh et al., 2014; Rajan et al., 2014; Gautam et al., 2014). They maintain and conserve a wide range of tropical fruit tree species and varieties based on their own interests and the local context. They often are the nodal points for the informal exchange of seed and plant material among farmers, and they are also important providers of materials and related knowledge to breeders and seed distribution programmes. Custodian farmers play a key role in linking traditional and modern seed systems, and thus may contribute to the evolutionary process of crop adaptation in a dynamic and competitive arena. However, though their roles as conserver, innovator and promoter are often well appreciated in local communities, their contributions often go unnoticed at national and global levels. Policies and institutions that could be developed to support their further efforts – for example, granting property rights for the varieties they develop, or guaranteeing the right of facilitated access to quality reproductive materials, and the right to save, exchange and sell such materials – are often underdeveloped (or non-existent) at national and global levels.

All the custodian farmers are self-motivated and have taken on the responsibility of conservation, adaptation and to some extent promotion of plant genetic diversity. There is no clear indication whether the costs involved are actually and fully recovered in a financial sense from the benefits they derive by maintaining such crop diversity on their own. Many of the benefits take the form of goods and services for the family well-being. Yet these custodian farmers also generate important spillover benefits beyond their immediate context, for other farmers in their own communities, and for their countries (or even the global community) considered more broadly. For example, custodian farmer Vishweshwar Ganapati Hedge from the Western Ghats of India has a personal zeal to select the best scions from the wild ‘appe’ mango and distribute them to more than 1,000 farmers and students. Similarly, Suradet Tapuan from Thailand has developed his own side-grafting technique for mango that is now being used by mango farmers from dry and rain-fed areas.
Both of these farmers inadvertently contribute to the global public good of fruit tree diversity as they maintain rich diversity of tropical fruits.

Policy support needed to strengthen the custodian farmer role

From a purely utilitarian point of view, it makes sense for governments to invest and to develop institutional and policy support to encourage these farmers in their continued efforts and to encourage other farmers to assume similar practices. One could also argue that there is a moral obligation on the part of society in general and the public plant genetic resource community in particular to give formal recognition to custodian farmers’ roles and mainstream their activities, providing whatever support is required. In Table 4.3 we provide a list of the key activities and responsibilities that have voluntarily been assumed by the custodian farmers that were the subject of this study. And, for each set of activities, we list the concomitant forms of institutional or policy support (including rights, privileges, freedoms, rewards and incentives) that are necessary for their current efforts and those of custodian farmers in future generations.

The provisions of the two international agreements that together provide the international legal framework for access and benefit-sharing – the Convention on Biological Diversity (CBD; with its Nagoya Protocol) and the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) – are presented and analyzed in Table 4.3. Many of the policy supports listed in the third column constitute means by which member states can implement their commitments under the ITPGRFA concerning the sustainable use and conservation of plant genetic resources for food and agriculture, and the promotion of Farmers’ Rights (under articles 6, 5 and 9, respectively; FAO, 2002). Farmers’ Rights are basically about: enabling farmers to continue their work as stewards and innovators of agricultural biodiversity; recognizing and rewarding them for their contribution to the global pool of genetic resources; and elevating the level of their participation in national agricultural biodiversity-related planning. The sections of the Treaty on conservation and sustainable use include undertakings to support on-farm conservation, increased use of crop diversity in farming systems, and increased participation of farmers in plant breeding. Our research with custodian farmers confirms that the recognition of their rights is inextricably linked to the promotion of their efforts to conserve and sustainably use genetic resources for food and agriculture and, by extension, their contributions to food security – today and in the future. Countries do not need to be members of the ITPGRFA to develop these kinds of policy support nationally.

