
Chapter 14

Gene, Gender and Generation: Role of Traditional Seed Supply Systems in the Maintenance of Agrobiodiversity in Nepal

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Introduction

Seeds, the planting materials used for the production of subsequent crops, have been the continuous source of crop diversity in all farming systems for generations. They carry life in all its diversity as it is built into the genetic structure of individual species and form a bridge between one generation and another. The diversity of seed supplies, however, is increasingly being influenced and controlled by human activities, both *in situ* and *ex situ*. Farmers, from time immemorial, have been observing and selecting their crops and crop varieties, saving and maintaining seeds for the next season as experimenting with new seeds exchanged with neighbours and relatives. These activities constitute *in situ* crop conservation. Increasingly, the public sector has also been instrumental in creating and maintaining crop diversity through *ex situ* activities that involve *in vitro* genetic restructuring and laboratory gene banking. However, in many mountain areas *ex situ* crop conservation is unaffordable, and the fate of crop diversity is largely governed by the fate of the traditional seed supply systems that exist within local communities. Even where it is possible, *ex situ* conservation alone cannot fulfill the needs of agrobiodiversity conservation, as it does not maintain the evolutionary process through which the present day land races have been created (Brush 1995). For this reason the traditional seed supply systems are very important and irreplaceable.

Traditional seed supply systems contribute greatly to the on-farm conservation of plant genetic resources, which can be defined as the continuous cultivation and management of a diverse set of crop populations by farmers in different

agro-ecosystems in which crops have evolved. Traditional seed supply systems have been developed through generations of experience by farming communities to suit their environments and to meet their need for seeds for a variety of crops in a secure and sustainable manner. Most of the seed needs of farming households are met by their own production and preservation, an activity in which women play a significant role. In the low input farming systems that prevail in Nepal, women have traditionally been the managers of crop germplasm and diversity. However, most of the research and development interventions aimed at increasing crop production, through the use of new seed varieties and/or new seed supply systems, have undermined both the importance of the traditional seed supply systems and women's traditional role as custodians of local crop varieties and land races - threatening crop diversity and thus future food security. This paper examines processes in traditional seed supply systems, discusses their contribution to crop diversity and the role of gender, and highlights issues related to policies and programmes for conservation of agrobiodiversity.

Traditional Seed Supply Systems and the Role of Gender

Farming in Nepal is dominated by the subsistence agriculture on which 81 per cent of the population depend. It is determined by the widely varying agro-ecological conditions, which can change drastically within a few kilometres, and the socioeconomic circumstances of farmers. The result is a series of farming systems that are highly complex, diverse, and associated with risks. This diversity in farming systems has helped in turn to maintain and promote agrobiodiversity, through the large numbers of crop and animal species and their varieties and breeds maintained at the household level. The prevalence of subsistence production in Nepal means that, to sustain their livelihoods, farmers grow all kinds of crops, mostly land races, for food, fibre, and shelter, and keep varieties of livestock. As the infrastructure for agriculture is not well developed (irrigation, roads, marketing networks for agricultural inputs and products), the majority of farming households rely on the natural pattern of the seasons and on their traditional systems, both of which are full of risks and uncertainties. To survive in such a situation they mix all possible enterprises and, through years of experience, have selected crops, trees, and livestock varieties that are well adapted to their environments, demand less resources, and provide security against risks and uncertainties.

The traditional seed supply systems in Nepal are characterised by farmers producing and preserving their own seeds for subsequent planting, at times often exchanging with and/or borrowing from other farmers, with very few monitored transactions. It is estimated that as much as 90 per cent of the total seed requirements for cereals and other food crops, and about half of the total seed requirements for vegetables (90% for traditional vegetables), in the country are

met by the traditional seed supply systems (Cromwell *et al.* 1993; Joshi 1995). The traditional seed supply systems have a great influence on the existing crop diversity. They have been developed through generations of experience to fulfill the seed supply needs for an extremely large number of crops and crop varieties.

The traditional seed supply systems are dynamic and continuous processes comprised of variety selection, variety adaptation, seed selection, processing, storage, and exchange by farmers. Through these processes, genetic variations in crop varieties have evolved continuously, contributing to the maintenance of on-farm crop diversity. The flow of genetic materials in the traditional seed supply systems in Nepal is shown in Figure 14.1.

There are three areas in the traditional seed supply system through which the flow of genetic material takes place: nature, the farmer's field, and the community. Wild plants and weeds provided the genetic base, through evolutionary processes, for the land races cultivated by farmers. Selection of crop varieties takes place in and from the farmer's field, through mass selection and adaptation, seed selection, processing, and storage. Exchange of seeds produced in the farmer's field takes place in the community from farmer-to-farmer, through neighbours, relatives and friends. Genetic materials from new modern varieties also flow into local crop varieties through these exchanges of seed. In the day-to-day life of farmers, the processes of the traditional seed supply systems revolve around the crop and seed activities undertaken in the farmer's field and in the farm community. Women play a leading role in both of these places.

