(Protecting Farmers' Rights) in the Implementation of the ITPGRFA: Lessons from the Preparation of Annex 1

Madan R. Bhatta
National Agriculture Genetic Resources Centre,
Khumaltar,Lalitpur

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Importance of Plant Genetic Resources for Food and Agriculture (PGRFA)

- **Globally, over 84% of human diet and nutrition comes from plants.**
- **Asia and the Pacific, the Near East and Africa plants provide about 90% of human diet**
- **Latin America and the Caribbean 80%**
- **Europe and North America 75% (FAO, 2010)**

Importance of PGRFA

- **Out of the 10, 000 to 12, 000 known edible plant species, only 150 to 200 are used by humans and four of them alone-rice, wheat, maize and Potato-contribute more than 60% of calories and proteins that humans obtain from plants (FAO, 1997).**

- **Over 70% of the required production increases by 2050 will have to come from higher yields and less than 10% can be expected from an expansion in arable land (Hegwood, 2009).**

Importance of PGRFA

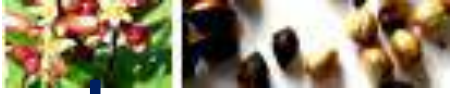
- **The intelligent use of Plant Genetic Resources through plant breeding has played a principal role in global food security during 20th century (Green revolution and post green revolution-saved one billion people from starvation).**
- **Over the last 60 years it has been estimated that half the yield gains in major crops is attributable to the introduction of new cultivars as a result of plant breeding.**
- **Since 1960 global food production has <u>trebled</u>.**
- **While the population has <u>doubled</u> only.**

Global Population Explosion

Year	Population	Years to double
1 AD	250 million	
1650	500 million	1650 years
1850	1 billion	200 years
1930	2 billion	80 years
1975	4 billion	45 years
2011	7 billion	36 years
2027	8 billion	16 years
2050	9.5 billion	23 years

Global Cereal Production since 1961-2010 (Million tones)

Year	Wheat	% change	Rice	% change	Maize	% change	Wheat Nepal	% change
1961	222	-	200	-	220	-	0. 112	-
2010	689	210 %	678	239 %	817	271 %	1.845	1458%



Production of three major cereals of Nepal over last 27 years

	Rice Nepal	Maize Nepal	Wheat Nepal
	Production in metric tonnes		
1985	2709430	819850	533720
			IRR = 84%
2011/12	4460278 (64.5%)	2067722 (152.3%)	1845411 (245 %)

Causes of Undernourishment in Developing Countries

- Complex in nature not only food production
- Socioeconomic barriers such as
- Distribution
- Purchasing power
- Eating habits
- Inadequate farming system
- Lack of food storage facilities
- The difficulty in combining high yield with resistance to biotic and abiotic stresses

The Right to Food?

- Feeding more than half of the world's grain production to animals is the more significant indicator of food security.
- As 7kg of grain is required to produce 1kg of Meat, there is an argument that meat production on this scale impedes the goal of global food security.
- 43% of the global cereal production is used for animal feed.
- Biofuels (Ethanol) and food security ?

Plant Genetic Resources for Food and Agriculture

- Historically, plant genetic resources were relatively 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 domistications.

- Relatively open flows of plant germplasm resulted the spread of PGRFA from its center of origin to the centers of domestication.
- Famines (genetic vulnerability) and the green revolution in the 1960s and 1970s: (Irish Potatao famine, Chinese narrow genetic base in major food crops), Ug99 in wheat.

Paradigm Shift (1980S and 1990S)

Common Heritage

- unrestricted access
- public breeding no IPRs
- International Undertaking 1983

National Sovereignty

- controlled access
- private breeding
- IPRs (PBR & patents)
- Convention on Biological Diversity 1993

Paradigm Shift

- 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.

- In 1971, the FAO, the World Bank and the United Nations Development Programme founded the Consultative Group on International Agricultural Research (CGIAR). The CGIAR is an association of public and private donors that supports a network of 16 international research centers (IARCs) each with its own governing body

- It was with the advent of the "Seed Wars" in the 1980s and the negotiation of the Convention on Biological Diversity that developing countries made clear that this practice was not acceptable and that legal mechanisms to formally support this position were sought.

Genesis of ITPGRFA and MLS

- **CBD-Conceived in the mid- to late 1980s, adopted in 1992 and entered into force in 1993**
- **CBD-1992- Countries have Sovereign Rights to legislate, manage, exploit and control access to their natural resources, including PGRFA**
- **Objectives: conservation, sustainable use, fair and equitable benefit sharing**

➢ **Based on concept of national sovereignty**

- **Access subject to national legislation**
- **Prior consent and mutually agreed terms**
- **Country of origin**
- **In practice, implemented - bilaterally**
- **Restricted Access**

Genesis of ITPGRFA and MLS

- **Nepal has been a signatory to the CBD in June 1992 and ratified it in November, 1993 (MoFSC-Focal Point) = 192 Member States**

- **Before CBD there was almost free exchange of PGRFA among countries around the world.**

International Treaty on Plant Genetic Resources For and Agriculture (ITPGRFA) and MLS

- **ITPGRFA: After long (7 years) of negotiation process the International Treaty was adopted by resolution 3/2001 of the 31st Session of the Conference of the FAO in November 2001 and entered into force in June 2004.**
- **As of today, 133 countries had become Members of the ITPGRFA (Conservation and utilization for global food security- Facilitated Access).**
- **Nepal ratified ITPGRFA on 2 January, 2007 and became party to it on 19 October, 2009.**
- **MoAD , the focal ministry for the Treaty is responsible for taking initiatives required to fulfill the commitments of the Treaty.**

Why to implement ITPGRFA/MLS in Nepal?

