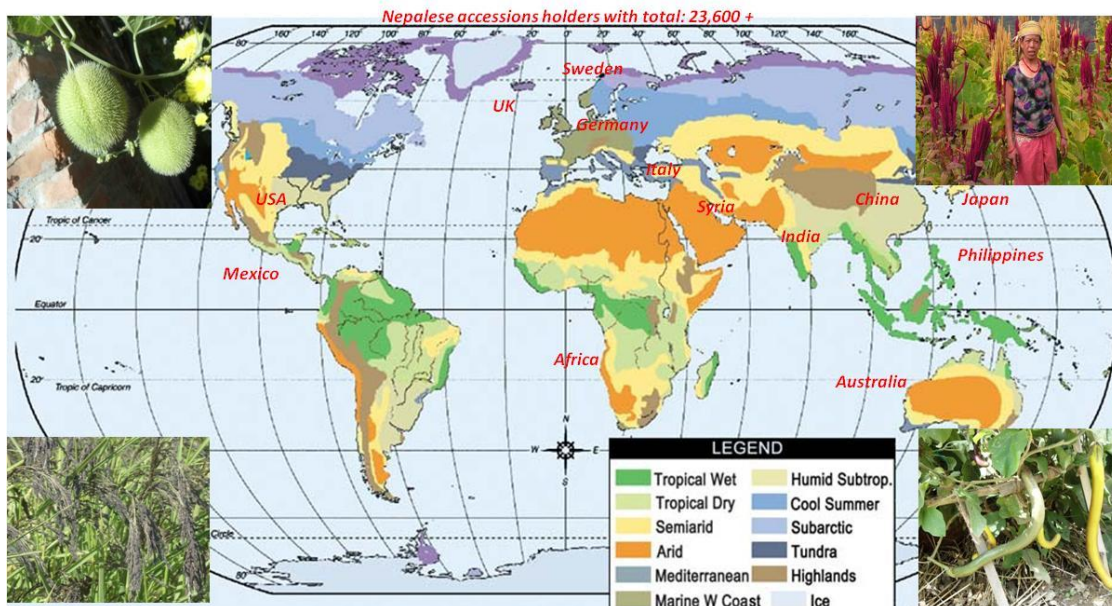


Nepal

International Treaty on Plant Genetic Resources for Food and Agriculture and Multilateral System (ITPGRFA-MLS) Implementation Strategy and Action Plan (IMISAP) 2015-2020



MoAD



NARC

Kathmandu
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Abbreviation

ABS	Access and Benefit Sharing
ADS	Agriculture Development Strategy
AGRBS	Access to Genetic Resources and Benefit Sharing
APGR	Agricultural Plant Genetic Resources
APP	Agriculture Perspective Plan
AVRDC	Asian Vegetable Research and Development Center
BS	Bikram Sambat (Nepali date)
BSF	Benefit Sharing Fund
CBD	Convention on Biological Diversity
CG	Consultative Group
CGIAR	Consultative Group on International Agricultural Research
CIMMYT	International Maize and Wheat Improvement Center
CIP	International Potato Centre
CSB	Community Seed Bank
DADO	District Agriculture Development Officer
DoA	Department of Agriculture
EPA	Environment Protection Act
FAO	Food and Agriculture Organization
GMO	Genetically Modified Organism
GoN	Government of Nepal
GRPI	Genetic Resources Policy Initiative
ICARDA	International Center for Agriculture Research in Dry Areas
IMISAP	ITPGRFA-MLS Implementation Strategy and Action Plan
INGER	International Network for Genetic Material Evaluation and Research
INGO	International Non-Governmental Organization
IRRI	International Rice Research Institute
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
LI-BIRD	Local Initiatives for Biodiversity, Research and Development
MEA	Multilateral Environmental Agreements
MLS	Multilateral System
MoAD	Ministry of Agriculture Development
MoFSC	Ministry of Forest and Soil Conservation
NAES	Nepal Agriculture Extension Strategy
NAGRC	National Agriculture Genetic Resources Center
NAP	National Agriculture Policy
NARC	Nepal Agricultural Research Council
NBSAP	Nepal Biodiversity Strategy and Action Plan
NCCP	National Climate Change Policy
NGLRP	National Grain Legumes Research Program
NGO	Non-Governmental Organization
NGRCC	National Genetic Resource Conservation Council
NIAS	National Institute of Agrobiological Sciences
NPQP	National Plant Quarantine Program
NPWCA	National Parks and Wildlife Conservation Act
NRRP	National Rice Research Program
NSB	National Seed Board
NWRP	National Wheat Research Program
PGR	Plant Genetic Resources
PGRFA	Plant Genetic Resources for Food and Agriculture
PIC	Prior Informed Consent
SMTA	Standard Material Transfer Agreement
SQCC	Seed Quality Control Center
VDC	Village Development Committee
WTO	World Trade Organization

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Background

Agricultural plant genetic resources (APGR) are most important for securing food and nutrition in the country and world. Diversity at species as well as genetic levels is necessary to breed new cultivars with desired traits. APGR available in the country alone is not enough to secure the food sufficiency therefore, APGR from the global communities have been introduced in regular basis. In addition genetic erosion demands agriculturists, breeders and producers to search APGR in other locations for agriculture research and development. Both national and global crop gene pools should be utilized for sustaining the agricultural production system (**Figure 1**).

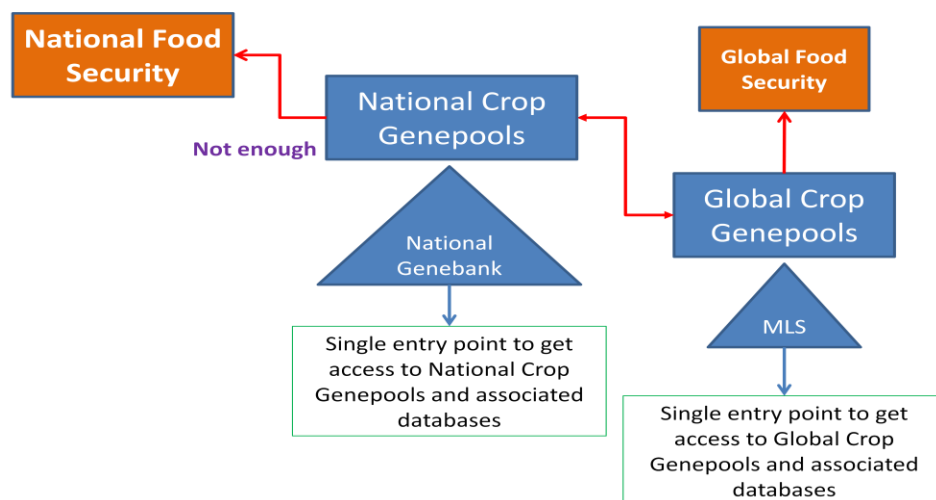


Figure 1. Gene pools concept and access for food and nutrition security.

Before Convention on Biological Diversity (CBD, <http://www.cbd.int/convention/>), there was almost free exchange of plant genetic resources for food and agriculture (PGRFA) among countries around the world. CBD 1992 stated that countries have sovereign rights to legislate, manage, exploit and control access to their natural resources, including PGRFA. Nepal has been a signatory to the CBD in June 1992 and ratified it in November 1993 and MoFSC is the focal ministry. Restricted access to PGRFA may lead to food and nutrition insecurity in the world, therefore, International Treaty was evolved to facilitate the access to PGRFA. ITPGRFA (<http://www.planttreaty.org/>) is a global treaty for food security and sustainable agriculture. Nepal ratified ITPGRFA on 2 January 2007 and became party on 19 October 2009 and MoAD is the focal ministry for the Treaty.

Special provision in ITPGRFA is the creation of multilateral System (MLS) to facilitate the access to PGRFA. The multilateral system is a global gene pool of a number of the most important crop genetic resources for food security, shared and managed jointly by all contracting parties. This system is also operative within 15 CGIAR system and applicable to 35 food crops and 29 forages species listed in Annex 1, that account for >80% of human calorie intake from plants. The standard material transfer agreement (SMTA) of the ITPGRFA would bind the recipients and donors of these PGRFA that are in public domains in certain conditions. The International Treaty offers immense opportunities to Nepal for access to global crop gene pools and equally enables other member countries to have access to the genetic resources of Nepal that are in public domain.

To facilitate the implementation of ITPGRFA in Nepal, a project called Strengthening National Capacities to Implement the International Treaty on Plant Genetic Resources for Food and Agriculture (commonly called as GRPI-2 project) was initiated in 2012 with the financial support from Bioversity International. This project could able to make many stakeholders aware of ITPGRFA-MLS, to draft governance mechanism including designated authority for MLS access and benefit sharing, to generate some facts and figures on interdependence on PGR, to revise the Agrobiodiversity Policy

2007 considering the provisions of ITPGRFA, to include the provisions of ITPGRFA in NBSAP (2014-2020) and to generate huge information on different aspects of ITPGRFA-MLS.

On ratifying the Treaty, countries agree to make their genetic diversity and related information about the crops stored in their genebanks and public domains available to all through the MLS. Fifteen CGIAR centers together maintain over 700,000 samples of PGRFA in their collections and held in FAO trust that are accessible under the terms of the MLS. Contracting Parties and Natural or Legal person have also made available of more than 500,000 and 3000 accessions of Annex-1 Crops respectively through MLS. Japan became a Contracting Party to the Treaty on 28 October 2013 and Japan's Genebank (NIAS) submitted almost 18,000 crops and forages accessions into the Multilateral System with high-value associated data. However, Nepal could not submit the accessions of PGR under MLS being ratifying the Treaty on 2007. This ITPGRFA-MLS Implementation Strategy and Action Plan (IMISAP) is developed thus, to accelerate the inclusion of Nepalese accessions under MLS and to get the benefit as much as possible from the provisions of ITPGRFA in support of conservation and sustainable utilization of APGR.

Agrobiodiversity

Nepal is home to extraordinarily rich diversity of natural flora and fauna as well as cultivated crops due to its extreme variation in climate, ecology, farming systems, and socio-cultural settings. Comprising less than 0.1% of the earth's land area, the country is home to about 600 species of food plants, 400 species of agro-horticultural crops, 60 species of wild edible fruits, 200 species of commercially important medicinal and aromatic plants, 300 species of orchids, 5000 species of insects, 185 species of fishes, and a variety of other economically and ecologically important species (MoFSC 2002, Upadhyay and Joshi 2003, Gautam 2008). Agriculture Plant Genetic Resources (APGR) play vital role in the national economy, food security and livelihood, since more than three-fourths of the country population depends on agriculture for their livelihoods. APGR (also called agrobiodiversity) consists of cultivated crops, wild edible plants and crops wild relatives.

