

Alliance



Good Practices for Agrobiodiversity Management

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6. Germplasm Rescue and Repatriation

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A. Introduction

Many agricultural areas are at risk of converting them to use for non-agriculture purposes. Due to many factors such as increase access and availability of modern varieties, change in market preferences, low productivity of native landraces and climate change, crop landraces are threatened and are at the risk of losing from the fields. Still there are many rare and unique landraces conserved by farmers in different parts of the country. Native agricultural genetic resources that are being grown in red zone areas are all endangered. Unique and rare landraces as well as landraces grown in small areas by few farmers are also endangered. Different natural calamities also make native landraces endangered. Such landraces are lost if further conservation action did not take place. Exploration and collection of such endangered landraces is called germplasm rescue. National gene bank started rescue since 2014 for buckwheat diversity in Dolpa district.



Collection of native germplasm was started in 1940 in Nepal and almost 50,000 accessions have been collected so far. After collections, these landraces are never reintroduced or repatriated to the sites from where these were collected. Repatriation is the process of returning collected landraces to their collection site after a few to many years as well to the analog sites identified using geo-references of the collection point. Repatriation of germplasm has been formally initiated since 2016 in Nepal. National Genebank regularly repatriate crop landraces through distribution of diversity kit during field visit for collection. Rescue supports for long term conservation of endangered landraces and repatriation supports maintain diversity on-farm.

B. Objectives

- To conserve and make availability of endangered, rare and unique crop landraces in future
- To repatriate the germplasm in lost or original place and their analog site
- To increase the population of endangered landraces and providing farmers additional crop diversity

C. Methods and Process

Germplasm Rescue

Red zoning and red listing are the initial step for germplasm rescue (Figure 1). Different methods, tools and approaches eg interaction meeting, field and literature survey, news, field visit, focus group discussion, key informant survey, GIS and CAT can be used to identify the endangered, rare and unique landraces. Rescue mission is then organized following the exploration and collection standards of the Genebank. Among the different rescue techniques (Figure 1, Joshi and Gauchan 2017), direct rescue is more effective and should be carried out the earliest the possible. Seeds and other planting materials should be collected properly along with passport data.

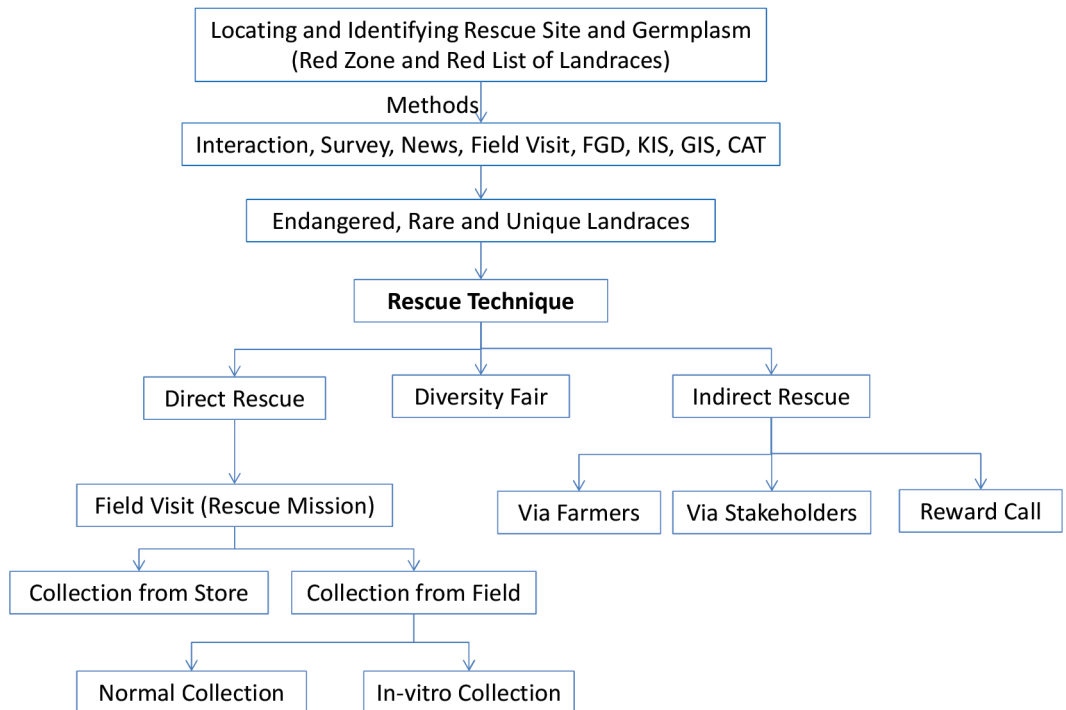


Figure 1. Different techniques and methods of rescuing the germplasm.

Repatriation

First of all, it is important to identify the landraces for repatriation either in original site of that landrace or in analog sites of their original place. Alternatively, sites identification can be first step in repatriation process (Figure 2). If landrace is important and main target of repatriation, then landraces identification comes first in the repatriation steps. Methods used for site and landrace identification are field and literature survey, genebank database observation, collection map, focus group discussion, key informant survey, GIS and CAT.

