4 Leveraging the successful participatory improvement of Pokhareli Jethobudho for national policy development in Nepal

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Introduction to the enhancement project

Rice is a major crop in Nepal, both in terms of the area of cultivation and production, and it is the most preferred food in the country. The Pokhara Valley in the Kaski district is rich in rice diversity. D.K. Rijal and his colleagues (1998) reported 69 rice varieties under farmers’ cultivation in this district, out of which 62 were landraces. Jethobudho is a popular rice landrace widely grown in the Pokhara Valley (grown by approximately 15 percent of rice growers) due to the high market demand for its quality traits such as aroma, taste, softness and other culinary qualities (Anonymous, 2006). Production of this variety has been fairly low, however, as it is susceptible to lodging as well as numerous diseases and has a low yield compared to modern varieties. This chapter is about a highly participatory project that was designed to enhance the qualities and performance of Jethobudho, to make it more attractive for use in the Pokhara Valley and to share associated benefits with local farmers.

The project, Strengthening the Scientific Basis of In Situ Conservation of Agricultural Biodiversity on Farm (In Situ Project), was jointly implemented by Local Initiatives for Biodiversity, Research and Development (LI-BIRD), which is a Nepal-based nongovernmental organization; the Nepal Agricultural Research Council (NARC); and Bioversity International, in collaboration with the Kaski District Agricultural Development Office (DADO), various farmers’ groups and community-based organizations in operation at the project sites. It ran from 1997 to 2006. This chapter also draws on experiences with respect to the cultivation and use of Pokhareli Jethobudho after the In Situ Project came to a close.

One of the primary objectives of the enhancement program was to get the improved Jethobudho variety registered in order to facilitate the formal and legal production and marketing of its seeds as well as to provide some form of ownership right to the farmers who contributed to its development and conservation. The In Situ Project initiated a participatory landrace enhancement program for Jethobudho rice using methods of participatory plant breeding (PPB). PPB is a method of plant breeding that involves farmers
in various stages of the breeding process – in parent selection, in the identification of preferred traits, in the selection of lines from the segregating or heterogeneous population and in the provision of feedback on the performance of the advanced lines (Witcombe et al., 2006). According to M.L. Morris and M.R. Bellon (2004, p. 32), PPB refers to a set of breeding methods characterised by many different forms of interaction between farmers and breeders . . . all designed to shift the locus to the local level by directly involving the end user in the breeding process.

The main objective of the PPB program for Jethobudho rice was to improve its production traits – reduce lodging, and increase disease tolerance and yield while maintaining the quality traits inherent to the variety – in order to maintain or increase its cultivation. Another objective of the enhancement program has been to develop a better, and relatively uniform and stable, variety compared to the local population but with the true traits of the Jethobudho landrace, making it eligible for official variety registration. This would then allow farmers to claim ownership rights over the new Jethobudho rice variety as per the existing Seeds Regulation, and commercially produce and market its seed. LI-BIRD, the Agricultural Botany Division of the NARC and Bioversity International, jointly developed the PPB program for the enhancement of the Jethobudho landrace in the Pokhara Valley, in collaboration with the DADO and the Fewa Seed-Producing Farmers’ Group of Pame village in the district of Kaski, which represented farming communities of the area. It is interesting to note that while LI-BIRD, the NARC, the DADO and Bioversity International recognized that only by registering the enhanced variety and applying separately for a right to ‘ownership’ (equivalent to a breeder’s right) under the existing regulations would the farmers be able to enjoy formal exclusive control over the crop and to benefit from its production, the farmers themselves were not aware of the need to register the enhanced variety. Without the assistance of the project partners, the farmers would not have been able to take advantage of this opportunity.

Two farming communities in the Pokhara Valley were selected as primary sites for the program, namely Fewa Phant (at 900 metres above sea level) and Malmul Phant (at 600 metres above sea level). Jethobudho rice is indigenous to the Pokhara Valley, and these two communities were well known for growing it. In fact, this particular variety has not been identified in any other part of Nepal. As mentioned earlier, the very qualities that make Jethobudho rice so popular, such as its aroma, taste and texture, have a great deal to do with the physical conditions of where it is grown. The soil condition, the water quality and the air temperature of the Pokhara Valley all serve to influence the quality of this cultivar. It is interesting to note the fact that this rice variety is so easily affected by its physical location is possibly a factor that limits its range of cultivation. While the project partners have started to assess its production in other hill districts of Nepal, its growth is clearly quite limited to date. Another
Improving Pokhareli Jethobudho in Nepal

reason for the selection of these two communities was the fact that, of all of the communities in Nepal, these two places were very interested in participating in the enhancement program in order to improve the production and the quality traits of their traditional Jethobudho variety. The farmers in these communities expected to benefit personally from the increased production and the higher market price that the enhanced Jethobudho rice variety would demand.

