

Enhancing local seed security and on-farm conservation through a community seedbank in Bara district of Nepal

Pitambar Shrestha, Abishkar Subedi, Deepak Rijal, Deepa Singh, Bhuwon R. Sthapit and Madhusudan P. Upadhyay

Abstract

In Kachorwa, Nepal, farmers experienced rapid loss of rice landraces along with a significant decrease in the area under cultivation (from 0.3 to 0.03 ha) in a short span of time (only 5 years). This could have been due to several reasons; but we identified a threefold factor responsible for this accelerated process. First, access of farmers to better options improved, second, lack of security of quality seeds and availability of cultivation practices, and the third reason identified by us was certain policies that served as disincentives to landrace growers. The joint workshop among members of the Community Biodiversity Register Group (CBR) and *in situ* project team decided to implement Community Seed Bank approach to improve or reverse landrace disappearance. By improving economic incentives this approach enhances on-farm conservation of endangered crop landraces. To assure wide participation of the local people the CBR group renamed it the Agriculture, Development and Conservation Society (ADCS). Through a series of informal gatherings and consultation with the project team, the society explored and documented crop diversity and their status from previous records such as CBR, diversity fair and farmers' network analysis. ADCS established a small-scale seed house using locally available construction materials. The initial resources were volunteered by *in situ* staff, local farmers and project staff. Different structures used to store seeds include *mor* (made of rice straw), *ghaila* (made of mud), *kothi* (made of mud and bamboo), *chaintha* and *mouna* (made of bamboo). The society has employed a twofold strategy: ADCS distributes seeds to farmers on the condition that they will return 150% of the total amount they borrowed, and crop varieties are regenerated in locally managed diversity blocks. This paper documents the local initiatives employed for the sustainable management of local crop diversity in *terai* conditions of Nepal. Initial lessons learned are highlighted.

Key words: Community seedbank, landrace, local seed security, on-farm conservation

Introduction

Several studies have indicated that small scale farming households need different types of seeds to allow for varied physical environments, to benefit from the many end uses of each crop, and as a coping strategy for complex, diverse and risky environments (Lewis and Mulvany 1997). Certain landraces are maintained because of their religious and cultural significance in specific ethnic communities (Rana *et al.* 1999). However, along with the adoption of improved varieties and cultivation practices, a large number of landraces maintained in traditional farming systems have been replaced. This replacement not only leads to serious genetic erosion (Porceddu *et al.* 1988) but also hinders efforts to improve crop varieties further (Nevo 1995). Similar stories have been documented from Nepal *terai*. Kachorwa of Bara District of *Terai*, Nepal is a high-yield environment, which has good access to road and markets, agriculture inputs, irrigation and technical services (Sherchand *et al.* 1998). Past studies have shown that traditional varieties are being replaced with improved varieties. The unavailability of quality seed has been enabling farmers to choose the modern varieties (Chaudhary *et al.* 2001). The records for the decrease in number of landraces and the area in which these landraces were grown are alarming.

The baseline studies (1998) documented that the average area covered by landraces was 0.3 ha which decreased to 0.03 ha when monitored after 5 years (CBR 2003). Out of 33 rice landraces inventoried in the base year, the number decreased to 14 after 5 years (Table 1). Such loss is also related to the erosion of traditional knowledge and culture. This process

may be accelerated further by improved access to farmers' alternative options, policy disincentives that prevail on landraces, and availability of seeds of preferred landraces. This alarming record warns that local diversity may disappear in the near future. In response to this situation, Kachorwa farmers established the Agriculture Development and Conservation Society (ADCS) to reverse this process. ADCS is represented by local farmers, nodal farmers, male and female farmers' groups. The society was legally registered with clearly defined mandate, roles and responsibilities. The main duties include coordination and linkages with farming communities, CBOs, agrovets and Non-Government Organizations. One of the key areas to address this problem was through the establishment of the community seedbank. It aimed at improving farmers' access to quality seeds, allowing traditional seed exchange and knowledge, and enhancing sustainable management of local resources. ADCS aims to gather, improve, regenerate and market seeds of endangered, most available and useful landraces involving local institution. Initially, ADCS has been managing seeds of rice, finger millet, pigeon pea and sponge gourd. In this paper, we document and analyze the process through which the seedbank was established, mechanisms through which seeds of endangered crop varieties are restored, and how seeds are managed in a sustainable manner. The lessons learned are highlighted.