1. This legally binding Treaty covers all PGRFA relevant for food and agriculture.
2. Each country that ratifies will then develop the legislation and regulations it needs to implement the Treaty (Article 4).
3. The Treaty is vital in ensuring the continued availability of the plant genetic resources that countries will need to feed their people.

Treaty's Objectives

1. Conservation (Article 5).
2. Sustainable use of PGRFA for food and Agriculture (Article 6).
3. Fair and equitable sharing of benefits derived from their use (Article 13).

Farmers' Rights (Article 9 - ITPGRFA)

- **Farmers' Rights include:**
  - **protection of traditional knowledge;**
  - **participate equitably in benefit sharing;**
  - **participate in decision making process , at the national level, on matters related to PGRs;**
  - **save, use, exchange, and sell farm-saved seed/propagating material subject to national law.**
  - **Compensation for losses due to use of new breeders' protected varieties.**

MLS and ABS

Article 10. MLS (Global gene pool)

Article 11. Coverage of MLS, Annex 1 and Interdependency

Article 12. Facilitated Access of PGRFA

Article 13. Benefit Sharing in the MLS

13.1 Access to PGRFA

13.2(a) Exchange of information

13.2(b) Access to and transfer of technology

13.2(c) Capacity-building

13.2(d) Sharing of monetary and other benefits of commercialization

- ***CGIAR centres do not commercialize / profit***
- ***Partner countries take 100% of the profits***

Multilateral System (MLS)

- **The multilateral system can be defined as 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 (COPs)**
- **This system is operative within 15 CGIAR system and applicable to 35 food crop species and 29 forages species listed in Annex 1, that account for >80% of human calorie intake from plants (Article 11)**
- **On ratifying the Treaty, countries agree to make their genetic diversity and related information about the crops stored in their gene banks and public domains available to all through the MLS (Article 12) .**

Multilateral System

- Under CGIARC umbrella –different IARCs such as IRRI, CIMMYT, ICARDA, ICRISAT, CIP etc.

- 15 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 Multilateral System of the International Treaty (MLS) (Using SMTA)
- Every year the CG Centers distribute more than 600, 000 seed samples of different crop species in developing countries.

Why to implement MLS in Nepal?

Countries' Interdependency on PGRFA

- 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). Examples:

Crops	Country of Origin
Potato:	Peru and Bolivia
Maize:	Mexico, Central America
Rice *Oryza sativa* subsp. Japonica	China
Rice *Oryza sativa* subsp. Indica	Indo Gangetic plains
Wheat:	West Asia (Turkey/ Iraq /Tunisia)
Soybean:	China
Beans:	Mexico, Latin America

Source: Crop Genetic Resources as a Global Commons, 2013

Countries' Interdependency on PGRFA

Crops	Country of Origin
Millet	Africa
Sugarcane	New Guinea, India (South Pacific Region)
Sorghum bicolor	East Sudanic Africa
Barley *: Hordeum vulgare* Lentil*: Lens culinaris,* Pea*: Pisum sativum,* Chickpea *: Cicer arietinum,* Faba bean*: Vicia faba*	Near East
Moong bean*: Vigna mungo*	Gujrat, India
Buckwheat*: Fagopyrum esculentum*	Eastern Himalaya, Nepal
Colocasia: *Coixlachryma-jobi*	China

Source: Crop Genetic Resources as a Global Commons, 2013

Countries' Interdependency on PGRFA

Crops	Country of Origin
Mango: *Mangifera indica*	India
Mango: *Mangifera sylvatica*	Nepal
Peanut:	Southeastern Bolivia and Northwestern Argentina
Banana: *Musa acuminata*	India to Papua New Guinea
Eggplant/Bringel	Southeast Asia
Tomato:	Latin America
Colocasia esculenta, Dioscorea esculenta,	New Guinea and Wallacea
Cucumber:	India, Nepal