Description of the specific enhancement efforts

The initial survey of the Jethobudho rice production areas in the Pokhara Valley was carried out in 1998, and it revealed that there was considerable variation in the characteristics of the cultivar, in terms of its morphology (grain type and colour), its agronomy (plant height, tilling ability, panicle length, culm strength, yield, blast occurrence and lodging intensity) and postharvest quality traits (softness, flakiness, aroma and other cooking qualities). This information provided breeders and the project team with an adequate foundation from which to use a mass selection method for the enhancement of the Jethobudho rice landrace. The project team designed detailed procedures and methods for such a selection and started implementation of these activities in 1999. In 2000, two sets of 338 lines were cultivated in Malmul Phant and in Fewa Phant. Following the harvest, 183 lines were selected according to various traits, such as field tolerance to leaf and neck blast, a strong culm, plant height below 150 centimetres (in order to avoid lodging) and high productivity. From 2001 to 2003, these 183 lines were repeatedly assessed and tested, according to the desired traits outlined earlier, until the number of selections was reduced first to 46 varieties and then to the final six. The details of the procedures and methods adopted throughout the project are presented in Table 4.1.

From the evaluation of 338 lines of the Jethobudho landrace, six lines were selected that consisted of traits that were consistent with the true Jethobudho landrace, as described by farmers and consumers with reliable traditional knowledge. All of these six lines were better than the existing Jethobudho population in terms of their agronomic traits (tolerance to blast disease and lodging, yield components and fodder quality) as well as their postharvest traits (milling recovery, softness, taste, flakiness, aroma and other cooking qualities) (Gyawali et al., 2006; Gyawali et al., 2010). The traits of these six lines were adequately uniform, were distinctly separable from the normal Jethobudho population and were adequately reproduced in new plants in the subsequent years. These factors qualified the bulk of these six lines to be registered as a new rice variety.