Table 1. Number of farmers and area planted of rice landraces in different time periods.

Year and type of study	Number of landraces	Number of growers of sampled HHs	Total area of sampled HHs (ha)	Mean area/HH (ha)
Baseline 1998 (n=202 HHs)	33	137	26.06	0.30
CBR 2003 (n=349 HHs)	14	111	10.40	0.03

Source: Rana *et al.* (2000) and CBR (2003).

Materials and methods

In January 2003, the *in situ* project staff held a 1-day workshop with the Community Biodiversity Register group to discuss the progress, problems and importance of on-farm conservation. Another objective was to identify the way forward, once local crop diversity was inventoried. During discussions, the CBR members raised their serious concerns regarding the high rate of landrace disappearances. Along with the improper management and utilization strategies, landraces and associated knowledge were rapidly eroding. To halt this process and restore this lost diversity, in the absence of formal support programmes, the participants strongly supported the concept of a Community Seed Bank (CSB). Further discussion touched on benefits associated with CSB. The workshop recommended that the ADCS will:

- Share experience with the GEF/LI-BIRD joint CSB project implemented in Kaski to learn and refine the concept, mechanism and promotional activities.
- Initiate a CSB locally. The group will collect seeds, and store them in traditional storage structures. Locally available resources will be used wherever possible to encourage the locals to volunteer for this work.
- Conduct awareness programmes about the endangered landraces, their importance, and their short- and long-term values. The use of different means of dissemination was discussed, including pamphlets, posters and articles. The *in situ* team was given the responsibility for this programme.
- Establish diversity blocks on rice to regenerate seeds, use block as a means to make people aware, and evaluate the performance. The team decided to collect rice, finger millet, pigeon pea, taro, sponge gourd, cucumber, bitter melon, bottle gourd and sorghum seed from farmers and neighbouring villages. It was decided that seeds produced from diversity block, and PhD research trials would be supplied to the CSB.

Search for resources

In the workshop, different ways were explored to gather resources. The participants showed a keen interest in contributing resources in kind. The project staff provided cash to purchase storage structures such as *gahila*, *mor*, *kothi*, etc. The local team also discussed the site on which to establish a seedhouse. To implement the process, different roles were identified: (1) coordinate with farmers and farming community, local bodies and institutions, government agencies, and donor agencies, (2) seek technical support from projects, (3) explore possibilities for the appropriate site for a seedhouse, and (4) explore whether other members would be interested in volunteering.

ADCS asked the Village Development Committee for the land to construct a seedhouse. After a thorough discussion the body provided about 300.0 m² area for seedhouse. The International Plant Genetic Resources Institute (IPGRI) recognized the community's initiatives and provided USD1000 so as to strengthen capacities of community seedbank for enhancing seed security and on-farm conservation. ADCS constructed a seedhouse using locally available materials. The local authority provided NPR12 000 to purchase aluminum sheets for roofing. Apart from technical support and a facilitating role, LI-BIRD also provided NPR5400 for the construction work. Several individuals belonging to different farmers' groups including *Shanti* women group, *Adarsha* women group, *Pragati* women group and the ADCS general members volunteered 2 person-days during construction of the seedhouse. Non-members also provided bamboo materials worth NPR3500. The local elite individuals cut a tree to contribute wood required. A few group members provided their tractor for transportation of soil, sand and brick, and some provided an oxen cart. Other members served lunch or snacks for labourers. As discussed during the workshop, the local team decided to construct a seedhouse in traditional ways and use storage structures that are made locally. Members of ADCS contribute voluntarily to the management of stored seed.