Source: Crop Genetic Resources as a Global Commons, 2013

Countries' Interdependency on PGRFA

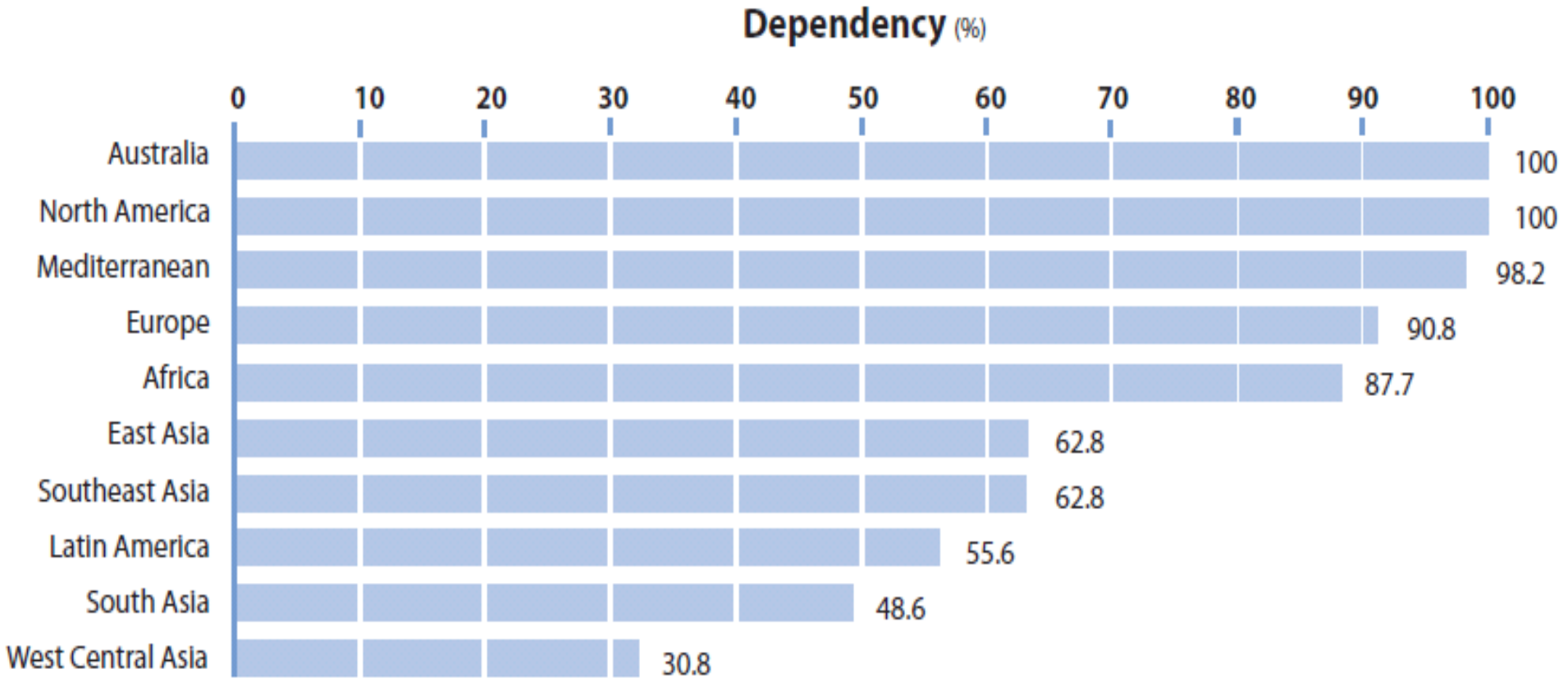
- **Brazil- Megadiverse country: 44,000-50,000 species of vascular plants (18% of the world´s plant diversity), but ...**
- **Highly dependent on PGR native to other countries for food and agriculture: coffee, rice, potatoes, wheat, sugarcane, etc**

Countries' Interdependency on PGRFA

- **The North Western Indian Mega Center comprises about 14-15% of the world's cultivated plants.**
- **Heavily depended on PGR native to other countries for food security such as wheat, rice, potato, tomato, coffee etc.**
- **One single wheat variety "PBW 343" (Attila) developed in the MLS and introduced in India occupy 8 million hectares, producing 28 million tones of wheat, worth of 4 trillion INRs in a single season.**

- **Similar case is with rice and maize in India.**

Percentages of Food Production of Major Crops Based on Species Originating from Other Regions



Source: The State of the World's Plant Genetic Resources for Food and Agriculture. [29]

Analyzing the Interdependency

- **All countries depend very largely on agricultural plant genetic resources that originated elsewhere**