The combined yield of the six lines was also higher than the normal population, ranging from 2.61–2.98 tonnes per hectare compared to 2.54–2.66 tonnes per hectare for the normal Jethobudho population (Gyawali et al., 2006; Gyawali et al., 2010). The milling percentage of the selected lines was also very high (71 percent), and local traders were willing to pay a higher premium price for it (approximately 100 Nepalese rupees per 0.1 tonne). The local traders were largely mill owners who were selling the milled rice to local consumers. The price for
<table>
<thead>
<tr>
<th>Year</th>
<th>Goals</th>
<th>Methods</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>• assessment of field diversity of Jethobudho for morphological, agronomic and quality traits</td>
<td>• participatory rural appraisal, baseline surveys and four-cell analysis in farming communities throughout the Pokhara Valley</td>
<td>• considerable variation was found in the Jethobudho population throughout the seven major Jethobudho production areas</td>
</tr>
<tr>
<td></td>
<td>• breeding goals were set for Jethobudho enhancement</td>
<td>• breeding goals were set jointly by the project team and the farming communities</td>
<td>• breeding goals were aimed at improving the Jethobudho population by selecting preferred traits</td>
</tr>
<tr>
<td></td>
<td>• analysis of the preferred traits</td>
<td>• trait analysis was done with the help of expert farmers, traders/millers and hoteliers</td>
<td>• landrace enhancement procedure was designed</td>
</tr>
<tr>
<td></td>
<td>• collection of accessions/lines for evaluation and enhancement</td>
<td>• farmers’ fields were visited during the harvest, and five panicles were selected from each field</td>
<td></td>
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<tr>
<td>2000</td>
<td>• diversity assessment</td>
<td>• two sets of the 338 lines were assessed in farmers’ fields: one at Malmul Phant and another at Fewa Phant</td>
<td>• 338 lines of Jethobudho rice were collected from seven production areas</td>
</tr>
<tr>
<td></td>
<td>• selection of lines for the identified preferred traits</td>
<td>• one set was assessed for blast tolerance at the NARC research station in Malepatan in the Pokhara Valley</td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>• 183 selected lines of Jethobudho were evaluated for blast and lodging tolerance as well as yield components</td>
<td>• the performance of 183 lines was assessed at the NARC research station in Malepatan and in farmers’ fields in Fewa Phant</td>
<td>• 183 lines were selected for awnless or short awn, field tolerance to leaf and neck blast, a strong culm, a height of no more than 150 centimetres and good productivity</td>
</tr>
<tr>
<td></td>
<td>• consumers and market traders identified numerous quality traits</td>
<td>• season-long data was collected for further screening</td>
<td>• 46 lines of Jethobudho landrace that confirmed most of the preferred tests were selected for further evaluation</td>
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<tr>
<td></td>
<td></td>
<td>• market surveys and consumer feedback were collected for the selection of quality traits</td>
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<td></td>
<td></td>
<td>• selection of lines was made on the basis of postharvest micromilling and organoleptic tests</td>
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</tr>
<tr>
<td>2002</td>
<td>• evaluation of 46 lines of Jethobudho landrace for agronomic and postharvest traits</td>
<td>• agronomic trials were conducted in farmers’ fields in Malmul Phant and Fewa Phant as well as at the NARC research station in Malepatan</td>
<td>• six lines of Jethobudho landrace confirming most of the preferred test were selected for further evaluation</td>
</tr>
<tr>
<td></td>
<td>• assessment of these cultivars for the aroma trait</td>
<td>• micromilling and organoleptic tests were conducted for postharvest traits</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• assessment of these cultivars for wider adoption in the Pokhara Valley</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>Event</td>
<td></td>
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<td>------</td>
<td>----------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 2003 | - Evaluation of six lines of Jethobudho landrace for agronomic and postharvest traits  
      - Agronomic trials were conducted in farmers’ fields in Malmul Phant and Fewa Phant as well as at the NARC research station in Malepatan  
      - Micromilling and organoleptic tests for postharvest traits  
      - Simple sequence repeats assessment for aroma traits  
      - All six lines performed better than the normal population  
      - These lines were bulked for further evaluation |
| 2004 | - The bulk of six lines were evaluated for wider adoption  
      - Seed production was initiated  
      - Participatory variety selection (PVS) was used to test wider adoption  
      - Farmers began seed production in five farming communities in the Pokhara Valley  
      - Bulk population performed better than the normal population |
| 2005 | - Evaluation of bulk population and seed production  
      - Field visit by member of the Variety Release Committee (VRC)  
      - Farmers participated in PVS and seed production throughout many locations in the Pokhara Valley  
      - Members of the VRC visited farmers’ fields in three farming communities  
      - Breeder and foundation seeds were produced for further multiplication  
      - Members of the VRC were satisfied with their performance |
| 2006 | - New Jethobudho population proposed for release and registration  
      - Seed production of new population  
      - Meeting of the Variety Approval, Release and Registration Committee held on 4 July 2006  
      - Seed production was initiated through the Fewa Seed-Producing Farmers’ Group in the village of Pame  
      - The bulk of six lines was officially released and registered as Pokhareli Jethobudho  
      - Seed production and marketing continued by farmers’ group |

Source: Adapted from the original (Anonymous, 2006; Gyawali et al., 2006; Gyawali et al., 2010).

*a* Four cell analysis groups plant varieties into four quadrants with plant varieties grown by (1) many farmers in a large area (acreage); (2) many farmers in a small area; (3) a few farmers in a large area; and (4) a few farmers in a small area (Rana et al., 2005).

*b* Agronomic trials consisted of assessing agronomic traits, such as plant height, number of tillers, panicle length, grain yield, straw yield, occurrence of neck blast disease, sterility and culm strength for lodging resistance.

*c* Organoleptic test is done to assess cooking and taste qualities of the given plant variety. The milled rice of the enhanced Jethobudho was cooked and its cooking and taste qualities were compared to the traditional Jethobudho and other rice varieties.

*d* Simple sequence repeat (SSR) assessment uses a molecular marker technique to establish the genetic relationship among plant varieties. The SSR assessment showed that the selected six lines of enhanced Jethobudho consisted of traits for aroma and that these aroma traits were quite similar to those found in the well-known *indica* and *japonica* aromatic rice varieties (Bajracharya et al., 2004).