It is beyond the scope of this chapter to provide an analysis of the extent to which the list of desirable policy measures in Table 4.3 are being addressed in the four countries that were involved in this research project. Instead, our intention is that Table 4.3, with its list of voluntarily assumed responsibilities and desirable supportive policies, will be useful in itself, not only for the four research partner countries but also for all countries where custodian farmers are, or could be, playing an important role.
<table>
<thead>
<tr>
<th>Role</th>
<th>Activities/responsibilities assumed</th>
<th>Necessary policy supports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintain</td>
<td>Save seed or planting materials of a richness of species, variety or trait diversity conserved at household level and document associated traditional knowledge</td>
<td>Recognition in national policies of the value of their efforts Protection of associated traditional knowledge (individual or collective) to ensure that benefits of use of specialist knowledge are shared in ways that are acceptable to the farmers and lead to community benefits Right to facilitated access to materials they need from the national or international genebanks Financial support, subsidies or rewards to compensate for custodian-related costs, and to support voluntary cooperation with formal sector actors where appropriate (e.g. genebanks and breeders in dynamic forms of <em>in situ</em> and <em>ex situ</em> conservation)</td>
</tr>
<tr>
<td>Adapt</td>
<td>Identify, domesticate, select or improve traits of interest Blend and use ecological indigenous knowledge of diversity, heritability and selection with scientific knowledge</td>
<td>Property rights (farmer plant breeders’ rights) for the varieties they improve, tailored to accommodate the conditions under which the farmers work and for the diversity of the materials they improve Right to save, exchange and sell propagating materials Public policy to promote participation of custodian farmers in research and development activities Financial support, subsidies or rewards for voluntary cooperation with formal sector actors in participatory plant breeding, multiplication of quality reproductive materials for use by others, and other aspects of the fruit tree value chain based on uses of custodian farmer varieties Right to facilitated access to information and materials from genebanks and public sector plant breeders Protection of farmers’ traditional knowledge and innovation in a secure way that leads to community benefits</td>
</tr>
<tr>
<td>Promote</td>
<td>Share materials and knowledge with other farmers High frequency of exchange of seed and associated knowledge Try to ensure family continues to harbour portfolio of species and varieties Transfer of knowledge and practices to next generation or kin Ensure alternative options for crops and varieties under threat</td>
<td>Right to save, exchange and sell reproductive materials Right to participate in decision making and benefit-sharing through community-based approaches Right to multiply and sell seed as Community Based Seed Producers (CBSP) groups Share in collective benefits through mechanisms such as: community biodiversity register (CBR), community seedbank (CSB), participatory plant breeding (PPB), farmer field school (FFS), community development, community biodiversity management (CBM) fund (Sthapit et al., 2006a). Empowered to participate in a network of custodian farmers Recognition of shared custodianship within households and whole communities Access to new materials Land tenure security (women farmers for intergenerational transfer of farms)</td>
</tr>
</tbody>
</table>
Challenges

Continuity

Although in some farm families custodianship is passed from generation to generation, this method of transmission is by no means guaranteed. In light of increasing rural migration and higher education rates, the new generation of potential custodian farmers is not unanimously keen on continuing their parents’ work. Inviting custodian farmers to participatory seed or planting material exchanges or diversity fair events provides alternative options for transferring knowledge, germplasm and roles to others. One proposed mechanism to maintain custodianship in this context is the establishment of a network in which the ‘tenure’ of one custodian farmer can be taken over or shared by other farmers when they are no longer willing or able to continue their efforts. Potential manifestations of this mechanism include community gardens or community seedbanks, which will help to preserve current information while linking it to young and future farmers.

Recognition

A second challenge is that the important role played by custodian farmers in conservation, innovation and development is often underestimated, under-valued and unrecognized (Sthapit et al., 2013; Gruberg et al., 2013). This can be attributed to the relative rarity of such farmers combined with their lack of connection to mainstream research and development institutes or networks. Mechanisms that establish connections between custodian farmers, the wider network of regional farmers and both national and international genetic resource systems would address this challenge. The decision to facilitate the process of mainstreaming the efforts by custodian farmers into national R&D systems should be taken up by the responsible authorities in the countries.