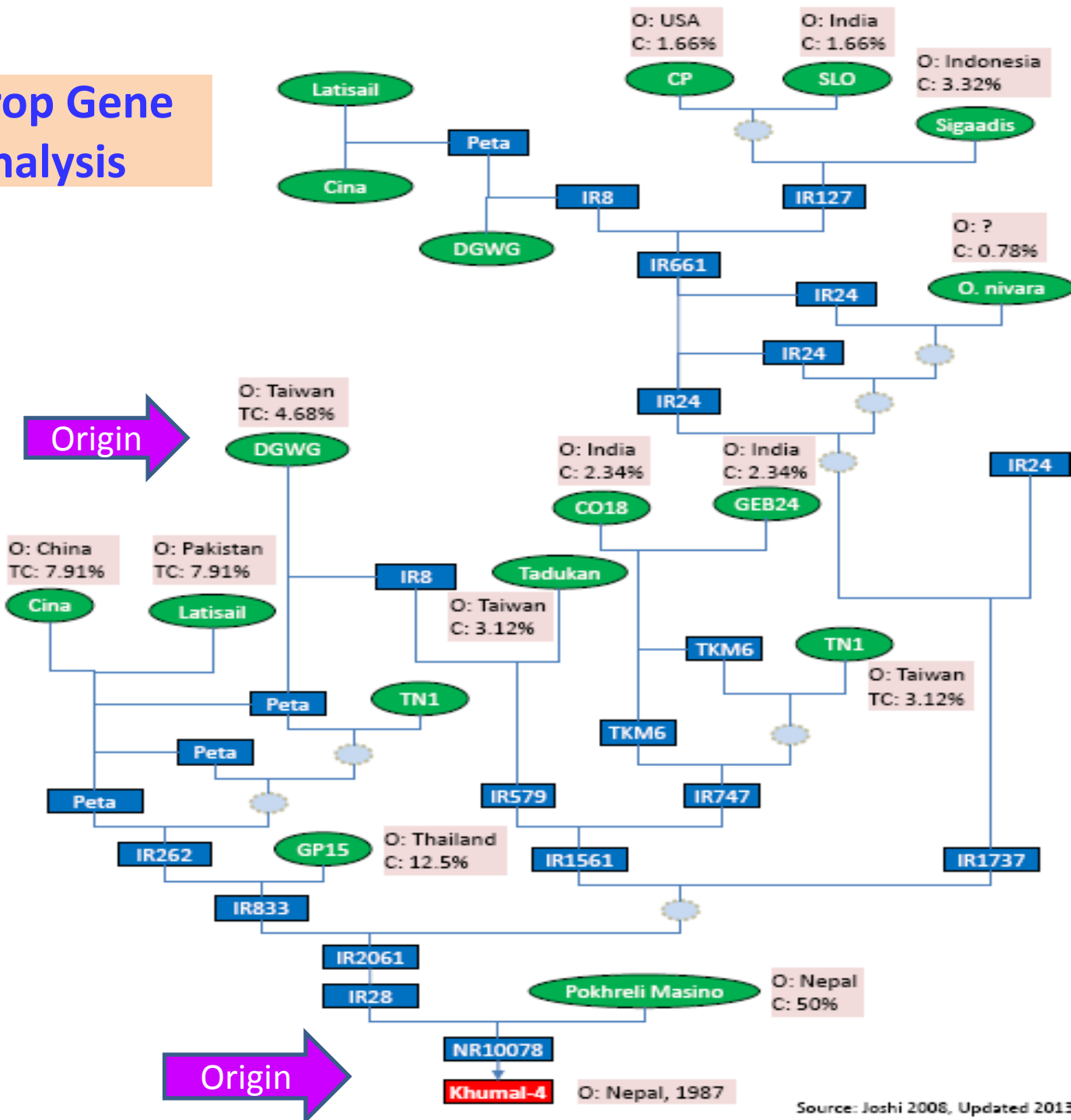
- **Where the ancestors (landraces) used in developing Nepalese modern varieties come from?**