*e* Participatory variety selection is a participatory method of selecting new plant varieties, whereby farmers are provided with seeds of new plant varieties for their independent testing/experimentation using their own management practices and selection criteria. It provides an effective method of testing the suitability of new plant varieties, thus confirming farmers’ diverse socioeconomic and production environment (Witcombe et al., 1996).
raw unprocessed rice was established through negotiation between the farmers and the traders, and it varied from year to year and even within the same season. One of the traders, a company called Karmacharya Traders, was a large enterprise based in Pokhara that operated nationally. It was selling Jethobudho rice with attractive packaging throughout Nepal. With the expanding market and increasing consumer preference, the demand and the price for the enhanced Jethobudho with better postharvest traits is higher than the existing Jethobudho variety.

After the development of the enhanced Jethobudho rice variety, the project partners began to look into the benefits of registering it. They began by discussing the advantages of registration with the Fewa Seed-Producing Farmers’ Group, and the farmers showed interest and enthusiasm in following this course. Hence, the project partners approached the Variety Approval, Release and Registration Subcommittee of the National Seed Board and invited them to make a field visit to monitor and assess the enhanced variety of Jethobudho in 2005. Such a visit is an established practice done with the objective of assessing the varietal characteristics (distinctness and uniformity criteria) of the potential new plant variety. The subcommittee members accepted the invitation and made a field visit to the Pokhara Valley in September 2005 (rice season). The team assessed the crop’s performance and interacted with the performance of the project team and the farmers’ group. The team was impressed with the performance of the enhanced Jethobudho variety and provided a positive report for its release and registration.

After receiving the favourable report, the project partners prepared and submitted the application form. It was assumed that the variety would be registered under the name of the farming community that was involved in its cultivation and conservation so that the farmers’ right to ownership would be ensured. However, it was learned through the application process that the registration could not be made solely under the farming community’s name due to the additional conditions set forth by the National Seed Board as per their interpretation of the related policy provisions in the National Seed Policy 1999. The application form required applicants to have a level of education and professional training for them to be able to maintain the breeder and foundation seeds that the farmers were unable to meet. Thus, the application was finally submitted under the names of the project partners and the Fewa Seed-Producing Farmers’ Group as co-registrees. The farmers were in agreement with this decision.

However, this was not the only hurdle facing the project team. The partners were aware from the very beginning that registration would be very difficult due to the kind of scientific data that was traditionally required. There are currently four legal documents in Nepal that support the registration of new plant varieties: the National Seed Policy 1999, the Agricultural Biodiversity Policy 2007 (first amendment, 2014), the Seeds Act 1988 (first amendment, 2012), and the Seeds Regulation 2013 (after first amendment of Seeds Regulation 1997). These provisions, however, were suitable only for varieties that were developed through a formal breeding system. They require the adoption of more formal breeding procedures as well as the presentation of multiseason scientific data with statistical analysis, and skilled technical staff and infrastructure that were far beyond
the common farmer’s reach. Several years earlier, LI-BIRD and CAZS (Centre for Arid Zone Studies) Natural Resources of the United Kingdom had begun lobbying efforts with the National Seed Board to have these provisions changed in order to recognize new plant varieties developed from participatory plant breeding. These lobbying efforts eventually succeeded, and in 2004 the National Seed Board formed a committee to review the plant variety release and registration process. The review committee included members from the National Seed Board, the NARC, the Ministry of Agriculture, the Department of Agriculture, LI-BIRD, the CAZS Natural Resources and the Seed Entrepreneurs of Association of Nepal. While LI-BIRD did present the perspectives of farmers, farmers were not directly involved in the committee’s decision making. In the course of the debate, LI-BIRD and CAZS Natural Resources provided evidence that:

1. participatory plant breeding did adopt scientific breeding principles and procedures;
2. the participation of farmers and the use of their knowledge and feedback in the breeding process increased breeding efficiency and the success of new plant varieties;
3. farmers’ perception data was systematically collected, was subject to statistical analysis and was very useful in assessing the performance of the new plant varieties.

The evidence also demonstrated that the farmers were making rational decisions in selecting lines from the segregating population (Witcombe et al., 2006).