APGRs are essential for a sustainable agriculture and food security. FAO estimates humans have used some 10,000 species for food throughout history. However, only about 120 cultivated species provide around 90% of food requirements and 4 species (Maize, Wheat, Rice and Potatoes) provide about 60% of human dietary energy for the world's population. Unlike most other components of biodiversity, agricultural crops are essentially manmade; they are the product of the breeding work of farmers and breeders over many generations. Without continued human management most agricultural crops would revert to the wild and be lost. Because of their special nature compared to other components of biodiversity, the International Treaty facilitates the access to crop varieties and their components for agricultural research and breeding of new varieties.

Of the myriad of varieties of these crops developed by farmers over millennia, which form an important part of agricultural biodiversity, more than 75% have been lost in the past 100 years. In the recent times, the country is also losing its significant portion of APGR due to its liberal economic policy, *ad-hoc* promotion of modern varieties and lack of overall policy on the conservation and sustainable use of genetic resources for food and agriculture (Chaudhary et al 2004, Gauchan et al 2005, Joshi et al 2005). To conserve APGR effectively, GoN has established National Genebank in 2010 (Joshi and Bhatta 2012). Now National Genebank is actively working on collections and conservation through different banks (Joshi et al 2013b), systematizing the APGR management and facilitating the access to APGR in the country. Many community seed banks (Joshi 2013) are also contributing on conservation of APGR.

Methodology in Developing IMISAP

Key personnel from NAGRC, LIBIRD and MoAD had discussed and developed the important points for inclusion in the IMISAP based on the experiences learned under the project 'Strengthening National Capacities to Implement the International Treaty on Plant Genetic Resources for Food and Agriculture (commonly called as GRPI-2 project and financially supported by Bioversity International). A working group was formed to develop the IMISAP under the leadership of Bal K. Joshi and Madan R. Bhatta and Krishna H. Ghimire as members. This group reviewed relevant literatures mainly report of the GRPI-2 project (GRPI-2 2015), NBSAP (MoFSC 2014), ITPGRFA (FAO 2009), Agrobiodiversity Policy (MoAD 2015), etc, discussed with key persons, hold several meetings. Contents were presented in the regional workshop and comments were incorporated. Based on the implementation status of ITPGRFA in the country, this IMISAP was developed to facilitate the implementation of ITPGRFA in Nepal. To materialize the IMISAP after editing, Secretary, MoAD has formed a central committee under the leadership of Joint Secretary, food security and environment division. This IMISAP was reviewed by the committee members and presented in the relevant meetings.

Country's Dependency on PGFRA

There is global interdependency on PGRFA for food and agriculture since all countries largely depend on PGRFAs that originate elsewhere. No countries in the world are self-sufficient in PGRFA for their food security (IPGRI 1996, 2000). Brazil, a megadiverse country with about 4,000-50,000 species of vascular plants (18% of the world's plant diversity), but Brazil is highly dependent on PGR native to other countries for food and agriculture eg coffee, rice, potatoes, wheat, sugarcane, etc. The North Western Indian Mega Center comprises about 14-15% of the world's cultivated plants, even though it has heavily depended on PGR native to other countries for food security such as wheat, rice, potato, tomato, coffee, etc (CBD 1992).

Based on the origin of crops varieties, one can estimate how much one country is dependent on others. It is difficult however, to track the exact origins of crop varieties because generally they incorporate traits from many different varieties from different regions. Based on the study of Joshi et al (2013a), Joshi (2004b and 2005) have shown the empirical evidence on how much Nepal is dependent on foreign rice and wheat genetic resources. Nepal has many diversity and important landraces (Joshi et al 2013c, Joshi et al 2014a, Joshi 2014a, Joshi et al 2013d, Joshi 2004a, Joshi 2014c) however, a large number of crop genetics resources enter annually for breeding research.

Majority of modern varieties have been developed outside the country using exotic ancestors and CG centers are the main source of APGR for adaptation, crop improvement and production trials. A total of 35 ancestors originated in 11 different countries were used to develop 28 rice cultivars. Eight countries are the origins for 28 rice cultivars. Pedigrees analysis of modern wheat varieties in Nepal showed that all ancestors and landraces were from other countries and international organizations. Only exotic ancestors were used for developing 35 modern wheat varieties. About 95% lentil breeding materials of NGLRP are the genetic resources received from external sources especially from ICARDA. Only exotic parents have been used to develop 8 modern varieties of potato in Nepal

Complete pedigree tree of one of the very popular rice varieties ie Khumal-4 is depicted in **Figure 2**. Genic portion contributed from each ancestor is also mentioned along with their origin. A total of 13 landraces originated in 8 different countries were used to develop Khumal-4. This indicates how much breeder needs to depend on foreign genetic materials. The genic portion of one landrace originated in Nepal was the highest.

Nepal's dependence is about 95 to 100% on foreign germplasm for varietal development. Very few numbers of local landraces were used in local crop breeding. Dependency will further increase mainly due to changes in climate and demand of growers and consumers.

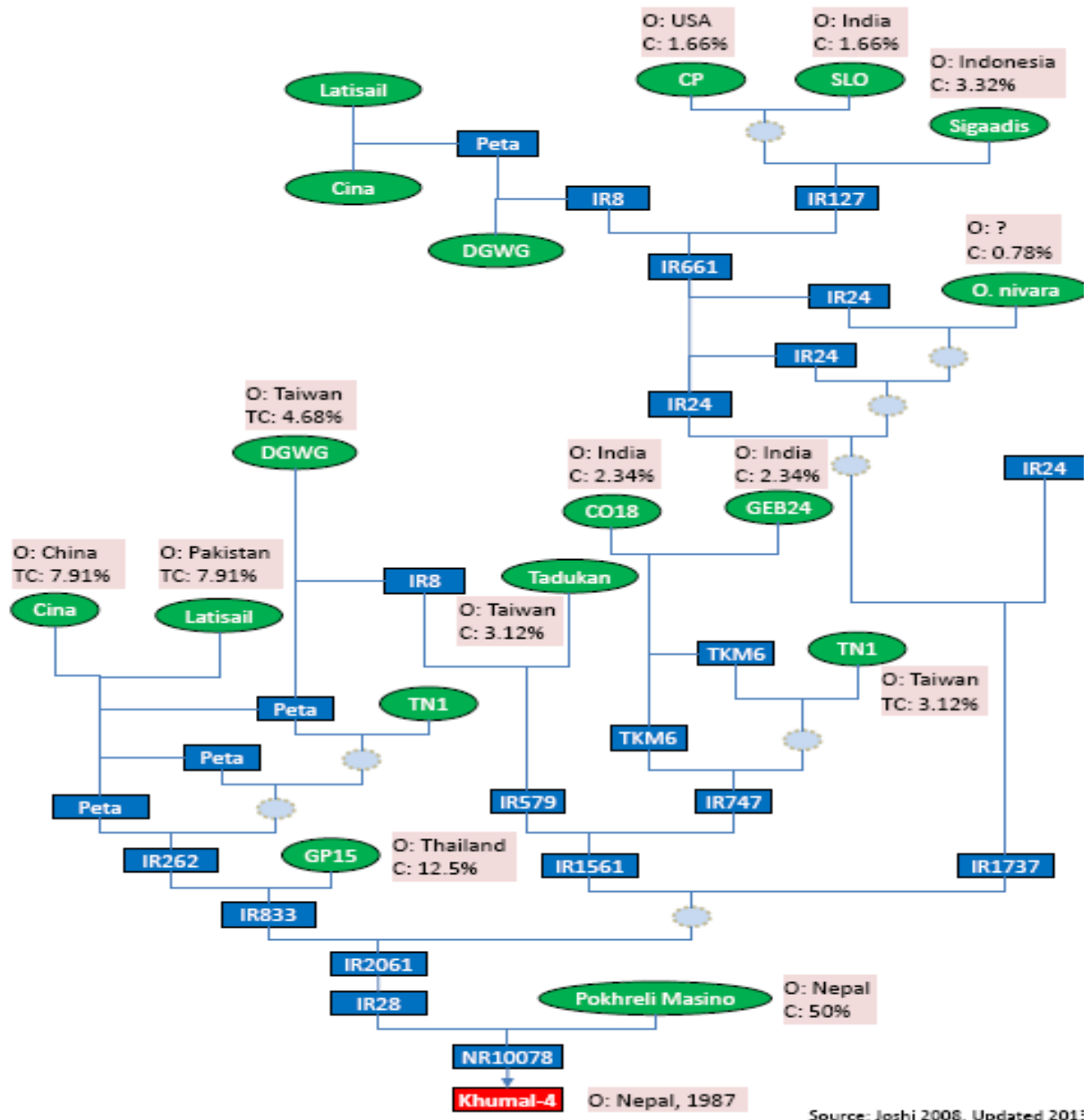


Figure 2. Pedigree tree of Khumal-4 rice variety along with genic portion of ancestors and their origin
O, origin; C, Contribution (genic portion)

CBD and ITPGRFA

Nepal, like other countries, has been an active member of the international community and is party to various conventions and treaties of international importance. Amongst those, Convention on Biological Diversity, 1992 (CBD), International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), World Trade Organization (WTO) and its attached agreements are the relevant treaties and conventions. The CBD (1992) brought genetic resources under the jurisdiction and sovereignty of national governments. However, the CBD recognized the special and distinctive nature of agricultural genetic resources: they were international - crossing countries and continents -

their conservation and sustainable use requires distinctive solutions and they were important internationally for food security. Subsequently the IU (International Undertaking) was renegotiated, to bring it in harmony with the CBD, and was renamed as a treaty (**Table 1**). For the purpose of food security and sustainable agriculture, ITPGRFA is important which was approved by the United Nations Food and Agriculture Organization (FAO) Conference on November 3, 2001. The Treaty came into force on June 29, 2004, and Nepal became party to the Treaty on October 19, 2009. For a least developed and agro-based country like Nepal, ITPGRFA provides several benefits in terms of ensuring nations' food security and supporting agricultural development.

The ITPGRFA is a comprehensive international agreement in harmony with the CBD, which aims at guaranteeing food security through the conservation, exchange and sustainable use of the world's PGRFA, as well as fair and equitable benefit sharing arising from its use. It also recognizes Farmers' Rights: to freely access genetic resources, unrestricted by intellectual property rights; to be involved in relevant policy discussions and decision making; and to use, save, sell and exchange seeds, subject to national laws. Considering the interdependency on PGRFA, the treaty has implemented a multilateral system (MLS) of access and benefit sharing, among those countries that ratify the treaty, for a crop list of 64, some of the most important food and forage crops essential for maintaining global food security.