Contribution of Crop Gene Pools: Pedigree Analysis

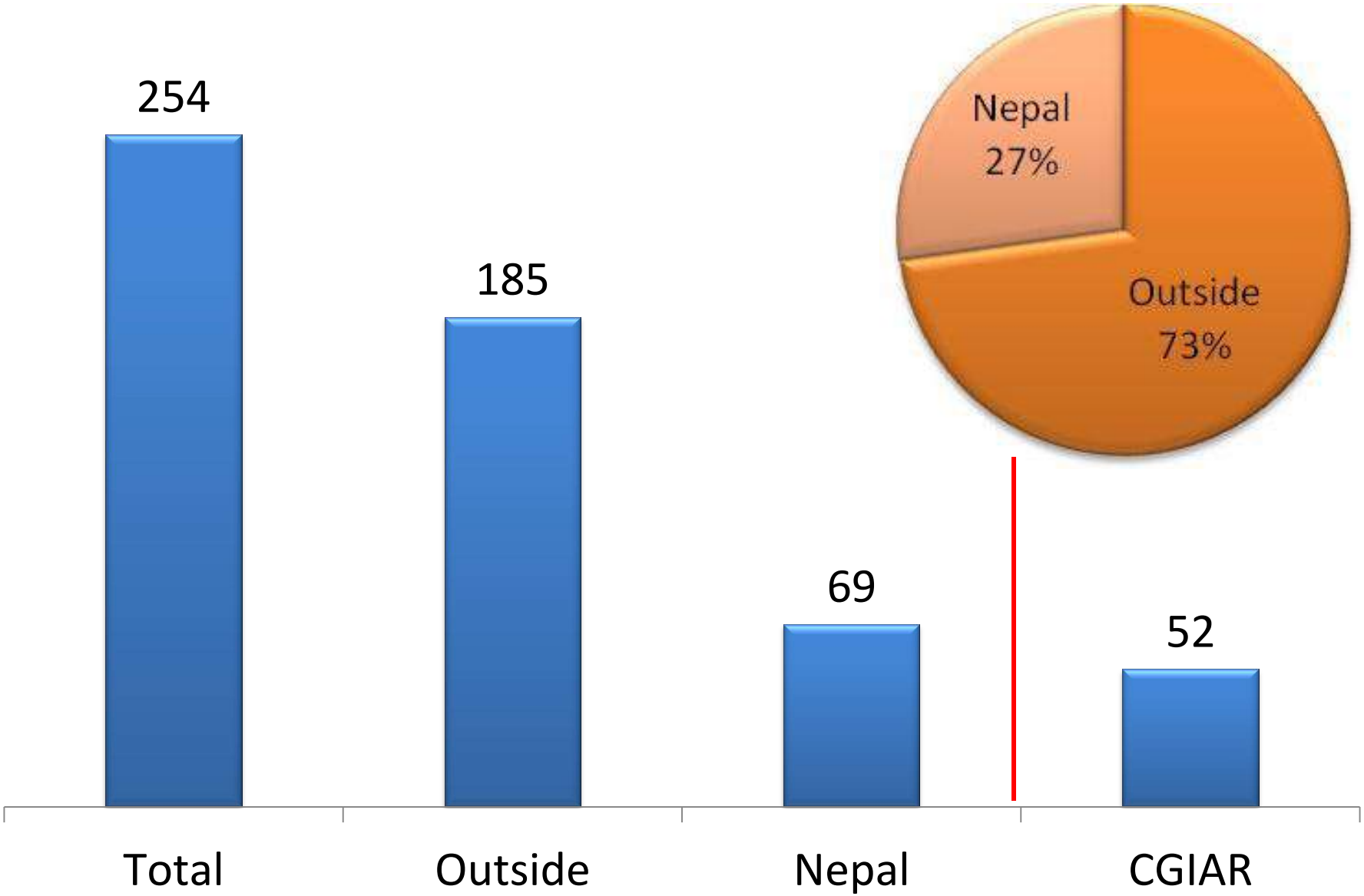
8 countries

1. USA
2. India
3. Indonesia
4. Taiwan
5. China
6. Pakistan
7. Thailand
8. Nepal

13 landraces

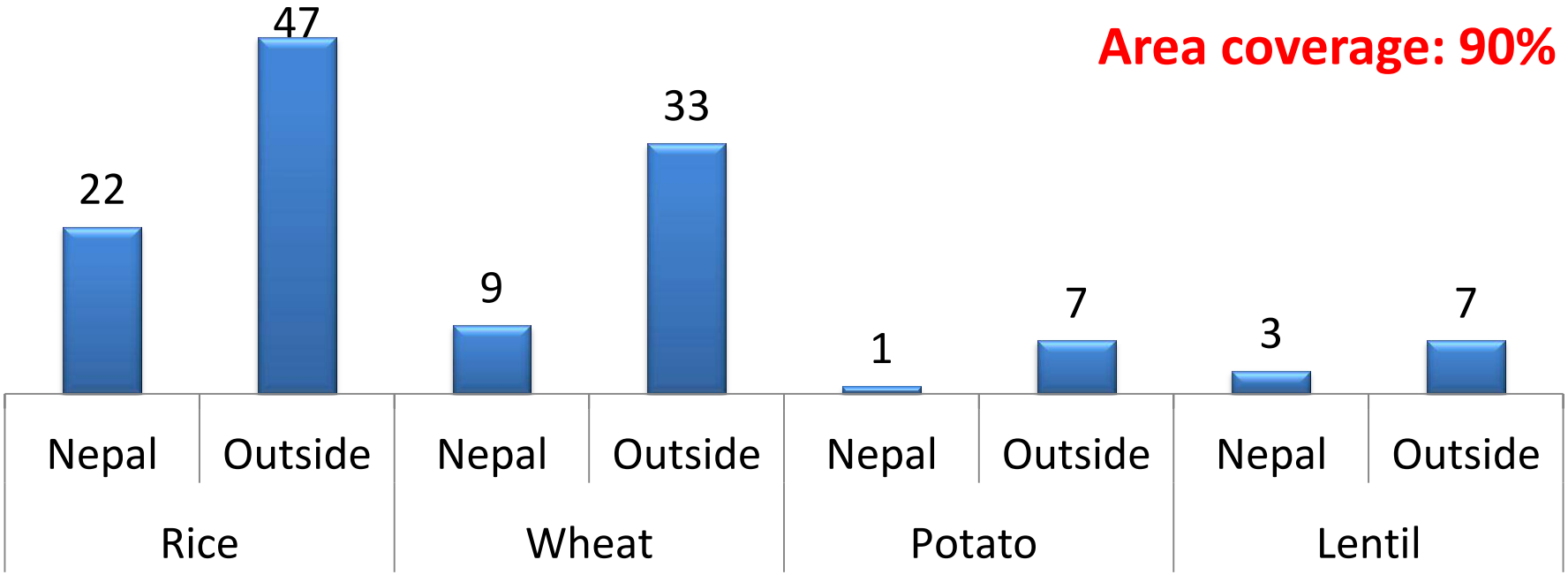