After lengthy discussions, the government finally agreed to recognize PPB as a complementary scientific method for developing new plant varieties, and to accept data from farmer participatory varietal research trials for the registration of PPB varieties. The proposal for new provisions for the national listing of local plant varieties, which are traditionally under cultivation, was also accepted, enabling formal registration of such varieties. These changes were made to the Seeds Regulation through a ministerial decision published in the Nepal Gazette on 6 June 2005. An industry breakthrough, these changes necessitated the inclusion of organoleptic data (cooking and taste qualities) and permitted the use of farmers’ perception data in the process of registering new plant varieties. By accepting farmers’ perception data, it was easier for farmers to meet the data requirements for variety release and registration. Ultimately, the use of farmers’ perception data and the requirement for farmers’ participation served (1) to reduce the experimental lag time as well as the time taken to register the variety and (2) to recognize the contribution of farmers’ knowledge and breeding material in the cultivation process, thereby making it much easier for them to become co-registrees. This latter achievement, in turn, has paved the way to establish the farmers’ ownership right to the enhanced Jethobudho variety along with the other (formal) partners.

With these various legal changes in place, it was finally possible to follow through with the application to register. On 4 July 2006, the enhanced variety of Jethobudho rice was officially released and registered under the name Pokhareli Jethobudho. Once the registration was complete, it was learned that
it was also necessary to submit a separate application for ownership, as the right to ownership was not included with the registration. According to section 14 of the Seeds Regulation 2013, the application for ownership is optional and is left to the decision of the party registering the variety. The registration of Pokhareli Jethobudho has, for the first time in Nepal, recognized farmers as breeders and made them eligible to claim breeders’ rights in the form of ownership right over the new variety. The farmers and the concerned organizations are now eligible to produce and market the seeds of this enhanced variety anywhere in the country, which was not possible for them prior to registration. However, as the scope of the ownership right is not defined in the existing Seed Law and Regulations, it is theoretically possible for anybody to produce and sell seeds of this variety. Because of this nobody has ever applied for the ownership rights for any registered plant variety. The Fewa Seed-Producing Farmers’ Group, which is a co-registrant of the new variety, is responsible for the production and marketing of the seeds and is beginning to benefit from this business. The group works in close conjunction with LI-BIRD, which is providing technical support and marketing assistance. The majority of sales have been made to the DADO, LI-BIRD and private seed traders, as well as farmers within and outside the farming community. The monetary benefit to the farmer from the sale of seed was relatively small until 2010 due to low seed sold per year. This scenario, however, changed in 2011 when a local private seed entrepreneur, allowed to trade the seeds, started paying a higher premium price to the seed-producing farmers. The amount of profit that each farmer received for his or her rice depended on the amount of seed that was sold. From 2006 to 2014, each farmer has received a gross revenue of 54,494 Nepalese rupees per year (see Table 4.2).

The future of the Pokhareli Jethobudho landrace is still uncertain, but there are strong efforts being made to create adequate incentives for on-farm conservation and use. The current rate of seed production is low compared to the overall quantity of rice production in the Pokhara Valley. LI-BIRD, in collaboration with the DADO, has also been striving to popularize the variety in areas outside the Pokhara Valley. A total of 1,202 kilograms of Pokhareli Jethobudho rice seed was distributed to farmers for cultivation in eight neighbouring districts in 2010. LI-BIRD has been monitoring the performance of Pokhareli Jethobudho, and hopefully their success will increase the demand for this variety in the following seasons. Furthermore, eight farmers in the Thulakhet Agricultural Group in the Pokhara Valley also began to produce and market Pokhareli Jethobudho rice seeds. They produced a total of 1,121 kilograms of seed and earned a net revenue of 4,484 Nepalese rupees. Such success stories have encouraged further research on and development of landrace enhancement programs. The National Rice Research Programme of the NARC initiated the enhancement of Lalka basmati rice – a type of red husk basmati rice that is found in the southern plains of Nepal – and formally registered and released it with the National Seed Board in 2010. In addition, LI-BIRD is planning to initiate landrace enhancement programs for other endangered rice varieties that have potential commercial value, such as Jhinuwa, Anadi, Kariya.
Table 4.2 Details of revenue generated from the sale of seeds of Pokhareli Jethobudho for seed-producing farmers in Kaski, Nepal