Policy, act and regulation are necessary at national level to materialize the ITPGRFA effectively as well as to handle Plant Genetic Resources for Food and Agriculture (PGRFA) scientifically. Although, National Agriculture Genetic Resources Centre (NAGRC) has been designated as a depository of the genetic materials, it is still not clear if the institution can be the one to facilitate the process of MLS as envisioned in ITPGRFA.

Table 1. Differences between CBD and ITPGRFA

Feature	CBD	ITPGRFA
Scope	All forms of biodiversity, including both wild and domesticated species.	The Treaty covers all plant genetic resources for food and agriculture, but the multilateral system includes only those that are listed in Annex I and which are under management and control of the contracting parties and in public domain.
Objectives	Conservation of biological diversity, sustainable use of the components of biological diversity and fair and equitable sharing of the benefits arising out of the utilization of genetic resources.	Conservation and sustainable use of plant genetic resources for food and agriculture and the fair and equitable sharing of the benefits arising out of their use, in harmony with CBD, for sustainable agriculture and food security.
Access purposes	Conservation and sustainable use for any purposes, in principle, but CBD was conceived mainly for chemical, pharmaceutical, and/or other non-food/feed uses.	Utilization and conservation for research, breeding, and training for food and agriculture, and as long as it does not include chemical, pharmaceutical and/or other non-food/feed industrial uses.
Access and benefit-sharing	CBD recognizes the sovereign rights of states over their natural resources, and the authority to determine access to genetic resources rests with national governments and is subject to national access and benefit-sharing laws. Access depends on "mutually agreed upon terms," established through bilateral contracts between providers and users on a case-by-case basis. Access is	Contracting parties (of the FAO Treaty) agree to establish a multilateral system of access and benefit-sharing (which applies only to the 35 food crops and 29 forages listed in Annex I of the Treaty, under the management and control of the contracting parties and in the public domain). The SMTA establishes ABS conditions, and access is facilitated and expeditious. Benefit-sharing is mandatory only when commercialized products (that incorporate material accessed from the

	subject to prior informed consent of the country of origin of resources, and to fair and equitable sharing of benefits deriving from their use. Access to associated traditional knowledge depends also on prior informed consent of Indigenous peoples and local communities.	multilateral system) are not available without restriction to others for further research and breeding (eg, patented genetic materials). The equitable share corresponds to 1.1% of gross product sales minus 30%, which represents 0.77% or 0.5% of all product sales resulting from the same crop. Other benefit-sharing mechanisms are exchange of information, access to and transfer of technology and capacity building.
Forms of conservation	Ex-situ conservation is considered as complementary to in-situ conservation, and must preferably take place in the country of origin of genetic resources.	Articles 5 and 6 of the FAO treaty establish principles and guidelines for in-situ, on-farm, and ex-situ conservation of all plant genetic resources for food and agriculture. The multilateral system of ABS (Articles 12 and 13) applies only to plant genetic resources listed in Annex I and under management and control of the contracting parties and in the public domain. Access to plant genetic resources for food and agriculture found in in-situ conditions must be provided according to national laws.

Source: Santilli 2012.

Germplasm Flows

Historically, plant genetic resources were freely exchanged in accordance with the idea that these resources were the common heritage of humankind. Farmers have been involved in collective system of conservation and utilization, openly sharing these since the earliest time of crop domestications. Relatively open flows of plant germplasm resulted the spread of PGRFA from its center of origin to the centers of domestication.

Before CBD there was almost free exchange of PGRFA among countries around the world. CBD stated that countries have Sovereign Rights to legislate, manage, exploit and control access to their natural resources, including PGRFA. There are historical examples of specific governmental rules restricting the export of certain specialized and industrial breeding materials such as pepper from India, oil palm from Malaysia, coffee from Ethiopia and tea from Sri Lanka.

On the contrary, in practice, various actors of Nepal have been accessing genetic resources from various sources and forms (eg CGIAR, India, China, AVRDC, etc) and facilitating access to Nepalese genetic resources to other countries. A large number of Nepal's plant genetic resources especially seed crops have been deposited at various seed banks abroad. Nepals' agricultural research institutions, particularly National level commodity research programs, such as Rice, Wheat, Maize, Grain Legume, Potato, etc and some NGOs have access to various genetic resources from centres like Consultative Group on International Agricultural Research (CGIAR) seed banks and research centres. Consequently, they have been developing new varieties of crops, fruits, forages, and livestock. But such activities are operated either using Standard Material Transfer Agreement (SMTA) or informal channels or on an *ad hoc* basis. No formal regulatory mechanism has been developed. There is no institution mandated to keep records of Nepal's PGRs taken abroad and foreign PGRs accessed from Nepal.

There are more than 100 institutions involved on APGR conservation, improvement and utilization. Main institutions involved on germplasm flows are NARC, SQCC, DoA, National Quarantine Office. Due to lack of governance mechanism of germplasm flows in the country, both private and public sectors are being involved directly for germplasm exchange. NAGRC is now playing vital role in

germplasm flow within country. Germplasm flows within country are easy and free. There is no restriction for germplasm exchange within country. But for commercializing the variety, it should be either registered or released under the National Seed Board. Duplicates of some of collections in the Genebank are already being made internationally available through CGIAR centres, which have acquired materials from Nepal at different times. For example, IRRI holds 3,000 accessions of rice originally collected from Nepal. Recently, Nepal sent duplicate samples of approximately 2,000 accessions of rice, barley, finger millet, wheat to IRRI, ICARDA and CIMMYT.

A large number of improved materials are being transferred from CG centres' breeding programs to Nepal. Breeding programs and seed suppliers are independently collecting APGR from within country as well from CG centers, India and China. Major crops introduced regularly from outside the country are rice, wheat, maize, potato, lentil, some vegetables and some forages. Rice, wheat and some vegetables are also regularly sent to other countries mainly Bhutan, India and Kenya, for research and production. Some vegetables have been regularly exchanged within SAARC countries. Important vegetables such as coulfLOUR, cabbage, tomato, cucumber, gourds, okra, radish, pumpkin, etc grown in the country are hybrids and imported from different countries by private seed companies and traders.

A total of 14 INGER nurseries are being received by National rice research program (NRRP) from IRRI each year and each nursery consist of 30-100 genotypes. NRRP had also sent three rice varieties for INGER nurseries to evaluate through IRRI in 2010. Similarly, Nepal regularly receives more than 50 genotypes of potato yearly from CIP. National Wheat Research Program is receiving wheat breeding nurseries and trials regularly from CIMMYT, Mexico since 1970. The NWRP receives more than 1000 genotypes yearly however the number of entries varies every year. New trials and nurseries are added depending on biotic/abiotic stresses tolerance including high yielding lines.

NWRP has been regularly sending 100 to 125 advanced lines developed by NWRP into Kenya every year since 2005 and also sending some selected F₃ and F₄ (40-60 crosses) segregating populations every year for screening against Ug99 (stem rust of wheat) without SMTA. In addition to this, NWRP and Bangladesh wheat research programs mutually share wheat advance lines without SMTA.

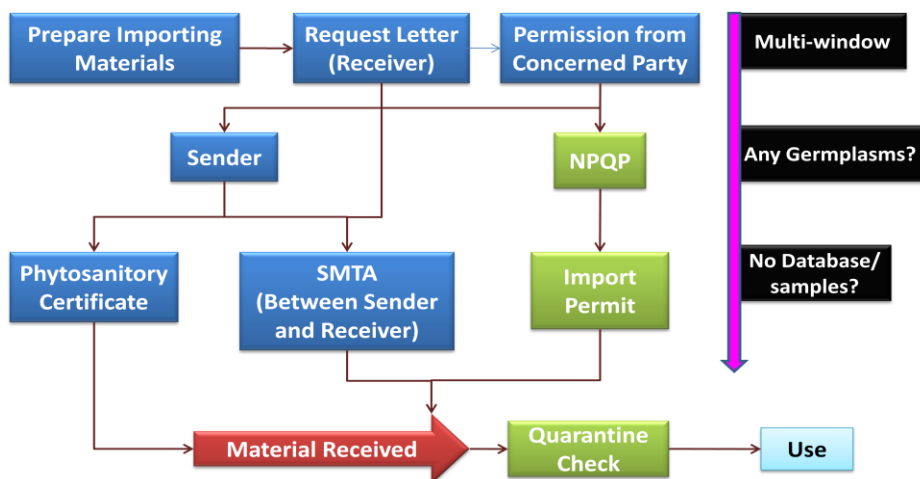


Figure 3. Existing mechanisms for germplasm import/ introduction (Material transport from foreign country)

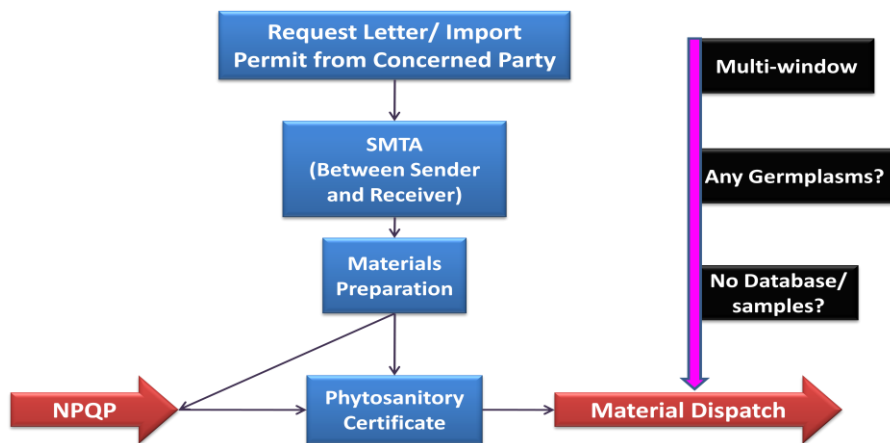


Figure 4. Existing mechanisms for germplasm export (Material transport from Nepal)

Agrobiodiversity related Policies, Acts and Strategies

Agriculture and natural resources related different policies, acts, regulations and strategies have been adopted in Nepal and are amended time to time. Among the various policies, some relevant to agrobiodiversity policies, acts and regulations have been briefed below.

Nepal Treaty Act 1990

This Act objective is to make legal provisions in regard to the procedure relating to signing, ratification, accession, acceptance, or approval of treaties or agreements to which Nepal or GoN is a party, as well as in regard to their implementation. The Act has defined “Treaty” as an agreement concluded in writing between two or more states, or between any state and any inter-governmental organization and this term also includes any document of this nature, irrespective of how it is designated.

The Act makes treaty provisions enforceable as good as laws (Section 9). Where a matter covered by a treaty conflicts with any law in force, the provisions of the treaty are to prevail over national legislation to the extent of the inconsistency (Section 9.1). This principle has been upheld by the Supreme Court with respect to the Convention on the Rights of the Child (Paudel v. Ministry of Home Affairs (2058) 43 NKP 423 (1989).