Enough seeds should be prepared based on the number of farmers interested to grow in original as well as analog sites. Such landraces can also be included in diversity kit for distribution to farmers. Information related to selected landrace should be compiled. Seeds along with cultivation techniques are provided to farmers free of cost. Regular monitoring and discussion with growers helps the program success. After few years, impact study is assessed and findings are shared among the relevant stakeholders.

GIS and Climate Analog Tool (CAT) are used for germplasm rescue and repatriation. DIVA-GIS (<https://www.diva-gis.org/>) is simple GIS software that can be used for generating collection map, analysis of collections, and identifying climate smart germplasm. CAT (<http://analogues.ciat.cgiar.org/index.html?showresults=1>) is used for identifying analog sites based on different scenarios. Details of these software are explained in Joshi et al (2017b) and Chaudhary et al (2016).

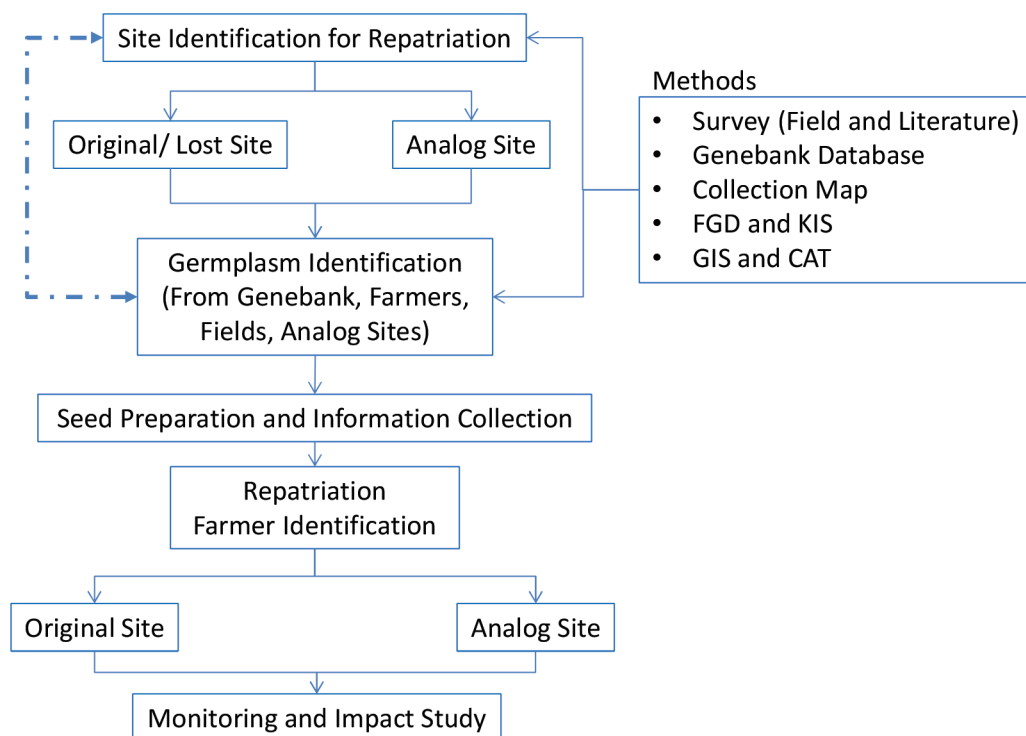


Figure 2. Steps for germplasm repatriation (any one either site or germplasm can be considered as first step depending on the target).

D. Advantages and Disadvantages

Advantages

- No risk of losing landraces from the field and communities

- Create awareness among farmers and researchers on importance of local genetic resources
- Very effective technique for collections of germplasm and passport data for gene bank preservation and future use
- Simple method for increasing population size of endangered landraces
- Increase diversity and help to maintain diversity on-farm
- Farmers feel happy to get either lost landraces or new landraces
- Local organizations eg community seed banks and farmer groups can be engaged and mobilized

Disadvantages

- Often risky and costly to visit to red zone areas
- Collection team should always be ready with necessary field collection items
- Seeds may be very few and need to multiply before providing to farmers
- Performance of repatriated landraces may not be good (Dongol et al 2017) may be due to quality of seeds
- Very few farmers may be interested on growing such landraces as many are interested on modern varieties

E. Success Cases

Based on the farmer's information, National Genebank had rescued some accessions of buckwheat from Dolpa, foxtail millet and proso millet from Humla and Lamjung. Rescue project of the Crop Trust in collaboration with GEF UNEP project rescued a total of 284 crop landraces from 2015 earthquake affected 10 districts (red zone) namely Lamjung, Dolakha, Kavre, Sindhupalchok, Gorkha, Dhading, Makawanpur, Rasuwa, Nuwakot and Ramechhap (Joshi et al 2017a).



Local bean from Jugu, Dolakha has been rescued and multiplied. Eight crop landraces of rice, buckwheat, finger millet, proso millet, bean, amaranth, naked barley and foxtail millet were repatriated to Dolakha, Lamjung, Humla and Jumla. Endangered landraces of rice, lentil, naked barley, and foxtail millet were repatriated to Lamjung, Kavreplanchok and Dolakha districts (Dongol et al 2017). This strategy was useful to promote both ex-situ and on-farm agrobiodiversity conservation, validate methodology to conservation and rebuild local seed system affected by disaster and help to safeguard native crop biodiversity for future generation to adapt to more extreme and changing climatic conditions (Gauchan et al 2018).

F. References

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