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of farmers</th>
<th>Seed quantity (kg)</th>
<th>Seed price (NPR/kg)</th>
<th>Gross revenue (NPR)</th>
<th>Seed premium (NPR/kg)</th>
<th>Revenue from seed premium (NPR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>7</td>
<td>3,425.0</td>
<td>35</td>
<td>119,875</td>
<td>4</td>
<td>13,700</td>
</tr>
<tr>
<td>2007</td>
<td>7</td>
<td>2,931.5</td>
<td>35</td>
<td>102,603</td>
<td>4</td>
<td>11,726</td>
</tr>
<tr>
<td>2008</td>
<td>7</td>
<td>3,240.5</td>
<td>44</td>
<td>142,582</td>
<td>5</td>
<td>16,203</td>
</tr>
<tr>
<td>2009</td>
<td>10</td>
<td>3,943.5</td>
<td>65</td>
<td>256,328</td>
<td>5</td>
<td>19,718</td>
</tr>
<tr>
<td>2010</td>
<td>10</td>
<td>4,788.0</td>
<td>75</td>
<td>359,100</td>
<td>5</td>
<td>23,940</td>
</tr>
<tr>
<td>2011a</td>
<td>10</td>
<td>4,850.0</td>
<td>120</td>
<td>582,000</td>
<td>70</td>
<td>339,500</td>
</tr>
<tr>
<td>2012</td>
<td>10</td>
<td>5,250.0</td>
<td>130</td>
<td>682,500</td>
<td>70</td>
<td>367,500</td>
</tr>
<tr>
<td>2013</td>
<td>10</td>
<td>6,500.0</td>
<td>150</td>
<td>975,000</td>
<td>80</td>
<td>520,000</td>
</tr>
<tr>
<td>2014</td>
<td>10</td>
<td>7,500.0</td>
<td>170</td>
<td>1,275,000</td>
<td>90</td>
<td>675,000</td>
</tr>
<tr>
<td>Total</td>
<td>42,428.5</td>
<td>4,494,988</td>
<td></td>
<td></td>
<td></td>
<td>1,987,287</td>
</tr>
</tbody>
</table>


a The net revenue from premium prices was calculated by multiplying the total seed sold each year with the additional amount received as a premium for the improved seed.

b Until 2010 LI-BIRD facilitated selling seeds and regulated the price. Both the seed price and seed premium increased drastically after 2011 when Unnati Agro-vet, a local seed trader, took over buying seeds directly from seed-producing farmers, responding to actual market price.

Kamud, Tilki and others. It is also planning to start PPB for the enhancement of some neglected and underutilized species, such as amaranth, buckwheat, barley, beans and aromatic sponge gourd. There is now increasing attention to and research initiatives for the enhancement of threatened landraces in Nepal.

Analysis of the enhancement project: strengths, weaknesses, opportunities and threats (SWOT)

The genetic enhancement of the Jethobudho rice landrace has successfully led to the identification of a particular variety, registered as Pokhareli Jethobudho, which is better than the existing population and consists of all of the traits of the original variety, as confirmed by those with reliable traditional knowledge. In addition, it is a multiline variety and has maintained the original traits and genetic diversity of the Jethobudho landrace. The improvements that were made to the preferred traits of the variety have also created a greater demand for the product by all involved in the value chain (i.e. by farmers, traders and consumers). Initial observations show that farmers are now more willing to cultivate this variety, and this willingness will certainly create an incentive for farmers to conserve Jethobudho rice on their farms. The official registration of this variety has provided recognition domestically and internationally for the landrace genetic enhancement program as well as for the need for intellectual property rights for farmers.
The project has also demonstrated that farmers are clearly able to enhance and maintain a good quality landrace by adopting innovative selection procedures guided by their local knowledge about the traits of the variety. The six innovative farmers of the Pokhara Valley were responsible for maintaining the six lines that ended up being identified as Pokhareli Jethobudho. These farmers have now been deemed the custodians of the Pokhareli Jethobudho variety, and they are benefiting directly from their efforts and knowledge of this landrace. The experience shows that the participation of farmers and farming communities is extremely important for the success of any landrace enhancement program, and that external assistance in the form of training and resource development can only strengthen their capacity to undertake such initiatives on their own.