Operating systems

Through discussion, several norms and rules were suggested, including:

- **Collection of seed:** all available seeds of landraces of the project were identified; keystone crop species will be collected over seasons.
- **Seed storage materials:** only locally available seed storage materials will be used for seed storage purposes.
- **Seed distribution and its selling:** the collected seeds are distributed based on the traditional *Dedha* system. In this system, after harvest the farmer will pay back 150% of source seed from where he/she had borrowed. If a farmer showed no interest in continuing the particular landrace, his/her seed will be purchased next year.
- **Maintain diversity block:** all endangered and other less popular landraces be maintained in diversity block and the population will be continuously improved through selection.
- Collection and management of seed.

To date, 37 landraces of rice, 5 of sponge gourd, 3 of pigeon pea and 2 of finger millet seeds have been collected and stored in the seedhouse (Table 2) and this number is increasing. The management of a community seedbank is based on traditional knowledge, skills and system. ADCS members look after seed drying and cleaning processes on a rotational basis. The project organized training for seed managers. The seedhouse and seed samples are checked collectively by ADCS members once their monthly meeting is over.

Table 2. Number of landraces at different times in the community.

Crop	Baseline study (1998)	Before CSB (CBR 2003)	After CSB (2004)
Rice	33	14	37
Finger millet	6	2	2
Sponge gourd	9	5	5
Pigeon pea	5	2	3

Source: Rana *et al.* (2000) and CBR (2003) and record of Community Seed Bank, Bara.

Regeneration, distribution and sale

The seeds are distributed every year. Seeds of rare and endangered landraces are regenerated at diversity block or in farmers' fields. The seedbank distributes the seeds to individual farmers, women and men group members on a loan basis—up to 5 kg seed and at cost for more than 5 kg. The quantity of loan to be sanctioned depends upon the availability of seed and number of farmers who have demanded the seed. The seeds for outsiders are sold for cash, with an objective to reduce workload and maintain quality. The seedbank members monitor and supervise farms to ensure the return of pure seed of high standard. If any farmer is not able to pay back the seed, then another source is identified for collection.

Training on quality seed selection and management

An *in situ* complementary project called 'Social Analysis and Gender analysis' (SAGA) was implemented in the community. Through this, training on rice landrace seed selection and management was conducted. Two women's groups and ADCS members were given this training. This training programme was organized twice: before planting and just before harvest. This helped farmers to know how to maintain high-quality seed either in the seedhouse or under field conditions.

Results and discussion

The *in situ* team and CBR members jointly organized a mass meeting in the community and discussed with community people the need for a nodal CBO and CSB for sustainable on-farm biodiversity management and community development. CBR members agreed to establish the Agriculture, Development and Conservation Society (ADCS) for the above purpose. They broadened the membership base to include women's group representatives, formed rules and regulations and registered the ADCS at the District Administration Office (DAO). The farmers collected 19 rice landraces from *in situ* site office to store in the seedhouse. The local team prepared a bamboo rack, purchased *ghaila*, prepared *mor*, and stored them in their seedhouse on 13 March 2003.

Farmers' response to improved seed security

Various surveys and studies conducted at the community during the project period already proved that the most landraces are grown by few farmers in small area, which were categorized as rare and endangered species. After community seedbank initiatives, the number of rice landraces has been increased from 14 to 37 (Table 2); other crop landraces also have increased. These all have been planted in diversity block to increase seed quantity in the 2004 season. Therefore, the community seedbank has contributed to seed security of local crops and landraces.

Contribution to on-farm conservation

Initial activities conducted by the community seedbank showed that it can play a key role in conserving local crop landraces on-farm. Thirty-five farmers used the community seedbank for local rice seed in 2004 (Table 3). Among them, 80% did not have their own source and

20% used the seed bank for its higher level of purity than their own source. Of the seed users, 43% were resource-poor, 40% were middle class and 17% were resource-rich households. Therefore, the contribution of a community seedbank is not only to increase farmers' access to seeds but also to support resource-poor farmers who do not have the capacity to save or purchase quality seed.

Table 3. Summary of community seedbank users and their socioeconomic status.