When a treaty to which the government is a signatory, but which has not been ratified, acceded to, approved or accepted by parliament, creates additional obligations that require the enactment of legislation, the government must enact laws for its execution in a timely fashion (section 9.2). Despite these statutory requirements, implementation at the national level has remained weak, especially in the case of multilateral environmental agreements (MEAs), because the government has not enacted the required legislation. Nor has the supremacy been recognized of MEAs over national legislation in practice.

It is obvious from the provisions of the Act that it has accorded supremacy to international treaties over national legislations stating that if any conflicts arise between an international law that Nepal has ratified and a national law, the treaty provisions shall prevail (Section 9). Moreover, this is an important law that works as a bridge between national laws and international laws. The Act has also obliges Nepal to enact necessary legal and policy instruments in order to implement the provisions of ITPGRFA.

Environment Protection Act 2053 (1997)

The Environment Protection Act (EPA) was enacted with the objective to make legal provisions in order to maintain clean and healthy environment by minimizing, as far as possible, adverse impacts likely to be caused from environmental degradation on human beings, wildlife, plants, nature and physical objects; and to protect environment with proper use and management of natural resources, taking into consideration that sustainable development could be achieved from the inseparable inter-relationship between the economic development and environment protection (Preamble).

The Act has defined Biological Diversity as ecosystem diversity, species diversity and genetic diversity, and National Heritage as any such object, site, plant and animal related with the environment available within Nepal as is likely to be important to the human being from natural, cultural, historical archaeological, scientific, spiritual, aesthetic or social point of view (Section 2 (j) and (k)).

The Act also includes provisions related to national heritage and assigns the concerned agency to protect National Heritage. For the purpose of the protection of National Heritage, the concerned agency is required to prepare and maintain an inventory and such inventory must also include the objects or places listed on the World Heritage List available within Nepal and such objects, places, plants, animals etc included in the inventory must be protected as prescribed (Section 9).

The GoN is empowered by the Act to delineate as an environment protection area, any area which contains biological diversity, rare wildlife or plants and places of cultural and historical significance which are considered extremely important from the point of view of environment protection (Section 10).

Similarly, the Act has empowered GoN to frame necessary Regulations for achieving the objectives of this Act. Under the list of subject areas of perspective Regulations, biological diversity and the protection of National Heritage is also included in the 4th place (Section 10). But neither the GoN has formulated regulations for conservation of biodiversity and protection of national heritage nor prescribed guidelines and criteria for utilization thereof. Looking at the provisions, it seems that it has attempted to cover most of the environmental aspects but fails to provide framework for conservation and utilization of biological resources, and does not include provisions related to ITPGRFA.

Environment Protection Regulations 2054 (1997)

The Environment Protection Regulations framed under the EPA have included provision on permission for research which prohibits conducting research without permission. The Regulations prohibit foreign organization or association, or any person or institution affiliated to it to collect sample of any living being, bacteria and plant, and take any activity relating to research in biodiversity without taking prior approval of the concerned body¹ (Rule 31). The provisions of the above mentioned rules are also relevant to the ITPGRFA.

National Parks and Wildlife Conservation Act 2029 BS (1973)

The National Parks and Wildlife Conservation Act (NPWCA) is the one of oldest laws of Nepal in the biodiversity conservation sector. The Act focuses on wildlife conservation through habitat conservation. Under the NPWCA, various pieces of Regulations like National Parks and Wildlife Conservation Regulations (NPWCR), Chitwan National Park Regulations, Bardiya National Park Regulations, Wildlife Reserve Regulations, Elephant Management Regulations, Mountain Protected Areas Regulations, Conservation Area Management Regulations, Conservation Area Government

¹ For the purpose of the Regulations "Concerned Body" means any Ministry of Government of Nepal connected with the functions set forth in the Act or these Rules (Rule 2.b).

Management Regulations, Khaptad National Park Regulations, Kanchenjunga Conservation Area Regulations and Buffer Zone Management Regulations have been promulgated and are in force for the management of the protected areas especially to conserve wilderness, biodiversity and landscape.

However, the Act is more focused on wildlife conservation and related uses, it has also included provisions on the collection of samples of biological resources for scientific research except the wildlife listed in the Annex 1. Samples can only be collected after obtaining permission from concerned official (Section 15).

National Parks and Wildlife Conservation Regulations 2030 BS (1974)

The National Parks and Wildlife Conservation Regulations are the major tools to implement the NPWCA, and have included various provisions related to conservation and utilization of biological resources under in-situ conditions.

Rule 22 provides for provisions relating to collection of samples of wildlife, birds, insects or fishes or any other natural products for scientific research except the wildlife included in Annex 1 of the Act by charging fee as included in Annex 2 of the Regulations. However, Annex 2 does not include fee for collection of samples of plant and their products. It means that it does not cover and consider the aspects of food security and human benefit from the conservation of PGR through MLS of access and benefit sharing.

Importantly, the legal provisions, procedures and institutional set up under the NPWCA and Regulations promulgated under it are more focused to protection of extinct, rare, threatened and vulnerable species of wild fauna and flora as envisaged in the CITES, World Heritage Convention, Ramsar Convention and CBD including UNFCCC and UNCCD.

Seed Act 1988 (Amendment 2008)

The Seed Act came into force in 1988 with the objectives of providing standard quality seeds in a well planned system of production, processing and testing in order to increase production and productivity of different crops. The Act has included provisions on the formation of National Seed Board (NSB), sub committees under the Board, establishment of seed certification organization, and establishment of central seed testing laboratory. It has given powers to NSB to notify types and varieties of seeds, and prescribe minimum level of purity and germination for such notified types and varieties. The Act has required truthful labeling of container of notified types and varieties compulsory. In relation to regulation and technical back up, provisions of seed analyst and seed inspector have been included. For import and export of notified types and varieties of seeds, a permission system has been instituted. In addition to above mentioned provisions, the Act has included a provision of giving recognition to national and international organization for seed testing and certification.

One interesting thing about Seed Act 1988 is that it recognizes ownership rights of breeders on varieties, but it does not specify what exactly means by ownership rights.

Further, in relation to the MLS under the ITPGRFA, the Act has covered the seed component but taken seed as market commodity rather than as genetic resource. It has tried to regulate import, export, production, certification, release and supply of seeds which are ready to sow in the farms and nurseries but does not look at the aspects of breeding, conservation and safeguard of PGRs for the future.

Seed Regulations 1997

The Seed Regulations 1997 were formulated to define rules, and regulate the production and marketing of quality seeds in the country. It has included provisions for institutional arrangements

such as formation of sub-committees under NSB. It has laid down processes of approval, release and registration of new plant varieties, and provisions for documentation and certification of released varieties at the concerned authority. Ownership right of new plant variety is the key provision to promote and encourage individual breeders.

Forest Act 2049 BS (1992)

GoN is empowered to impose restriction on collection, cutting, use, transport, sell and distribution or export of the prescribed forest products for the purpose of biodiversity and environment conservation. It may do so by publishing a notice in Nepal Gazette (Section 70 (a)). But it does not mention about access to genetic material or resources.

Forest Regulations 2051 BS (1995)

The Regulations have included provisions related to timber and non timber forest products including herbs, herbicides and fodders but do not contain provisions relating to PGRFA.

Plant Protection Act 2064 BS (2007)

The objectives of the Plant Protection Act are preventing the introduction, establishment, prevalence and spread of pests while importing and exporting plants and plant products, promoting trade in plants² and plant products.³

The GoN is empowered by the Act to designate any central level office related with plant protection as the National Plant Protection Organization (Section, 6(1)). The powers and functions of the National Plant Protection Organization include are, among others, to (a) prepare standards on the sanitation of plants or plant products to be imported or exported; (b) develop and enforce manuals on the examination, test, inspection and treatment of plants, plant products, biological control agents, beneficial organisms and other articles; (c) identify endangered areas and protect plants and plant products in such areas through quarantine process; (d) prescribe terms and restrictions relating to the trafficking and use of plants and plant products, biological control agents and beneficial organisms; (e) enforce the approved standards on the sanitation of plants or plant products to be imported or exported; and (f) make coordination with phyto-sanitary bodies of other countries and make understandings on the recognition of each other's permits and phyto-sanitary certificates.

Plant Protection Regulations 2031 BS (1975)

The Regulations require license to import plant or plant product and provide for fees too (Rule 3). A person who intends to import any plant or plant product has to make an application in the given format to the Office of Plant Quarantine Officer. At the time of application, applicant needs to submit a declaration form and such declaration form should also be accompanied by a duplicate copy of the declaration form to be provided by the exporting country (Rule 4).

For the purpose of export of plant and plants products, a certificate is required (Rule 7). A person who wishes to export a plants and plant products from Nepal to any country has to make an application to the Plant Quarantine Officer along with the detailed description. In response, Plant Quarantine Officer is empowered to issue the phytosanitary certificate, if it does not see any obstacle.

² "Plant" means every kind of plant, whether alive or dead, or any part thereof; and this term also includes stem, branch, scum, layering and grafting (Kalami), bark, root, leave, fruit, seed and germ plasma (section 2 (a)).

³ "Plant product" includes any plant product not yet manufactured for use (including feeds) or any manufactured product that may, by the reason of nature of their processing or otherwise, create a risk for the introduction, establishment and spread of infectious pests (section 2 (b)).

Agro-biodiversity Policy 2007

National agro-biodiversity policy aims at conservation and sustainable use of agricultural genetic resources and traditional knowledge, skill and practices and fair and equitable sharing of benefits for ensuring food security and reducing poverty in present and future generations.

The Policy has divided its working policies in four themes – a) conservation, promotion and sustainable use of agro-biodiversity; b) protection and promotion of the rights and interests of farmers', and traditional knowledge, skill, innovation, technology, use and practices of the farmers; c) arrangements for equitable and judicious distribution system of opportunities and benefits arising from access to and utilization of agricultural genetic resources and materials; and d) arrangement for equitable and judicious distribution system of opportunities and benefits arising from access to and utilization of agricultural genetic resources and materials. Some of the policies listed under these themes include strengthening traditional seed and other distribution system as well as exchange of seed among farmers; encourage use of scientific technologies and knowledge based on knowledge and skill of the farmers; and conservation of traditional knowledge, skill, research, use of technology and practice of farmers related to traditional and local food and management of agricultural genetic resources.

The policy constitutes National Agro-biodiversity Conservation Committee to implement the policy and monitor the progress. The Secretary of Ministry of Agricultural Development is the chair of the committee having representatives from public and private sectors including farmers. Genebank has been established in line with the objectives of the agro- biodiversity policy. The role of the Center in implementing the policy has not been incorporated yet in the policy document. Its role in the revised policy has been mentioned.