The case of the Jethobudho landrace has created opportunities for the enhancement, protection, utilization and conservation of local varieties and landraces of all other crops. Training and orientation programs could further empower farmers and farming communities to enhance local plant varieties and landraces as well as to officially register and establish farmers’ rights over these varieties and landraces. The policy precedent set in the case of Pokhareli Jethobudho could be extended to other plants and plant varieties.

The Jethobudho landrace enhancement program was initiated and driven by the In Situ Project team, while farmers participated in the process and provided their input as it was invited. One of the challenges to the program was the fact that, aside from the six innovative farmers that were cultivating the six lines of the enhanced variety and who knew how to maintain the desired qualities of the Jethobudho landrace, many of the farmers in the region did not have the same know-how or the same desire to improve their landraces. The economic incentive to maintain the enhanced population of Jethobudho rice was probably not high enough for some farmers to invest their time and effort in such a process. This lack of incentive can be explained in three ways. First, a majority of the farmers engaged in the production of Jethobudho rice were tenant farmers who were cultivating the land for absentee landowners on a sharecropping basis. They were cultivating Jethobudho rice largely in the interest of the landowners and were not taking much of it for their own consumption. Moreover, since they were selling the majority of their share of the rice to local traders – who were willing to buy the rice no matter what its quality since the demand for the variety was always higher than the supply – the quality of the rice did not matter so much to them. Second, farmers in this district have always traditionally sold paddy rice (unmilled) and, therefore, were not accustomed to paying much attention to the quality of the milled rice. Third, farmers in the area had a tradition of selling their rice by volume and, therefore, were more interested in increasing the volume of their product than in improving its qualities, such as purity, uniform grain size, appearance and milling recovery. The six farmers who participated in the project, on the other hand, were producing the variety largely for their own consumption and, therefore, were giving careful attention to the selection of seed in order to produce high-quality Jethobudho rice with a high milling recovery.
With respect to threats to the genetic enhancement of farmers’ varieties, it should be noted that the process of registration, while intrinsic to the ultimate goal of protecting traditional landraces, is not an easy task and requires continuous support of the project staff, especially in collecting, analyzing, presenting and defending the data as well as in the registration application. Registering the Pokhareli Jethobudho variety was one of the primary mechanisms used to ensure that farmers would benefit from the commercial production and sale of the seeds. However, it is not possible for farmers alone to fulfil all of the requirements of the variety registration process. The success of the landrace enhancement program, therefore, ultimately depends on the capacity of farmers and farming communities to undertake the enhancement process, to protect their varieties and to benefit from the production and marketing of the seeds.

Focus on relevant policies and laws

There are four existing legal documents in Nepal that support the participatory enhancement of the Jethobudho rice landrace as well as the protection of the enhanced variety, such as Pokhareli Jethobudho. The National Seed Policy 1999 emphasizes the need for the conservation of agricultural biodiversity and the establishment of rights over plant variety. It also encourages the development of new plant varieties. The Agricultural Biodiversity Policy 2007 (first amendment, 2014) proposes that participatory plant breeding be used as a working strategy to enhance the genetic performance of local plant varieties and landraces (MoAC, 2014). In addition to these official policies, the Seeds Act 1988 (first amendment, 2012) and the Seeds Regulation 2013 have made legal provisions for the registration of new plant varieties. These provisions, however, were previously suitable only for varieties developed through a formal breeding system and did not recognize enhanced varieties developed through participatory plant breeding. After considerable lobbying by organizations involved in the system, the government agreed to make changes to these regulations that would recognize participatory plant breeding as a scientific method of developing new plant varieties. These changes were made to the Seeds Regulation of 1997 through a ministerial decision published in the Nepal Gazette on 6 June 2005. Two major changes were made to the regulation. The first change enabled farmers to use qualitative data based on their traditional knowledge of the landrace in their application for registration. Such perception data included the major traits of the variety obtained through a preference ranking, consisting of aroma, flavour, texture and cooking qualities. The second change removed the requirement for cultivation data from several different locations in the country and for multiple years of production (at least three years per unit of land) and allowed for cultivation data that came from only one location and represented only one year’s yield performance. In addition, the law’s uniformity criteria were relaxed for the registration of local plant varieties and landraces.