Year	Number of farmers per category			Total number
	Rich	Medium	Poor	
2003	5 (12) [†]	19 (48)	16 (40)	40
2004	6 (17)	14 (40)	15 (43)	35

[†] Figures in parentheses indicate the percentage of users.

Model of community biodiversity management

Seed collection, management, exchange, regeneration, distribution and sale mechanism of community seedbank initiatives in the Bara site are recognised as 'good practice' effective for on-farm conservation. Farmers' increased access to seeds may enhance on-farm conservation. This approach may not be applicable equally to all crop landraces. Figure 1 presents the existing community biodiversity management practices.

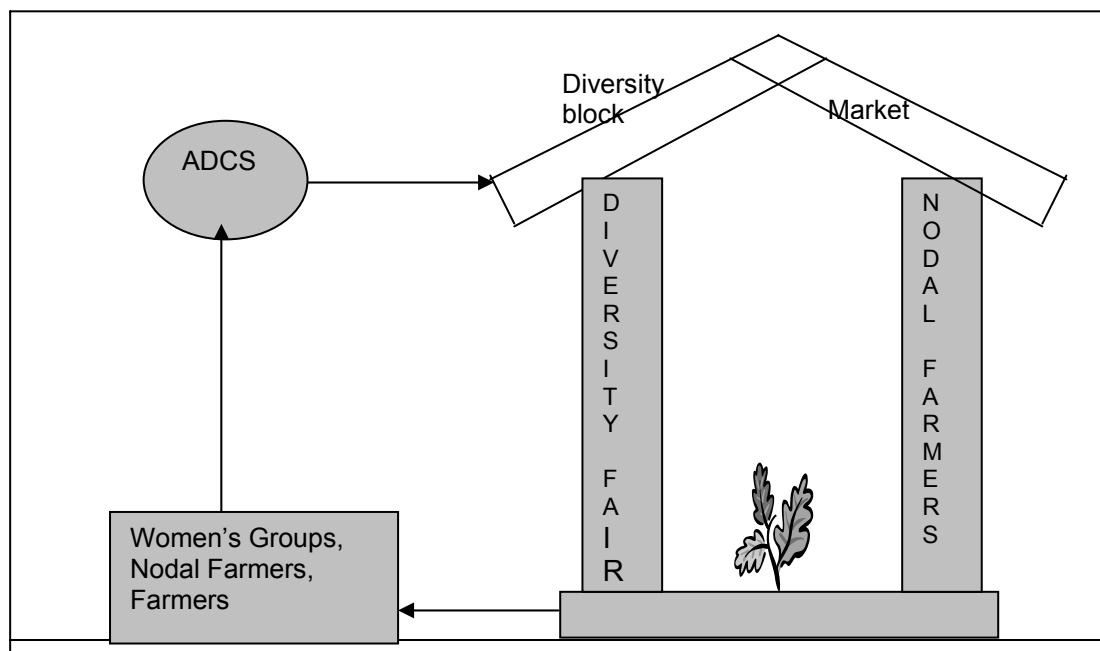


Figure 1. Community biodiversity management model of Bara ecosite for on-farm agrobiodiversity conservation.

Sustainability issue

The community seedbank is a joint effort of farming communities and the *in situ* conservation programme. Sustainability of this system largely depends upon the quality of seed and services provided by the community seedbank. The present community seedbank members have been involved since the beginning of the programme. As the seedbank was established to meet the needs of the local people, the likelihood is that the bank will operate smoothly over time.

Group members have been operating a savings and credit programme which helps in building cohesiveness among members, they hold meetings on a regular basis, share with each other their ideas and knowledge, plan and conduct different community development activities and, overall, have enhanced ownership of programme. The other source of income for the community seedbank is selling seed of landraces. The loan system of seed distribution and return has a multiplying effect. The group also made a rule that each member has to grow at least one landrace.

ADCS is gradually building its capacity on coordination and fund attraction. Understanding the value of plant genetic resources and importance of community seedbank, the Kachorwa Village Development Committee donated the land and cash resources. The cash contribution from IPGRI and Using Diversity Award to support local initiatives helped improve the seed security situation, thereby enhancing biodiversity conservation.