National Agriculture Policy 2004

National Agriculture Policy 2004 (NAP) aims at improving the livelihoods of the people through transformation of the subsistence agriculture into a commercialized and competitive system. It encourages the conservation and sustainable use of natural resources and biological diversity. It also identifies the role of in-situ and ex-situ conservation in agriculture sector for conservation and promotion of sustainable use of genetic resources. NAP adopts the provisions of Local Self Governance Act and accordingly devolves extension services to the local bodies. It intends to strengthen local bodies by making them accountable and competent by allowing them to formulate local level agricultural plans as per the local needs and priorities and implement the activities.

Nepal Agriculture Extension Strategy 2007

The goal of Nepalese agricultural extension service is to contribute to the overriding national poverty reduction goal by increasing the efficiency and productivity of agriculture and competitiveness in the value chain of agricultural system (from production to marketing) within the sustainable livelihoods framework. NAES has assigned high priority to food and nutrition security, income generation, environment conservation and biodiversity utilization, equity and inclusion, value addition and quality products, commercialization, and sustainable livelihoods.

Agriculture Perspective Plan

The agriculture perspective plan (APP) is a growth accounting framework for generating agricultural growth in the country. It focuses on agriculture-led economic growth for food security, poverty reduction and economic development. The APP is technology-driven based on priority inputs like fertilizer, irrigation, roads, electrification and technology. It does not directly emphasize on the seeds and plant genetic resources including germplasm exchange.

Three Year Plan (13th Plan)

The approach paper to the 13th plan is formulated with a long term vision to upgrade the least developed country Nepal into a developing country by the year 2022. The objective of the plan is to bring a feeling of direct positive change in the living standards of common people by reducing economic and human poverty. One of the priority areas of the plan is increasing productivity, diversification and commercialization of the agricultural sector. The objectives of the agriculture sector are, among others, to develop and expand environment friendly agricultural technologies which mitigate the negative effects of climate changes; and conserve, promote and utilize agro-biodiversity. The working policies that deal with biodiversity are: agriculture biodiversity will be conserved, promoted, and utilized; and appropriate technology and infrastructure will be developed for conservation and utilization of Nepalese knowledge and genetic/ natural resources.

Agriculture Development Strategy

The agriculture development strategy (ADS) document is developed by the government with a vision of a self-reliant, sustainable, competitive, and inclusive agricultural sector that drives economic growth and contributes to improved livelihoods and food and nutrition security. The ADS specifies four strategic components—governance, productivity, commercialization and competitiveness. Promoting community based seed production and agro-biodiversity in inaccessible remote areas is an activity for implementation of seed vision 2025 under the strategy of increasing agricultural productivity. The ADS emphasizes on strengthening the genebank and animal genetic resource program for the use of intellectual property right. For implementing the biodiversity policy the ADS proposes strengthening collection, classification, and assessment of diversified bio resources relevant to agriculture; initiating a system of registration of agro-biodiversity; developing regulation for the research and experimentation of biodiversity and genetic resources and developing regulation for GMO having negative impact on biodiversity, genetic resources, and human health. The ADS, however, proposes nothing for exchange of genetic materials. The farmers' rights in the ADS includes ensuring farmers participation in the policy formulation, planning, decision making, implementation, and monitoring of the strategy. In addition, the ADS also proposes for formulating legislation related to food rights and food sovereignty consistently with the principles of the Interim Constitution.

National Seed Policy 1999

GoN formulated the National Seed Policy in 1999 which focuses on seven areas of seed sectors in Nepal. Variety development and maintenance, seed multiplication, quality control, increased involvement of private sector, seed supply, institutional strengthening and biotechnology are the seven sectors of the Policy. The main objective of seed policy is to provide policy framework and guidelines to ensure production and distribution of quality seeds, promote export by producing quality seeds, make seed business effective in terms of existing world trade, and to conserve and protect right over seeds of local crop varieties having distinct genetic traits.

Some important policies are conservation of agro- biodiversity and establishment of variety rights, coordination with national and international seed companies for seed development and production, production and regular supply of source seeds on the basis of farmers demand, export of high value seeds, balance sheet of source seed through NSB, authority of foundation seed production in private sector, contract seed production, seed certification and truthful labeling and introduction of quality declared seed system, involvement of private sector in seed testing, sample collection and crop inspection for quality control, rental facilities of seed processing plant and storage to private sector, seed pledging, strengthening NSB, establishment of quality control center and seed testing laboratory in private sector; provision of buffer stock for emergency, study research and regulation of GMO, transgenic plants and tissue culture, preparation of biosafety regulation, human resource development.

National Climate Change Policy 2011

NCCP has referred that there have been changes in rainfall patterns and seasons due to climate change, and these have direct and indirect impacts on water resources, agriculture, forests and biodiversity, health, infrastructure development, tourism, and livelihoods. It further states that the impacts of climate change are vivid in least developed, landlocked, and mountainous countries and Nepal is also highly affected by climate change. It realizes the urgency to address the issue of climate change to minimize the existing effects and likely impacts in different ecological regions—from the Southern plains to the middle hills and to the high Himalayan Mountain in the north, and their peoples, livelihoods, and ecosystems. The adverse impacts of climate change have been noticed in agriculture and food security, water resources, forests and biodiversity, health, tourism and infrastructures. The goal of this Policy, among others, is to improve livelihoods by mitigating and adapting to the adverse impacts of climate change.

In the capacity building, the policy has included the provision on enhancing the adaptive capacity of food grains, species, ecosystem and health from probable effects of climate change (8.4.4). In the technology development, transfer and utilization section, more importantly, it has included a provision of identifying, developing and utilizing agricultural varieties/species that can tolerate drought (too little water) and floods (too much water). In relation to PGRFA, the provision of identifying, developing and utilizing agricultural varieties/species that can tolerate drought (too little water) and floods (too much water) is relevant and important for the future which can be taken as a realization of the need which ITPGRFA has tried to address and achieve.

Biotechnology Policy 2006

One of the strategy in the policy is to develop indicators to measure public benefit as may be provided by biotechnology for sustainability, natural resource management, environment and biodiversity conservation, and make such benefits to the public. The activities of biotechnology eg in-situ and ex-situ conservation and utilization of plant resources shall be carried out thereby protecting as well as preserving natural resources and biodiversity.

Seed Vision 2013

One of the objectives is to promote local seed security through conservation and sustainable use of agrobiodiversity. Implementation of the Seed Vision is visualized to contribute on food security, employment generation, biodiversity conservation. It support VDC and ward level resource centres and seed production at local levels to maintain seed quality and conserve biodiversity and promote VDC level seed bank. It also suggest to designate farms, stations, zones and pockets for variety maintenance and biodiversity conservation and to establish broader genetic base and biodiversity of crops and varieties using local land races, exotic germplasm and their wild relatives for developing climate resilient and nutrition rich varieties. Encourage to promote linkage between national gene banks, regional and international seed banks and community seed banks for exchange of materials and information for biodiversity conservation.

NBSAP

Conserving biodiversity is considered as an essential part of safeguarding the biological life support systems on Earth. It has been prepared to meet the national needs for managing biodiversity on a sustainable basis for the benefit of present and future generations. The NBSAP contains strategy for management of biodiversity, framework for Local Biodiversity Strategy and Action Plan as separate chapters. Some of the strategies in NBSAP for the management of agrobiodiversity are establishment of an efficient system for exchange of information on all kinds of agricultural genetic resources and implementation of ITPGRFA and multilateral system of exchange of PGRFA, strengthening community based management of agrobiodiversity, and expanding it to at least five additional districts by 2020, establishing and strengthening functional linkage between the National

Agriculture Genetic Resources Center (Genebank) and community based seed or genebanks and development and implementation of incentive measures for on-farm conservation of agrobiodiversity, and elimination of perverse incentives (if any).

Access to Genetic Resources and Benefit Sharing Bill 2002

The draft Bill on access to genetic resources and benefit sharing (AGRBS) has included the provisions related to ABS as stipulated in the CBD. These provisions include ownership on genetic resources and genetic material. There are three categories of ownership: (i) ownership of individual person or organization (ii) ownership of local communities (iii) ownership of Government of Nepal if genetic resources and materials do not fall under the first two categories. Any individual, local community, organization, local government body or Government of Nepal itself can separately or jointly prepare register of genetic resources and associated knowledge. However, this will require taking PIC from the owners of such genetic resources and associated knowledge. The Biodiversity Register prepared this way becomes a legal document after it is registered with the National Genetic Resource Coordination Council (NGRCC). To get access to genetic resources and materials, two procedures need to be followed: firstly, application for preliminary and scientific research and sample collection; and secondly, proposal for obtaining license for access, use and export. An institution named National Genetic Resource Coordination Council has been proposed to be established to coordinate access and benefit related affairs. Benefits arising from the access and use of genetic resources and materials are proposed to be shared among four parties: (i) local community, individual or organization; (ii) NGRCC; (iii) Government of Nepal; and (iv) local bodies.

Plant Variety Protection and Farmers' Rights Bill

Major objectives of the Bill are to develop agriculture, promotion of sustainable food security and biodiversity through development and conservation plant varieties and securing rights of breeders and farmers. It has defines seed, plant, plant species, farmer, local variety, local community, traditional knowledge, and provides for registration of new varieties and breeders' rights over new varieties. It does try to refer separate access and benefit sharing related law for access to local varieties and traditional knowledge and their benefit sharing provision.

NARC Vision 2010

One of the targets in NARC Vision is conserving, promoting, and harnessing agricultural biodiversity through the development and dissemination of environment friendly techniques. It focused that increased commercialization will be made compatible with biodiversity conservation and environmental sustainability. It realized to further refine its policy on conservation of agrobiodiversity and agricultural genetic resources through in-situ and ex-situ conservation strategies.

IMISAP

Agrobiodiversity should be effectively and efficiently conserved and utilized and it needs to have easy access to a variety of germplasm. ITPGRFA-MLS Implementation Strategy and Action Plan (IMISAP) is a guiding framework for effectively participating in MLS and harvesting both monetary and non monetary benefits from the MLS. Underpinned principle of IMISAP is that there is no other alternative of agrobiodiversity for food and nutrition security, and of genetic diversity for sustainable agriculture. Large number of crop genetic resources are necessary to breed continuously new varieties, The Treaty is vital therefore, in ensuring the continued availability of the plant genetic resources that countries will need to feed their people.