Identification and selection of the best fruit trees from farmer-managed genetic resources can provide immediate benefits to communities. Sthapit and Ramanatha Rao (2009) proposed a simple process by which custodian farmers’ unique, rare or elite varieties could be formally registered and thus enter the commercial multiplication and distribution system. A number of such elite materials in India have been identified and registered under the Protection of Plant Variety and Farmers’ Rights Authority (PPV&FRA; http://plantauthority.gov.in/). Similar actions could be used with farmers’ best varieties from Indonesia, Malaysia, Thailand and other countries. On the other hand, national seed laws that require farmers’ varieties to satisfy minimum standards of distinctness, uniformity and stability, or have exceedingly high standards for seed producers, can have the effect of preventing those materials, and the farmers who have developed them, from being recognized and from entering the market. Similarly, national access and benefit-sharing laws can present impediments for farmer exchange of materials if permission from national authorities is required and minimum processing fees have to be paid. Such
policies can, perhaps inadvertently, present challenges to the wider recognition of materials developed by custodian farmers. One potential method for addressing this obstacle is to require immediate registration into a type of ‘national seed board’ authority (e.g. NBPGR and PPV&FRA in India). It is also important to ensure free prior informed consent from custodian farmers, following clear, easy-to-follow procedures, in order to make sure that access to materials the farmers develop is subject to benefit-sharing conditions (Ruiz and Vernooy, 2012). Research into mechanisms for such issues is still in an infant stage. Recognition of local crop innovations by government authorities and the NGO sector has started in a few countries, for example in India, Bolivia and Nepal, but the identification and selection procedure may require more scientific rigour. It may also require investment on the part of national competent authorities to work with farmers, to help them develop materials and present them in ways that meet national registration standards. The Indian PVP&FRA has provided considerable community-level assistance to farmers in this regard, to register their farmer varieties under the Act. There are many research opportunities and significant excitement in this field as an entry point for on-farm conservation of agricultural biodiversity.

Further development of the framework of responsibilities and rights of custodian farmers as set out in Table 4.3 is essential in those countries where a relevant policy is not in place. This includes the right to participate in national decision-making processes, especially those related to plant genetic resources and benefit-sharing policies, as well as in international agreements. This will only become possible if we advocate for the formal recognition of custodian farmers, similar to the special recognition already afforded to outstanding progressive farmers or genebank curators, as stewards of the world’s food and nutritional security.

**A way forward**

1. Assess the importance of custodian farmers for on-farm/in situ conservation of local fruit tree diversity and the informal and formal seed system.
2. Establish fruit tree custodian farmers’ networks as an integral part of national and international conservation strategies and link them directly to agricultural biodiversity conservation institutions (e.g. genebanks to document diversity and involve custodian farmers in research programmes).
3. Use a community-based approach to improve the capacities of custodian farmers in: (i) protection of traditional knowledge of fruit tree genetic diversity for food and agriculture through documentation, use and conservation of this knowledge (e.g. community fruit catalogue, community biodiversity register); (ii) the right to save, use, exchange and own saved seeds or planting material (e.g. community seedbanks and participatory crop improvement); (iii) the right to participate in decision making at a national level on matters of the conservation and use of plant genetic diversity, as well as overall community development (e.g.
community biodiversity management, establishing CBM fund); and (iv) the right to equitably participate in benefit sharing arising from the use of plant genetic resources by creating economic and nutritional benefits (e.g. product development, marketing and home processing).

4. Support locally driven CBM funds that can directly maintain the multiplication and exchange of rare and unique materials at the local level.

5. Advocate formal recognition of custodian farmers and their roles in conservation of plant genetic resources and promote their participation in national-level decision making.

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References


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Custodian farmers of TFT diversity


Notes

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2 The workshop was held by the Global Environment Facility (GEF), the United Nations Environment Programme (UNEP) and Bioversity International in collaboration with ICAR, the National Bureau of Plant Genetic Resources (NBPGPR) and the Protection of Plant Varieties and Farmers’ Rights Authority (PPV&FRA), both in India.