The uniformity of the variety is a necessary condition for the registration of new plant varieties. This condition was removed in the case of farmers growing local plant varieties since it was acknowledged that farmers usually maintain
a population with a certain degree of heterogeneity. These changes had three obvious advantages:

1. they accepted farmers’ participation in the breeding process – that is, the collaboration of farmers and breeders;
2. they allowed for the straightforward use of farmers’ perception data, which did not require a complicated statistical analysis that would be difficult for farmers to implement;
3. by not having to work in many different locations, they made it easier and less costly for breeders and farmers to accomplish the genetic enhancement of a species.

The registration of enhanced local plant varieties has enabled the commercial production and marketing of such varieties. Since farmers are eligible to apply for ownership over a particular variety, they may be interested in investing time and money into its development without fearing that it will be lost to other cultivators, and they can market the product for financial benefit. There are two obvious benefits to the process of registration and ownership. First, it serves to promote the conservation and utilization of local plant varieties and landraces. Second, it establishes the rights of farmers and communities over such genetic resources.

It should be noted, however, that the legal provisions made in the Nepalese Seeds Act 1988 (first amendment, 2012) and in the Seeds Regulation 2013 for the protection of farmers’ rights over their plant varieties are very weak. Farmers can apply for a right of ownership over their new plant variety if they wish. However, the scope of this right is not defined by these legal instruments – that is, these do not mention the kind of rights the owner can exercise over the right-protected variety. There are also practical constraints in registering farmer-developed and/or farmers’ local plant varieties/landraces. The technical and logistical requirements that have to be fulfilled for the registration of plant varieties make it very difficult for the farmers and farming communities to register new and/or local plant varieties/landraces on their own. Farmers are not used to collecting and processing this type of data, and many are not actually capable of doing it. Therefore, they are often incapable of completing the registration application. A related problem occurs with respect to the definition of a breeder. According to the Seeds Act, anyone, including the farmer who develops the new variety, should be able to qualify to be a breeder. However, in actual practice, this is not the case. Based on the policy guidelines set out in the National Seed Policy 1999, the National Seed Board issued a set of infrastructure requirements and conditions on 5 September 2003 for private and nongovernment organizations engaged in the development of new plant varieties and the production of foundation seeds. According to these guidelines, such private or nongovernment organizations must have:

- their own land or land rented or leased for the purpose of research;
- a plant breeder with at least a master of science degree in agriculture;
• a seed technologist with at least a master of science degree;
• individuals with bachelor of science degrees for each crop for which plant breeding and/or seed production is to be done;
• other human resources as required for the multidisciplinary team;
• a seed godown (store) of the required capacity;
• other equipment, as necessary, to carry out plant breeding and seed production.

These conditions indirectly make farmers and farmers’ groups ineligible to qualify as breeders in the registration of new varieties. For ordinary farmers and farmers’ groups in Nepal, meeting these conditions is neither possible nor viable. The registration of the Pokhareli Jethobudho variety was possible because the application for registration by the Fewa Seed-Producing Farmers’ Group was made jointly with formally established partner organizations. So far, there are no cases where farmers have independently registered their varieties in Nepal. This discrepancy between Nepalese seed policy and the actual law was highlighted at the fourth National Seed Seminar on 19–20 June 2008 in Kathmandu, and a strong recommendation was made to remove the conditions set out for the production of breeder seeds (Shrestha et al., 2008). The draft Plant Variety Protection and Farmers’ Right Bill, which is under preparation, has recognized these weakness and has made explicit provisions for the registration of farmers’ varieties without imposing such conditions (ibid.).

Conclusion

This case study shows that value addition through genetic enhancement is effective in making local plant varieties and landraces competitive for continued production and conservation on farm. As is evident from the example of Pokhareli Jethobudho rice, farmers and farming communities have been making enormous contributions, through their local knowledge and innovative practices, to the continuous enhancement of genetic plant resources. However, the contribution of these farmers is not adequately recognized by the Nepalese government’s policies and law. As a result, farmers’ rights over their plant varieties are almost nonexistent in Nepal. Creating favourable administrative and legal procedures and conditions that would enable farmers to register and obtain ownership rights over their varieties is critical to establishing farmers’ rights over their genetic resources. There is an urgent need to review the Nepalese seed policy and law with an aim to making changes that will guarantee the rights of farmers and create incentives for the conservation of genetic resources.

References