As a Party to the CBD, and ITPGRFA, Nepal has an obligation of developing a national strategy for conservation and sustainable use of Agrobiodiversity. NBSAP 2014-2020 has been developed to

materialize the provisions of CBD. To materialize the ITPGRFA, MoAD has revised **Agrobiodiversity Policy 207 including the provisions of ITPGRFA**. Similarly this IMISAP has been framed for effective implementation of MLS targeting to harvest maximum benefits from MLS, to systematizing germplasm flows outside the country (to advance the research, breeding, study as well training (as shown in Figure 5), to harmonize with existing policy, regulations, acts and guidelines and to contribute for global food and nutrition security.

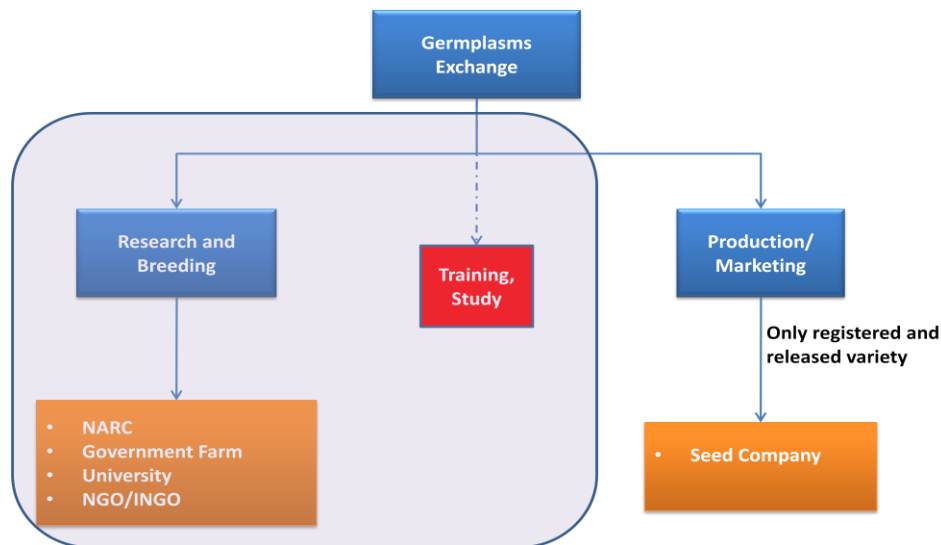


Figure 5. Scope of IMISAP

Strategy

Strategies have been developed for exploration and collection, conservation, documentation, materials for exchange, non-germplasm base technology transfer, resources utilization, capacity built up, germplasm export and import, and monitoring.

Exploration and Collection

- Exploration and collection shall be systematized and managed giving authority to NAGRC
- Any of such works need to carry out with the involvement and guidance of National Genebank
- Guidelines developed by NAGRC will need to follow.
- Portion of each accessions collected shall be conserved in National Genebank

Conservation

- Ex-situ, on-farm and in-situ conservation strategies shall be institutionalized.
- Short term, medium term and long term facilities shall be strengthened and equipped.
- Field Genebank (Joshi 2014b) shall be established across the NARC Stations, DADOs and Government Farms.
- Cryo-preservation facility, DNA bank shall be established and strengthened.
- Linkage between Community Genebanks (seed and field genebanks) with National Genebank with proper recognition shall be established
- Government support to CSBs through National Genebank shall be established.
- Collaboration for wild relatives and wild edible plants conservation in-situ shall be established with relevant institutions.
- Advanced technologies eg GIS (Joshi et al 2008) and biotechnology (Joshi et al 2014b) shall be applied to manage and conserve APGR.

Documentation

- National database system of each accession including phenotypic and genotypic; characterization and evaluation data shall be generated and maintained.
- Finger printings of indigenous landraces shall be developed.
- National database system shall be made available on line and it will be linked with MLS database

Materials for Exchange

- APGR under exchange shall be domesticated APGR, crop wild relatives and wild edible plants and its list shall be prepared. Red listing system (Joshi et al 2004) shall be in place.
- Seeds and vegetative parts shall be immediately used for exchange.
- In-vitro plantlets (pathogen free), DNA (not able to regenerate), dry sample (DNA extraction) and artificial seeds shall also be considered for exchange in future and facilities shall be created for such kind of works.
- Initially only ex-situ materials shall be in place for exchange.
- Mechanism shall be developed to use on-farm materials and in-situ materials for exchange

Non-germplasm base Technology

- Information such as inventories of crop diversity and results of technical, scientific and socio-economic research, for example, research related to evaluation and utilization of agricultural crops shall be exchanged.
- Technology for the conservation, characterization, evaluation and use of crop diversity under the Multilateral System shall be transferred and capacity of the users will be enhanced.

Resources Utilization

- Germplasm available in MLS along with database (information) shall be made access to researchers, breeders, farming communities, agriculturists, students.
- Linkage between farming communities including CSBs and researchers to global crop gene pools shall be established.
- Non germplasm base technology shall be made available to Nepalese scientists.
- Nepalese researchers and institutions shall be encouraged to use Benefit Sharing Fund. Capacity on developing such project shall be enhanced.
- Mechanism shall be in place for recipients to pay an equitable share of financial benefits into the Treaty's Benefit-sharing Fund (BSF) whenever applicable.
- Enabling environment shall be created to complement BSF with voluntary contributions from institutions, international foundations and the private sector.
- The funds that accumulate in the Benefit-sharing Fund shall be mechanized primarily to reach to the farmers who use and conserve crop diversity.

Capacity Build up

- Technical capacity for individual and institutional shall be enhanced.
- Programs shall be developed for scientific and technical education and training.
- Research facilities shall be further improved
- Linkage with national and international institutions shall be established.

Germplasm Import and Export

- One window system for germplasm export as depicted in Figure 6 shall be adopted.
- Multi-window system shall be adopted for import of germplasm as shown in Figure 7.

- Authority to consider requests for access to materials in the multilateral system shall be defined.
- Database shall be maintained that will support to trace back and / trace forward the germplasm. All germplasm shall get accession number and have passport data.

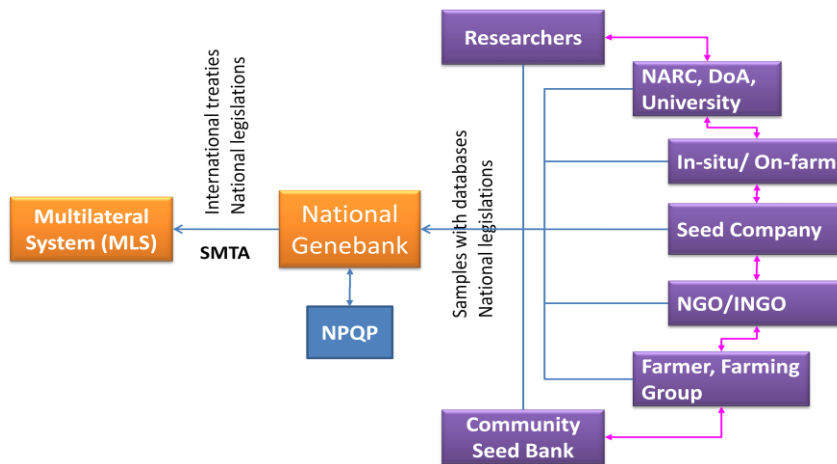


Figure 6. Export mechanism of germplasm under ITPGRFA-MLS

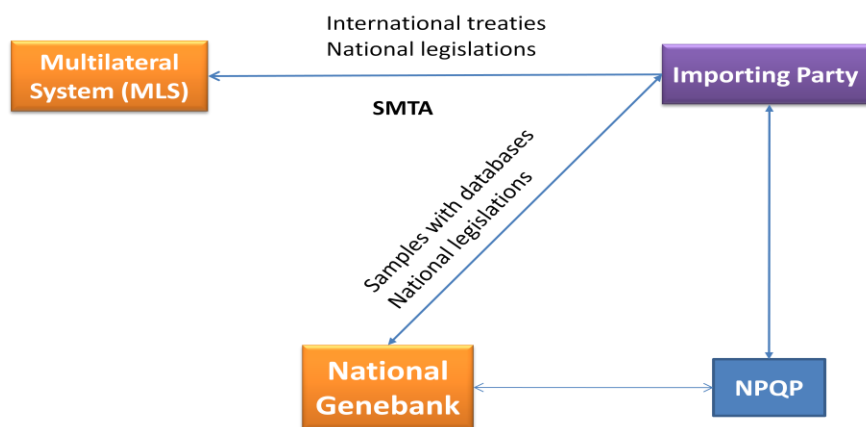


Figure 7. Import mechanism of germplasm under ITPGRFA-MLS

Monitoring

- Strong monitoring mechanism shall be developed to place all activities timely including Farmers' rights, provision under SMTA and incentive to target communities
- Impact shall be assessed after one year of notifying the Nepalese accessions of crops to IT Secretary.

Action Plan

SN	Activity	Responsible organization	Date
1.	Inclusion of IT provisions in agrobiodiversity policy	MoAD, NAGRC, LIBIRD	2014
2.	Harmonizing IT and CBD	MoAD, NAGRC	2014
3.	Translation of IT document in Nepali	NAGRC	2015
4.	English translation of Revised Agrobiodiversity Policy	NAGRC	2015
5.	Preparation of Nepal Annex 1 crops available across the country and international Genebanks (ex-situ, on-farm and in-situ)	MoAD, NAGRC, LIBIRD	2015-2020
6.	Awareness campaign regarding the potential use and benefit from MLS	MoAD, NAGRC, LIBIRD	2016-2020
7.	Capturing Benefit Sharing Fund (BSF) for AGRFA conservation and utilization	MoAD	2016-2020
8.	Agrobiodiversity conservation and utilization act	MoAD, NAGRC, LIBIRD	2015
9.	Agrobiodiversity conservation and utilization regulation	MoAD, NAGRC	2015
10.	On-line access to germplasms and database	NAGRC	2016-2020
11.	Notification to IT secretary	MoAD	2015-2020
12.	Identification of National designated Authority (Legal authority for issuing import and export permit)	MoAD	2015
13.	Characterization at phenotypic and genotypic level before making access through MLS	NAGRC	2016-2020
14.	Translate SMTA in Nepali language	NAGRC	2015
15.	Accessioning germplasm for inclusion under MLS	NAGRC	2016-2020
16.	Farmers' friendly materials developed	MoAD, NAGRC, LIBIRD	2015-2018
17.	Strong quarantine regulations		2016-2018
18.	Safety backup and safety duplication with the MLS of ITPGRFA (one window for export and multi window for import with strong database)	NARC, MoAD	2016-2020
19.	Encouraging and linking natural and legal persons (CSBs and farmers) with the MLS	NGO, MoAD, NARC	2015-2020
20.	Linking CSBs with National Genebank	MoAD, LIBIRD, NAGRC	2014-2020
21.	Prepare database under MLS for Nepalese people and process of access	MoAD, NAGRC	2016

Implementation of Strategy and Action Plan

A committee should be formed under the leadership of IT Focal Person and representative from NAGRC, NPQP, SQCC and CBD Focal Person. This committee is fully responsible to implement, monitor and regulate the IMISAP. NARC, DoA, MoAD and other relevant organizations should have annual program to materialize the IMISAP. Working group/committee may be formed as and when necessary for a particular task. All relevant national policies, acts, regulations should be integrated to implement this IMISAP. Project proposal calls for using benefit sharing fund and notification of important PGRFA under MLS should be regularly made to agriculturist, farmers, researchers and other stakeholders. Documentation system of APGR at local, regional and national levels should be placed in action to facilitate the accessions under MLS. There is a need of special attention to recalcitrant seeds and vegetatively propagated materials to conserve and make access through MLS. Case study of particular action will be documented along with its impact to share to the Nepalese communities.