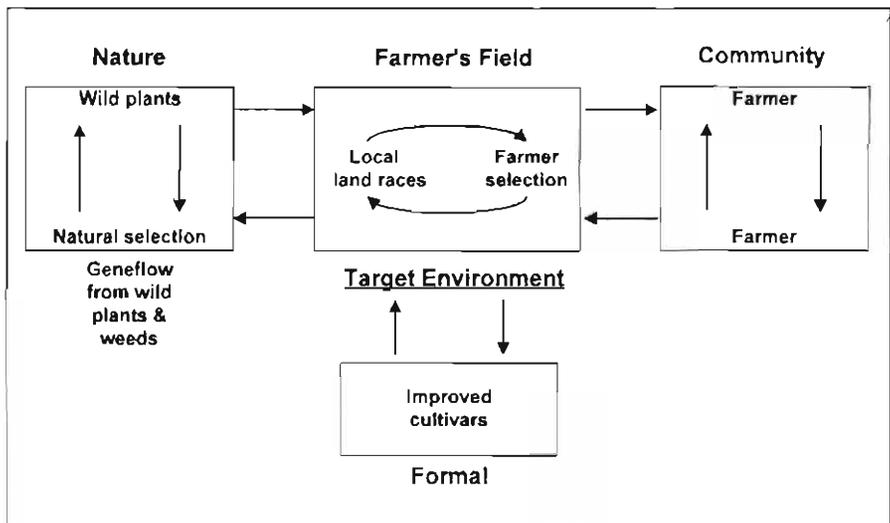


Figure 14.1: Gene Flow in the Traditional Seed Supply System

It is well known that women play an important role in the traditional seed supply systems in Nepal. According to Acharya and Bennett (1981), 30 per cent of the decisions on what crop to plant are made by women alone, and only 18 per cent by men. Similarly, 60 per cent of the decisions on what seed to use for planting (own or borrowed) are made by women alone, and only 21 per cent by men (in addition to 11 % by both and 8% dictated by traditional practice). The gender analysis further reveals that women supersede men in decision-making in all seed related activities (Table 14.1).

Table 14.1: Gender Variation in Decision-making with Regard to Seed Production and Supply

Activity	Per cent decisions made by	
	Men	Women
Crop selection	40	60
Seed selection	48	52
Storage methods	27	73
Grains to be consumed	27	73
Processing	27	73
Grain selling	49	51

(Source: Compiled in Bajracharya (1994))

Women farmers select good seeds for the next season, and mix them with different locally available preserving materials (ash, herbs, oils) frequently drying them in the sun first, and preserve them using different methods of storage. Women are often the ones who exchange seeds with neighbours, friends, and relatives; carry seeds from different crops and crop varieties from their parents as a gift to in-laws; and add diversity to the local seed banks. In some ethnic groups, grandmothers and mothers pass on their skills in selection of varieties and seeds to their daughters and daughters-in-law. This is quite a strong tradition amongst *Jyapu* farmers in the Kathmandu valley. In Tibeto-Burmese communities, such as the *Gurung* and *Magar*, it is a tradition to give new seeds to relatives when visiting, thus helping seed flow from one village to another. As illustrated in Figure 14.1, these new seeds may become a new source of gene flow to traditional land races. As a result the whole process becomes dynamic, and this helps to maintain crop genetic diversity on farms. Thus women's contribution to the existing richness of on-farm biodiversity is quite substantial. However, the value and the contribution of the traditional seed supply systems and women to on-farm biodiversity have been neglected in agricultural research and development programmes. The consequences of changes in seed-related programmes and policies for seed security on gender relations and ultimately on on-farm biodiversity have hardly been considered.