Conclusions

The community seedbank is leading to sustainable local seed security. It fulfills the community's requirement for quality landrace seed and helps to increase farmers' access to quality seed as a means of conserving local crop diversity to maintain on-farm. The level of awareness of community people on conservation of agricultural biodiversity and capacity of CBO has been enhanced after establishment of a community seedbank at Kachorwa. However, research and development effort is still required to ensure conservation and utilization of agricultural biodiversity with increasing income and economic status of the people. This approach is based on indigenous knowledge and is low cost, managed by the local community without facing major technical and financial problems. Initial efforts of this community-based biodiversity management approach have shown encouraging results for on-farm conservation of agricultural biodiversity. Therefore, dissemination of this approach in other areas of the country can halt the high level of genetic erosion, especially in the case of on-farm biodiversity.

Acknowledgements

The authors are thankful to women's and men's groups and ADCS members of Kachorwa, Bara, who played key roles in making this effort successful. The field-based staff (Kali Bahadur Limbu of LI-BIRD and Devendralal Karna of ADO Bara) are acknowledged for their assistance. Professional members of LI-BIRD and NARC involved in the *in situ* crop conservation project are thankfully acknowledged for their technical input. IPGRI-APO and IDRC Canada are also gratefully acknowledged for financial and technical support.

References

- Chaudhary, P., D. Gauchan, R.B. Rana, B.R. Sthapit and D. Jarvis. 2001. Genetic erosion in local rice diversity: Evidence from the terai Nepal. *In* On-farm management of agricultural biodiversity in Nepal (B.R. Sthapit, M.P. Upadhyaya, B.K. Baniya, A. Subedi and B.K. Joshi, eds.). Proceedings of a national workshop, 24–26 April 2001, Lumle, Nepal.
- CBR. 2003. Community biodiversity register, Bara, Nepal.
- Lewis, V. and P.M. Mulvany. 1997. A typology of community seed banks. Natural Resources Institute/Intermediate Technology, UK.
- Nevo, E. 1995. Asian, African and European biota meet at 'Evolution Canyon' Israel: local tests of global biodiversity and genetic diversity patterns. *Proc. Royal Society of London* 262:149–155.
- Porceddu, E., C. Ceoloni, D. Lafiandra, O.A. Tanzarella and G.T. Scarascia Mugnozza. 1988. Genetic resources and plant breeding: problems and prospects. Pp. 7–22 *in* Proceedings of 7th International Wheat Genetics Symposium (T.E. Miller and R.M.D. Koebner, eds.), 13–19 July. Institute of Plant Science Research, Cambridge, UK.
- Rana, R.B., P. Chaudhary, D. Gauchan, S.P. Khatiwada, B.R. Sthapit, A. Subedi, M.P. Upadhyaya and D.I. Jarvis. 2000. *In situ* crop conservation: findings of agro-ecological, crop diversity and socio economic baseline survey of Kachorwa ecosite, Bara Nepal. NP Working Paper No. 1/2000. NARC/LI-BIRD, Nepal/IPGRI, Rome, Italy.

- Rana, R.B., D. Gauchan, D.K. Rijal, S.P. Khadiwada, C.L. Paudel, P. Chaudhary and P.R. Tiwari. 1999. Cultural and socio-economic factors influencing farmer's management of local crop diversity: Experiences from Nepal. *In* Conserving Agricultural Biodiversity *In situ*: A Scientific Basis for Sustainable Agriculture (D. Jarvis, B. Sthapit and L. Sears, eds.). Proceedings of a Workshop, 5-12 July 1999, Pokhara, Nepal. IPGRI, Rome.
- Sherchand, K.K., N.P. Adhikari, S.P. Khatiwada, J. Bajracharya, K.D. Joshi, K.B. Kadayat, M. Chaydhaary, P. Chaudhary, S.S. Bishwokarma and S. Yadav. 1998. Strengthening the scientific basis for *in situ* conservation of agrobiodiversity: Findings of site selection in Bara, Nepal. NP Working Paper No. 2/98. NARC/LI-BIRD, Nepal/IPGRI, Rome, Italy.