Issues and Challenges

- Germplasm collection in the country need to be regulated and systematized.
- Crop wild relatives and wild food plant species are generally under the management and control of MoFSC, however, these are very important for agriculture research and development. There is need of simple mechanism between MoFSC and MoAD to better utilize and conserve these resources.
- Germplasm should be regularly added to MLS using the criteria that Nepalese communities accept. Regular notification is therefore necessary from IT Focal Point to IT Secretary.
- Ex-situ materials mainly orthodox seeds are identified for inclusion under MLS. Options need to identify for the inclusion of on-farm and in-situ materials.
- Monitoring mechanism for MLS and SMTA need to materialize and examples of benefit from MLS and SMTA should be documented and shared among the Nepalese people.
- Plant quarantine system is not strong enough to monitor all seeding materials and well as grains for food. Sometimes, grains imported from outside might be planted for production. There are many entry points of germplasm in Nepal and Nepal does not have quarantine offices to all entry points.
- Nepal ratified ITPGRFA on 2007. Many exercises have been conducted to include germplasm under MLS, however, any accessions from Nepal still has not been formally included under MLS.
- Contribution of foreign germplasm has been realized and appreciated, however, uses of Nepalese germplasm in breeding and production have not been documented for global food security.
- There are many holders of APGR in the country and participation mechanisms of them need to be formulated for the inclusion of APGR under MLS independently.

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Annex

Annex 1. List of crops introduced in Nepal that increased crop diversity

SN	Crop group	Crops
1.	Cereals	Barley, Maize, Wheat
2.	Grain legumes	Chickpea, French bean, Faba bean, Lentil
3.	Vegetables	Potato, Onion, Cauliflower, Cabbage, Tomato, Chayote, Sweet Potato, Chili
4.	Oilseeds	Soybean, Groundnut
5.	Fiber crops	Cotton
6.	Beverages	Coffee, Tea, Tobacco
7.	Fruits	Strawberry, Pepino, Apple, Pineapple, Litchi, Pomegranate, Grape, Ground apple, Guava, Custard apple, Avocado, Arecanut, Macademianut, Sapota, Kiwi

Annex 2. IT Annex-1 Crops (accessible through MLS)

A. Food Crops = 52 genus (35 crops)

SN	Crop	नेपालि	Genus	Species	Observations
1.	Breadfruit	रामफल	Artocarpus	altilis Fosb.	Breadfruit only
2.	Asparagus	कुरिलो	Asparagus	Officinalis L. var. altilis L.	
3.	Oat	जौ	Avena	Sativa L.	
4.	Beet, Mangelwargel	चुकन्दर	Beta	Vulgaris L.	
5.	Brassica complex		Brassica		Comprises oilseed and vegetable crops (cabbage, apeseed, mustard, cress, rocket, turnip)
6.			Armoracia		
7.			Barbarea		
8.			Camelina		
9.			Crambe		
10.			Diplotaxis		
11.			Eruca		
12.			Isatis		
13.			Lepidium		L. meyenii is excluded
14.			Raphanobrassica		
15.			Raphanus		
16.			Rorippa		
17.			Sinapis		
18.	Pigeon Pea, red gram, cajan pea, congo pea, no-eye pea	रहर	Cajanus	Cajan L. Huth	
19.	Chickpea, gram, garbanzo	चना	Cicer	Arietinum L.	
20.	Citrus		Citrus		
21.	Citrus		Poncirus		As rootstock
22.	Citrus		Fortunella		As rootstock
23.	Coconut	नरिवल	Cocos	Nucifera L.	
24.	Major aroids, cocoyam, taro, arum	ककलो, पिण्डालू	Colocasia	Antiquorum Schott. Var. esculenta	Taro, cocoyam, dasheen and tannia
25.	Dasheen	गावा	Colocasia	Esculenta L. Schtt.	?
26.	Major aroids		Xanthosoma		
27.	Carrot	गाजर	Daucus	Carota L. var. sativa DC.	
28.	Yams, greater yam, white yam	घर तरुल	Dioscorea	Alata L.	
29.	Finger Millet, Agrican Millet, Bird's food millet	कोदो, मरुवा	Eleusine	Coracana L. Gaertn.	
30.	Strawberry, alpine strawberry	भूईँ ऐसेलु	Fragaria	Nubicola Lindl. Ex Lacaita	
31.	Sunflower	तारामण्डल, सूर्यमुखि	Helianthus	Annus L.	
32.	Barley	जौ	Hordeum	Vulgare L.	
33.	Sweet potato	सखरखण्ड	Ipomoea	Batatas L. Lam.	

34.	Grass pea, chuckling vetch jarosse	खेसारी	Lathyrus	Sativus L.	
35.	Lentil	मुसूर	Lens	Culinaris Medic.	
36.	Apple	स्याउ	Malus	?	Pyrus malus L.
37.	Cassava, Tapioca, Manioc	सिमल तरुल	Manihot	Esculenta Crantz	
38.	Banana, Plantain, Adam's flag	केरा	Musa	Paradisiacal L.	Except M. testilis
39.	Rice, Paddy plant	धान, चामल	Oryza	Sativa L.	
40.	Pearl Millet	वाजरा	Pennisetum	Typhoidis Rich.	L.C.
41.	Beans	असारे सिमि, डालो सिमि	Phaseolus	Vulgaris L.	Except P. polyanthus ?
42.	Pea, garden pea,	कला, केराउ, मटर	Pisum	Sativum L.	
43.	Potato	आलु	Solanum	Tuberosum L.	
44.	Rye		Secale		Section tuberosa included, except S. phureja
45.	Eggplant, brinjal, aubergine, guinea squash	भाण्टा, वैगुन	Solanum	Melongena L.	
46.	Sorghum, great millet	जुनेलो	Sorghum	Vulgare Pers.	
47.	Triticale		Triticosecale		
48.	Wheat	गहू	Triticum	Aestivum L.	
49.	Wheat		Agropyron		
50.	Wheat		Elymus		
51.	Wheat		Secale		
52.	Faba Bean, Vetch, broad bean, horse bean	बकुला	Vicia	Faba L.	
53.	Cowpea et al.	बोडि	Vigna	Unguiculata L. Walp.	
54.	Maize, Indian corn	मकै	Zea		Excluding Z. perennis, Z. diploperennis and Z. lusurians

B. Forages = 81 species (29 forage crops)

SN	Forage	नेपालि	Genus	Species
Legume forages				
1.			Astragalus	chinensis
2.			Astragalus	cicer
3.			Astragalus	arenarius
4.	Sword bean	तरवारो सिमि	Canavalia	ensiformis
5.			Coronilla	varia
6.			Hedysarum	coronarum
7.			Lathyrus	ciera
8.			Lathyrus	ciliolatus
9.			Lathyrus	hirsutus
10.			Lathyrus	ochrus
11.	Sweet pea	केराउ फुल	Lathyrus	odoratus
12.	Grass pea, chckling vetch jarosse	खुसरि	Lathyrus	sativus
13.			Lespedeza	cuneata

14.			Lespedeza	striata
15.			Lespedeza	stipulacea
16.		नखर सिम्बी	Lotus	corniculatus
17.			Lotus	subbiflorus
18.			Lotus	uliginosus
19.			Lupinus	albus
20.			Lupinus	angustifolius
21.			Lupinus	luteus
22.			Medicago	arborea
23.	Yellow Lucerne, falcate Lucerne, yellow clover	भिरिन साग, कोते मान्द्रो	Medicago	falcata
24.			Medicago	sativa
25.			Medicago	scutellata
26.			Medicago	rigidula
27.			Medicago	truncatula
28.			Melilotus	albus
29.			Melilotus	officinalis
30.			Onobrychis	viciifolia
31.			Ornithopus	sati vus
32.			Prosopis	affinis
33.			Prosopis	alba
34.			Prosopis	chilensis
35.			Prosopis	nigra
36.			Prosopis	pallid
37.	Tropical kudzu	कडुजु धास, विदारि लहरो	Pueraria	phaseoloides
38.			Trifolium	alesandrinum
39.			Trifolium	alpestre
40.			Trifolium	ambiguum
41.			Trifolium	angustifolium
42.			Trifolium	arvense
43.			Trifolium	agrocicerum
44.			Trifolium	hybridum
45.			Trifolium	incarnatum
46.			Trifolium	pretense
47.	White clover, ladino	प्याउलि, बेउलि	Trifolium	repens
48.			Trifolium	resupinatum
49.			Trifolium	rueppellianum
50.			Trifolium	semipilosum
51.			Trifolium	subterraneum
52.			Trifolium	vesiculosum
Grass forages				
1.			Andropogon	gayanus
2.			Agropyron	crisatatum
3.			Agropyron	desertorum
4.			Agrostis	stolonifera
5.			Agrostis	tenuis
6.			Alopecurus	pratensis
7.			Arrhenatherum	elatius
8.			Dactylis	glomerata
9.			Festuca	arundinacea
10.			Festuca	gigantea
11.			Festuca	heterophylla
12.			Festuca	ovina
13.			Festuca	pratensis

14.	Festuca	rubra
15.	Lolium	hybridum
16.	Lolium	multiflorum
17.	Lolium	perenne
18.	Lolium	rigidum
19.	Lolium	temulentum
20.	Phalaris	aquatica
21.	Phalaris	arundinacea
22.	Phleum	pratense
23.	Poa	alpine
24.	Poa	annua
25.	Poa	pratensis
26.	Tripsacum	laxum
Other forages		
1.	Atriplex	halimus
2.	Atriplex	nummularia
3.	Salsola	vermiculata

Annex 3. Nepal Annex-1 Crops for inclusion under MLS (First list 2015)