Efficiency of the Formal Seed Supply Systems

The formal seed sector in Nepal is underdeveloped. The national Agricultural Inputs' Corporation (AIC), the only formal organization to deal with seeds of cereal crops, supplies only 10 per cent of the total national seed requirements (Cromwell *et al.* 1993). The AIC only deals with officially released varieties, and there are not many even for major food crops, and because of this their contribution to enhancing varietal diversity is minimal. The distribution of seeds of commercial (non-traditional) vegetables is done entirely by the private sector and amounts to over 50 per cent of the total seed requirements for these crops. But, in the last few years, increasing efforts have been made to increase the seed supply capacity of the AIC. The result is that modern high-yielding crop varieties, developed by public sector agricultural research systems, are being pushed on to farmers with very little understanding of farmers' crop needs, their environment for growing crops, and the likely implications of such efforts on crop diversity. The policy of subsidising the price of seeds and other inputs for a few modern varieties has artificially increased the benefits from using such varieties. Government and non-government organizations have continued advocating the use of a few modern crop varieties without actually analysing the consequences. These varieties are also being promoted by attaching high social status to their use. The idea that the traditional local crop varieties are inferior and a symbol of backwardness is intentionally conveyed to farmers. The Block Production Programmes undertaken by the government District Agricultural Development Offices in the 1980s for major food crops, especially wheat, maize, and rice, are good examples. Farmers were encouraged to grow a single modern variety of a crop by the provision of production 'packages' comprised of seeds, fertilizer, pesticides, training, and technical advice. Both agricultural training and agricultural fairs have been oriented to encourage the use of modern varieties. As a result of systematic efforts and interventions like these, on-farm crop diversity is being narrowed down continuously. This is evident in the case of crops such as wheat, maize, rice, and potatoes, in some areas, and in the case of indigenous vegetables in commercial growing centres. Shahi and Mathema (1983) reported that, in valleys such as Kathmandu, Chitwan, and Trisuli, 80-90 per cent of the traditional rice cultivars have been replaced by modern varieties. Similarly, formerly very popular scented, quality rice varieties, such as *Samundraphinj*, *Biramphul*, *Bayerni*, and *Ramani*, are no longer grown widely throughout the Pokhara Valley (Sthapit *et al.* 1995). Experience also suggests that traditional vegetable crops, such as pumpkin, cucumber, other gourds, and leafy vegetables, are being marginalised and replaced by commercial vegetables. These commercial vegetables are often hybrids, and the source and supply of seeds are highly unreliable and controlled by outsiders. If this trend continues, Nepal will be losing its valuable genetic resources as well as indigenous knowledge about selecting and maintaining seeds of open- and self-pollinating crops at the farm level, a big loss for future generations. Despite international

concern, there is still no consolidated initiative for formulating policies and programmes in this direction.

Rea's (1995) argument that some development interventions, such as those linked to new seed varieties or new seed diffusion systems, can dispossess women and cause them to lose their skills has also been found to apply to Nepal. Seed sector activities in Nepal, especially those of government agencies, have hardly considered the gender implications. Despite the heavy involvement of women in the traditional seed supply systems, their roles as a source of information and as custodians of local crop varieties and land races have been greatly undermined. On the one hand, modern varieties are mostly developed with the single objective of increasing production and productivity (whereas farmers have multiple objectives). On the other hand, women are rarely included in the process, and therefore their needs and requirements are ignored. Finally, packaged with attractive incentives, these modern crop varieties are often pushed through men. Men have greater mobility, better access to information, and are the first to receive new seed varieties and associated training opportunities. For example, the dissemination of mini-kits and other packages of improved seed varieties has targetted male farmers (Shrestha *et al.* 1984). Similarly, even in areas in which seed projects have intervened, women comprise only 25 per cent of the official participants in seed-related training (Cromwell *et al.* 1993). The implications of such gender-blind, seed-related development activities are four-fold: first, the resources and efforts spent are missing the target; second, women are being systematically dispossessed of and are losing the expertise inherited through generations; third, the crop diversity base is narrowing down without the consequences properly being understood, resulting in limited choices for women; and fourth, there is a danger of introducing seed-borne diseases that could lead to unpredictable losses of crop production or even in a particular crop industry being wiped out. The problem of bacterial wilt disease in potatoes in the western hills of Nepal is an excellent example.

Issues for Consideration

The traditional seed supply systems of mountain communities are under-explored. There has been very little research into farmers' knowledge about the selection, cleaning, treatment, and storage of seeds. Although it is clear that women are more involved in the traditional seed sector than men, the gender dynamics of the whole process is not well understood. In poverty-ridden regions where the immediate need for increasing food production is more important, on-farm biodiversity conservation has received little attention. National policies and strategies on the conservation of on-farm biodiversity are lacking. Because of this, the value of crop genetic diversity for future generations and the role of women in conserving this diversity through traditional seed supply systems have

not been explored. Encouragingly, new initiatives for on-farm biodiversity conservation have been started at different levels. In this context, the following issues related to women's role in the traditional seed sector and their contribution to the conservation of crop diversity need to be considered.