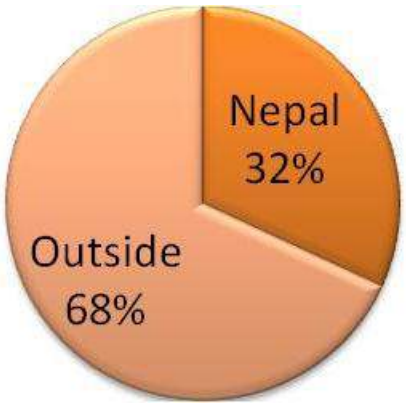
Origin of Varieties Released in Nepal

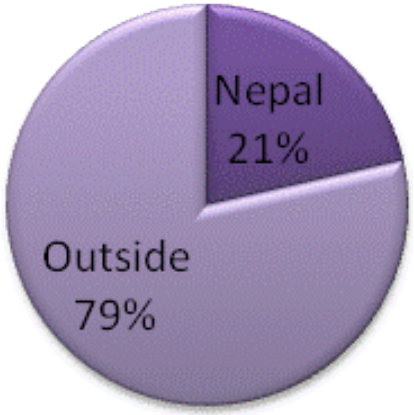


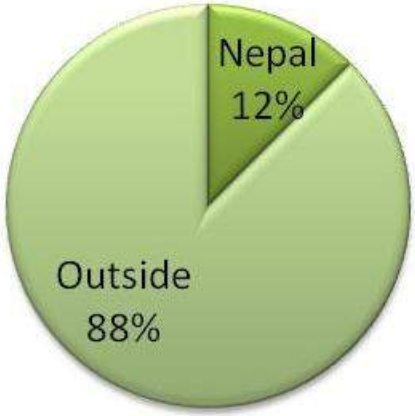
Origin of Released Varieties of 4 Selected Crops