See below **Figure** for total accessions of these crops

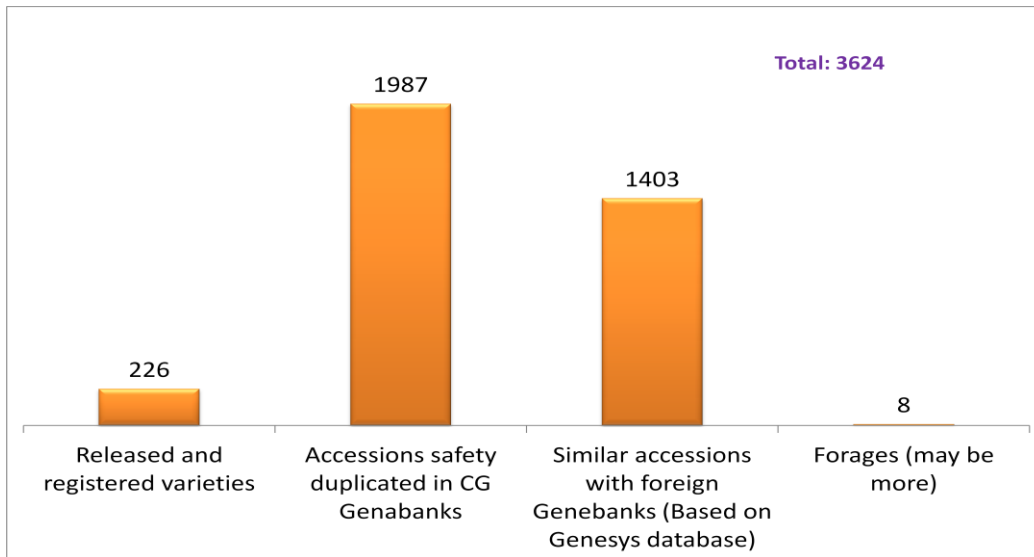
A. Food crops

SN	वालीको नाम	Common name	Scientific name
1.	कुरिलो	Asparagus	Asparagus officinalis L var altilis L
2.	तने बोडि	Asparagus Bean	Vigna unguiculata subsp Sesquipedalis (L) Verdc
3.	जौ	Barley	Hordeum vulgare L
4.	सीमी	Beans	Phaseolus spp
5.	मास	Black Gram	Vigna mungo L Hepper
6.	भण्टा	Brinjal	Solanum melongena L
7.	रायो साग	Broad Leaf Mustard	Brassica juncea L var rugosa
8.	बन्दा	Cabbage	Brassica oleracea L var capitata L
9.	गांजर	Carrot	Daucus carota L
10.	फुलगोबी, काउलि	Cauliflower	Brassica oleracea L var botrytis L
11.	चना	Chickpea	Cicer arietinum L
12.	बोडी	Cowpea	Vigna unguiculata L
13.	कोदे	Finger Millet	Eleusine coracana Gaertn
14.	खेसरि	Grasspea	Lathyrus sativus L
15.	रायो, तोरा	Indian Mustard	Brassica juncea Cass
16.	ग्याठ गोबि	Knol-Khol	Brassica caulorapa L
17.	मसुरो	Lentil	Lens culinaris Medic
18.	मकै	Maize	Zea mays L
19.	मुंग	Mung Bean	Vigna radiata (L) R Wilczek
20.	उवा	Naked Barley	Hordeum vulgare L var nudum Hook f
21.	जै	Oat	Avena sativa L
22.	चाइनिच साग	Pak choi	Brassica rapa var chinensis
23.	केराउ	Pea	Pisum sativum L
24.	रहर	Pigeon Pea	Cajanus cajan Millsp
25.	थाके सिमि	Pole Bean	Phaseolus vulgaris L
26.	आलु	Potato	Solanum tuberosum L
27.	मुला	Radish	Raphanus sativus L
28.	तोरी	Rapeseed	Brassica campestris var toria Dutch
29.	धान	Rice	Oryza sativa L
30.	चुकन्दर	Sugar Beet	Beta vulgaris L
31.	सलगम	Turnip	Brassica oleracea var rapa L
32.	गहुँ	Wheat	Triticum aestivum L

B. Forage crops

SN	नेपालि	Common name	Scientific name
1.	खेसरि	Grass pea	Lathyrus sativus
2.	भिरिन साग, कोते मान्द्रो	Yellow Lucerne, Yellow Clover	Medicago falcata
3.	लुसर्न	Lucerne (Alfalfa)	Medicago sativa
4.	बरसिम	Berseem	Trifolium alexandrium
5.	रातो क्लोभर	Red Clover	Trifolium pretense
6.	प्याउलि, बेउलि	White Clover, Ladino	Trifolium repens
7.	सतफल	Saftal Clover	Trifolium resupinatum
8.	राइ घाँस	Rye Grass	Lolium perenne

Total Nepalese accessions of different crops proposed for inclusion in the MLS (First list of accessions 2015)



Annex 4. APGR in National Genebank (NAGRC), Khumaltar

SN	Crop	No of accessions	SN	Crop	No of accessions
1	Rice	2400	D.	Oilseeds	185
2	Wheat	1700	31	Tomato	20
3	Barley	1230	32	Pumpkin	50
4	Maize	220	33	Okra	125
A.	Cereals	5550	34	Bitter gourd	15
5	Finger millet	600	35	Sponge gourd	20
6	Foxtail millet	35	36	Barela	25
7	Proso millet	30	37	Lettuce	10
8	Pearl millet	5	38	Brinjal	25
9	Buckwheat	230	39	Cucumber	40
10	Amaranths	200	40	Leaf mustard	30
11	Sorghum	50	41	Coriander	25
B.	Pseudocereals	1150	42	Cress	30
12	Lentil	300	43	Chilli	100
13	Chickpea	300	44	Radish	50
14	Cowpea	150	E.	Vegetables	565
15	Grass pea	120	45	Taro	30
16	Pigeon pea	20	46	Yam	15
17	Field peas	125	47	Ginger	80
18	Beans	430	48	Turmeric	75
19	Rajma bean	20	49	Chayote	15
20	Broad bean	25	50	Potato	10
21	Soyabean	150	51	Sugarcane	6
22	Ricebean	40	52	Garlic	50
23	Horsegram	60	53	Fruit trees	20
24	Greengram	10	F.	Field Gene Bank	301
25	Blackgram	50	54	Others (miscellaneous)	1500
C.	Pulses	1800	Total		11051
26	Rapeseed/mustard	90			
27	Sarsoon	20			
28	Sesame	40			
29	Niger	15			
30	Linseed	20			

Annex 5. Nepalese APGR conserved in foreign national genebanks and institutes including CG banks

Holder	Accession, n
National genebank database from EUROSIA	
Austria	3
Azerbaijan	2
Belarus	1
Belgium	1
Bulgaria	7
Czech Republic	17
Germany	1041
Greece	1
Hungary	7
Netherlands	639
Nordic Countries	8
Poland	5
Romania	8
Russian Federation	228
Spain	3
Ukraine	36
United Kingdom	1513
AVRDC	850
Japan database from NIAS	4136
Institute database from GENESys	
International Rice Research Institute	2672
International Centre for Agricultural Research in Dry Areas	1391
Department of Applied Genetics- John Innes Centre- Norwich Research Park	1308
International Crop Research Institute for the Semi-Arid Tropics	1050
National Small Grains Germplasm Research Facility- USDA-ARS	1034
Genebank- Leibniz Institute of Plant Genetics and Crop Plant Research	1034
Asian Vegetable Research and Development Center	848
Centre for Genetic Resources- the Netherlands Plant Research International	628
North Central Regional Plant Introduction Station- USDA-ARS- NCRPIS	395
Centro Internacional de Mejoramiento de Maíz y Trigo	241
N.I. Vavilov All-Russian Scientific Research Institute of Plant Industry	228
Plant Genetic Resources Conservation Unit- Southern Regional Plant Introduction Station- University of Georgia- USDA-ARS	168
Western Regional Plant Introduction Station- USDA-ARS- Washington State University	151
Millennium Seed Bank Project- Seed Conservation Department- Royal Botanic Gardens- Kew- Wakehurst Place	137
Soybean Germplasm Collection- USDA-ARS	109
Welsh Plant Breeding Station- Genetic Resources Unit- Institute of Grassland and Environmental Research	51
Institute of Plant Production n.a. V.Y. Yurjev of UAAS	24
Northeast Regional Plant Introduction Station- Plant Genetic Resources Unit- USDA-ARS- New York State Agricultural Experiment Station- Cornell University	23
National Clonal Germplasm Repository USDA- ARS	21
Dale Bumpers National Rice Research Center- United States Department of Agriculture- Agricultural Research Services	20
International Livestock Research Institute	18
Genebank Department- Division of Genetics and Plant Breeding- Research Institute of Crop Production	17

Botanical Garden- University of Nijmegen	11
Centro Internacional de Agricultura Tropical	11
University of California	10
Botany Department- University of California	10
Ustymivka Experimental Station of Plant Production	10
Nordic Genetic Resource Center	8
Institute for Plant Genetic Resources 'K.Malkov'	7
Institute for Agrobotany	7
West African Rice Development Association	6
Fruit Laboratory- USDA- ARS Plant Germplasm Quarantine Office	5
Plant Breeding and Acclimatization Institute	5
Warwick HRI Genetic Resources Unit	5
Suceava Genebank	5
International Institute of Tropical Agriculture	3
External Branch North of the Department Genebank- IPK- Potato Collection in Gross-Luesewitz	3
External Branch North of the Department Genebank- IPK- Oil Plants and Fodder Crops in Malchow	3
AGES Linz - Austrian Agency for Health and Food Safety / Seed Collection	3
National Arboretum-Germplasm Unit- USDA/ARS	2
Subtropical Horticultural Research Unit- National Germplasm Repository - Miami- USDA	2
Ornamental Plant Germplasm Center- Ohio State University	2
Junta de Andalucía. Instituto Andaluz de Investigación Agroalimentaria y Pesquera. Centro de Investigación y Formación Agroalimentaria Córdoba	2
Genetic Resources Institute	2
Crop Germplasm Research Unit USDA- ARS	1
Plant Genetic Resources Unit- Cornell University- New York State Agricultural Experiment Station- USDA- ARS	1
Nottingham Arabidopsis Stock Centre	1
Diputación General de Aragón. Centro de Investigación y Tecnología Agroalimentaria. Banco de Germoplasma de Hortícolas	1
Podil's'ka State Agrarian-Technical Academy	1
Institute of Volatile Oil Bearing and Medicine Crops	1
Research Institute for Cereals and Technical Plants Fundulea	1
Agricultural Research Station Suceava	1
Medicinal and Aromatic Plants Research Station Fundulea	1
Federal Research Centre for Cultivated Plants - Institute of Horticultural Crops and Fruit Breeding	1
National Botanical Garden of Belgium	1
Belarus Research Institute of Arable Farming and Fodders	1
Total	20208