- The traditional seed supply systems possess a great potential for increasing food production as well as for conserving on-farm crop diversity. These systems are adapted to different agro-ecological niches and to the different socioeconomic circumstances of farm communities, and thus they provide a basis for livelihood in diverse areas and communities. However, this has not been explored seriously or systematically. The mechanism of operation and the gender dimension of these systems need to be thoroughly researched to provide a basis for any interventions in the traditional seed supply systems. Care needs to be taken to complement the systems rather than disrupt them.
- Agricultural development in Nepal is being pursued only in terms of producing more than the present level through the use of modern, high-yielding crop varieties. This has certainly led to reduced on-farm crop diversity. Cromwell (1992) describes a similar pattern in Zimbabwe. The issue here is whether the contradiction between agricultural development and biodiversity can be minimised or made more complementary. This might be achieved by: a) evaluating traditional local crop varieties and land races, maintaining an inventory of them, and making them available to researchers and farmers; b) offering farmers a wide range of choice of crops and crop varieties; c) providing suitable new seed varieties to increase the plant genetic resource base for exploiting untapped and unused farm resources; and d) exploring and exploiting the market potential of local crop varieties, which is often high because of the unique and preferred qualities of such crops. In all these processes women need to be provided with opportunities for active participation.
- National policies and strategies in the seed sector can play an important role not only in directing on-farm crop diversity conservation efforts, but also in preventing the short-term profit-oriented exploitation of crop genetic resources at the expense of future generations. Such policies and strategies should make sure that promotion of improved modern crop varieties is not at the expense of local land races. At present, women's opinions, needs, and perceptions are very rarely reflected in national policies (Gurung 1995). Care should be taken to make use of women's role and knowledge in the traditional seed sector instead of marginalising them. Hecht (cited in Rea 1995) used the *Prestige and Knowledge Pyramid* to ask, "How can biodiversity be saved as long as most knowledge about how to maintain it

in a particular setting is vested in women at the bottom, and most prestige and policy-making power in men at the top?"

- Women's skills and dominant role in the traditional seed sector can be used for *in situ* crop conservation activities, including seed banking. The recognition of women's skills and roles in such activities will raise their social status and technical awareness. Market exploration and exploitation of local crop varieties can increase the decision-making power of women by improving cash earnings. Women farmers need to be helped to organize themselves into groups and to acquire the skills and management capacity to grow local land races as seed crops and to start village level gene banking. Women's participation in agricultural training and fairs also needs to be increased by organizing such activities in village settings.
- At present, diffusion of technology and new seed promotion mechanisms, such as extension agencies, training, agricultural fairs, and market promotions, by government and many non-government agencies are entirely biased towards improved modern crop varieties. There is an urgent need to correct this bias by reorienting the present attitude of devaluating the importance and contribution of traditional crop varieties and land races. These mechanisms should include valuable and outstanding local crop varieties so that farmers have a choice of diversifying their crop resources. Agricultural fairs should include, and make awards to, outstanding local crop varieties. Women will obviously benefit from this as their contributions will be recognised and sought in the process.
- The farmer-to-farmer seed distribution mechanisms, in which women play an important role, need to be strengthened. For example, *Pokhreli masino*, a popular rice land race from the Pokhara Valley, has spread to most parts of the mid-hills of Nepal through farmer-to-farmer seed exchange (Green 1987). *In situ* rural gene banks need to be established and a seed distribution network for local crop varieties developed, which can ensure large scale re-emergence of these varieties. The formal seed sector should be decentralized, and local institutions should be promoted and empowered to meet the seed needs specific to their local conditions and requirements. There is no reason why the formal seed sector, such as AIC and NGOs, should not promote outstanding traditional crop varieties.
- In order to promote the acceptability of new crop varieties at the same time as on-farm crop diversity, plant breeding should be decentralized and the breeding objectives reoriented to serve the needs of small farmers (Cromwell *et al.* 1993; Sthapit *et al.* 1995). This would create new crop diversity on farms and conserve genetic variation through traditional seed supply

systems. Women's participation in the evaluation of post-harvest criteria has been found to be vital for the success of this approach, thus women should be actively involved in the process.

- Pressure should be continued to ensure that crop genetic resources preserved in the farm communities as common property are not monopolised under legislation related to plant breeders' rights and intellectual property rights. Patenting of life forms will not only put the food security of small farmers at risk, but also put women at an even greater disadvantage than at present.

Conclusion

The traditional seed supply systems in Nepal, which have sustained crop production and contributed substantially to on-farm crop diversity through the generations, have not been well explored or exploited. Modern crop varieties are being pushed indiscriminately, often through men, without analysing the consequences on crop diversity, seed security, and gender relations in farming communities. However, in the light of increasing pressure of development for change, and the urgency of demands to advance the cause of women, it will be difficult to promote on-farm biodiversity in isolation. The question arises whether we can maintain agrobiodiversity by production-led development efforts and by ignoring women's role in local seed supply system, as women are the traditional guardians of agrobiodiversity. It appears that on-farm biodiversity conservation can be better promoted if development and conservation are treated as complementary topics to be exploited with care, and if the question of gender is considered carefully at all stages of the efforts made. Genes, the basis of mountain agriculture, can also be better conserved through proper consideration of gender.

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