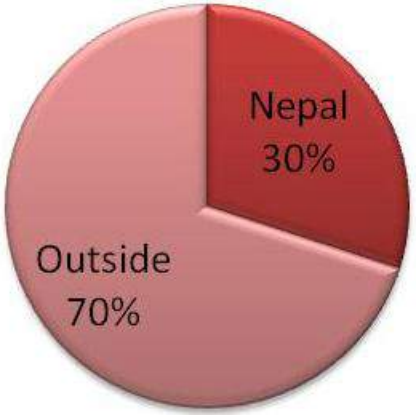
Area coverage: 90%





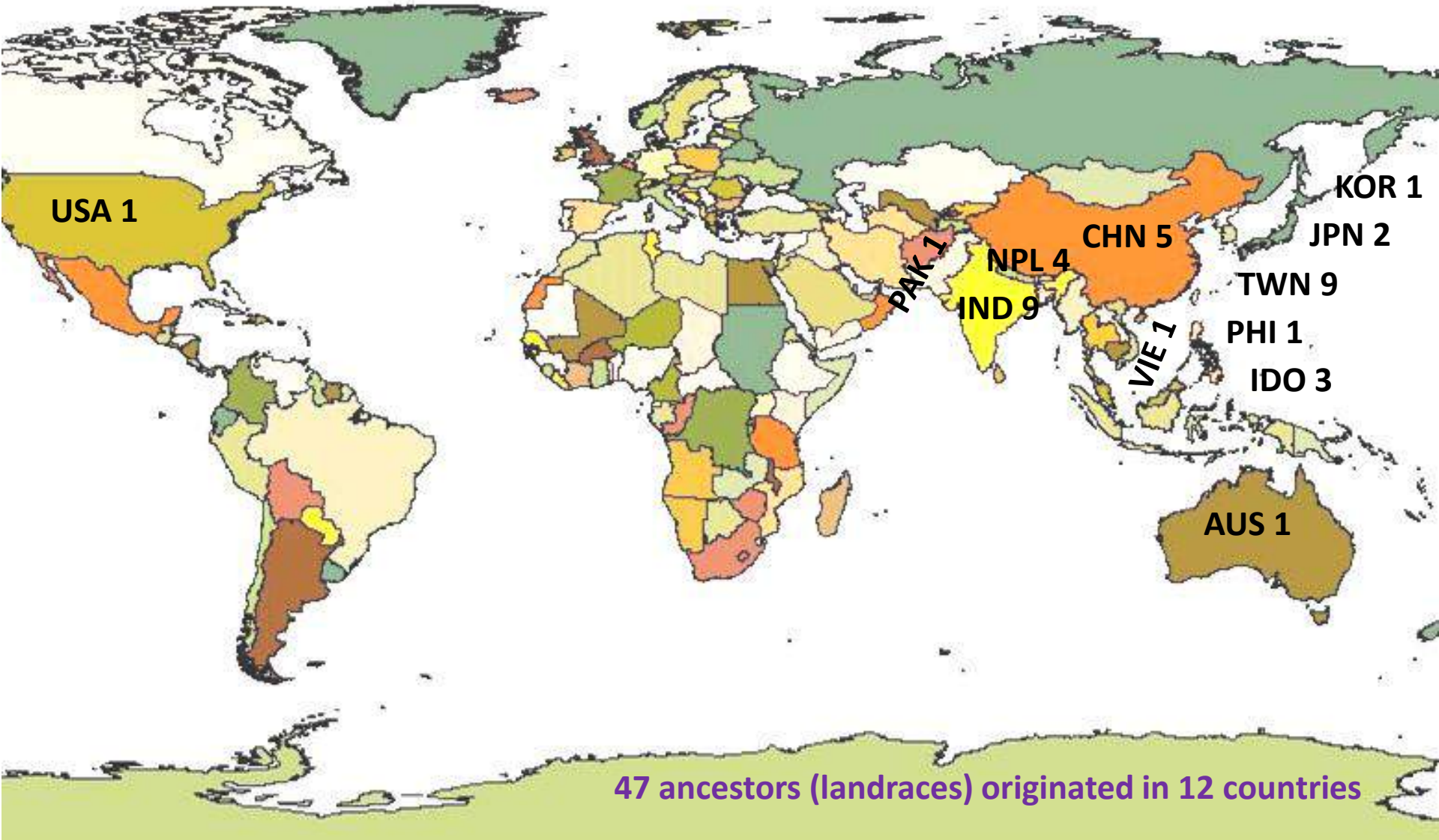






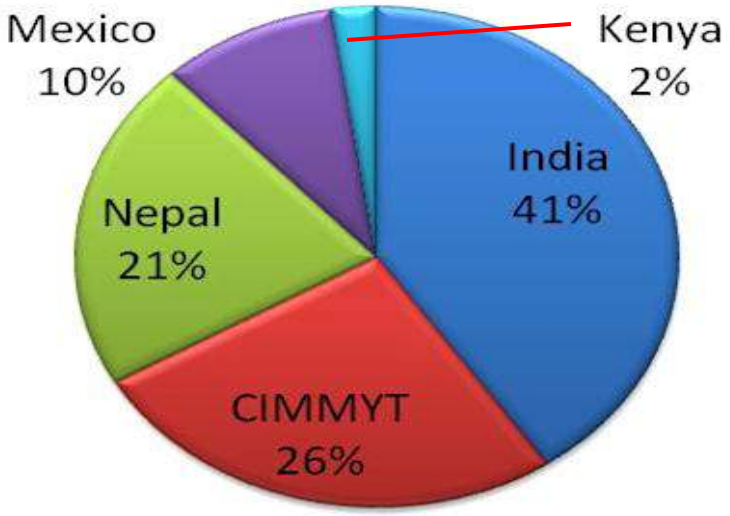
Countries where the Ancestors of Nepalese Improved Rice Cultivars Originated

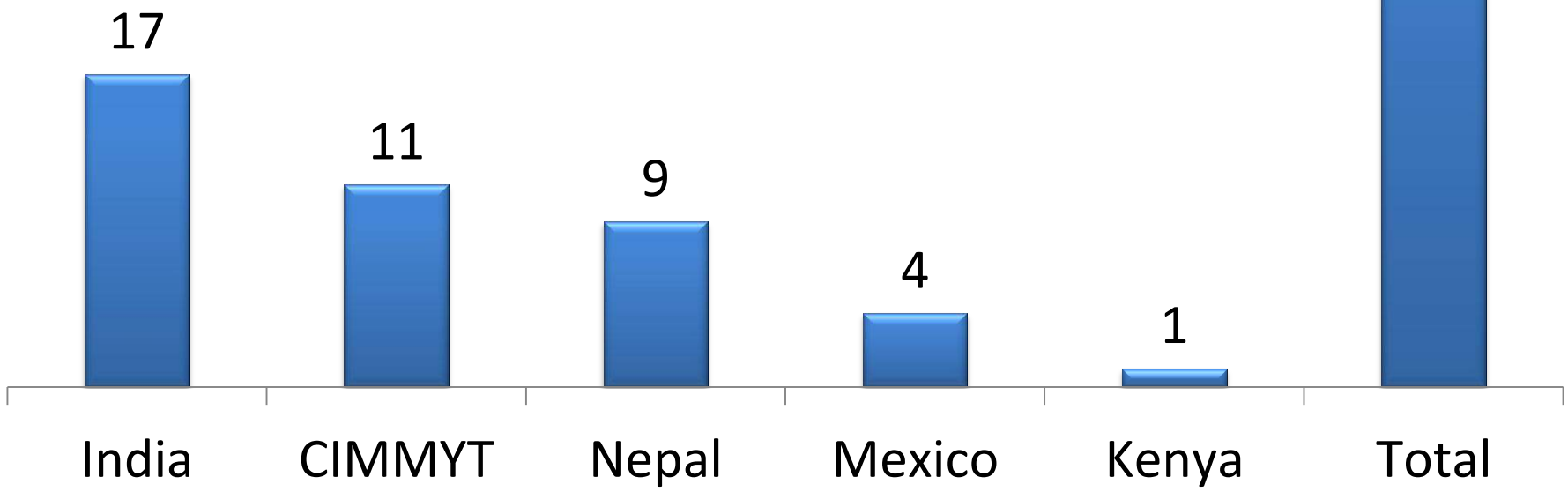
Based on 20 rice varieties for Mid and High Hills



47 ancestors (landraces) originated in 12 countries

Origin of Wheat Varieties Released in Nepal: Evidence of Dependency

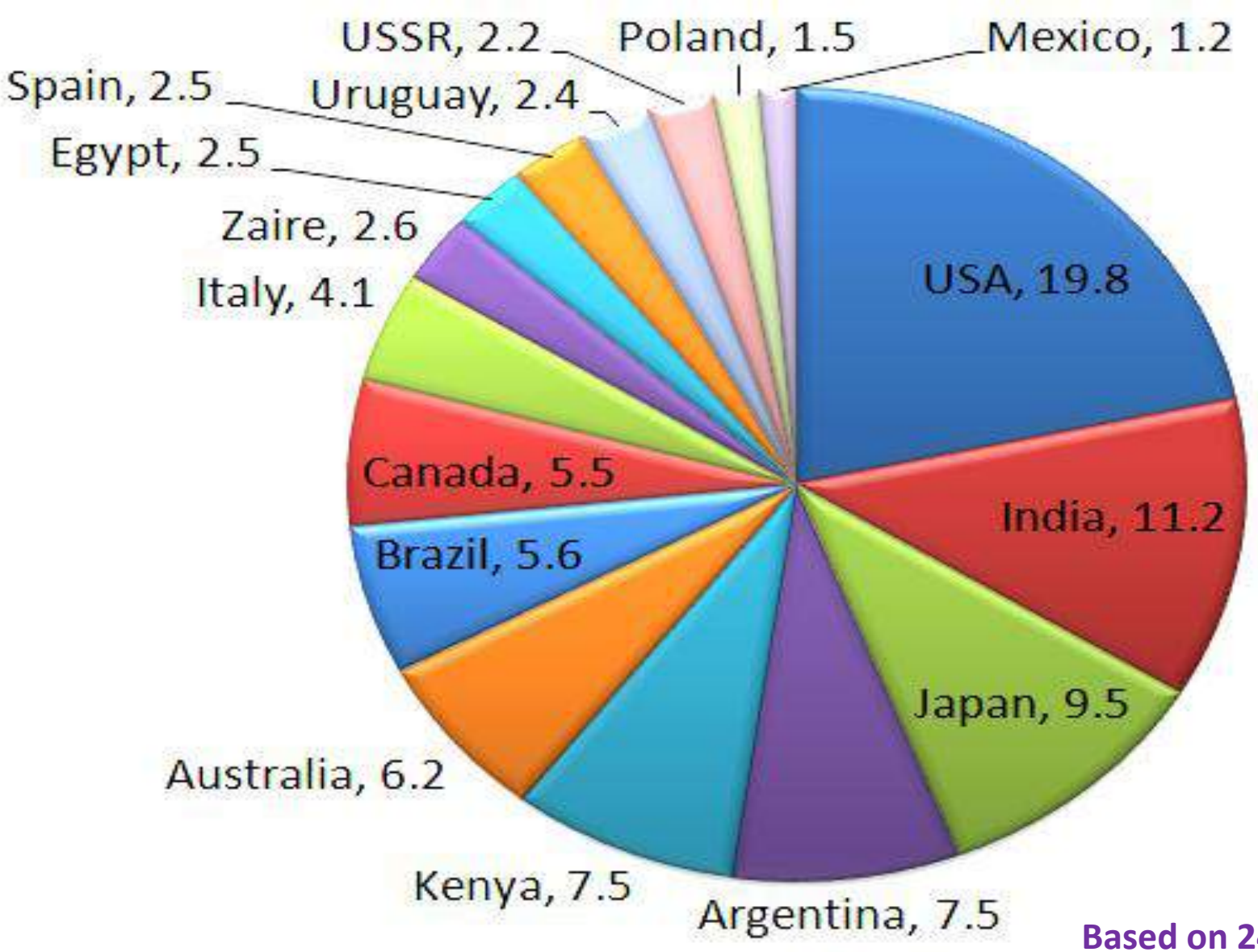




Ancestors, their Origin and Number of Wheat Varieties Contributed (Based on 24 varieties)

SN	Ancestors	Origin	Varieties Contributed, n
1	Akagomughi	Japan	24
2	Kenya 324	Kenya	24
3	Turkey Red	USA	23
4	Rieti	Italy	24
5	Steinwedel	Australia	20
6	Hd 845	India	2
7	Hard Red Calcutta	India	23
8	Oro	USA	23
9	Kanred	USA	23
10	Red Egyptian	South Africa	17
11	Iumillo	Spain	23

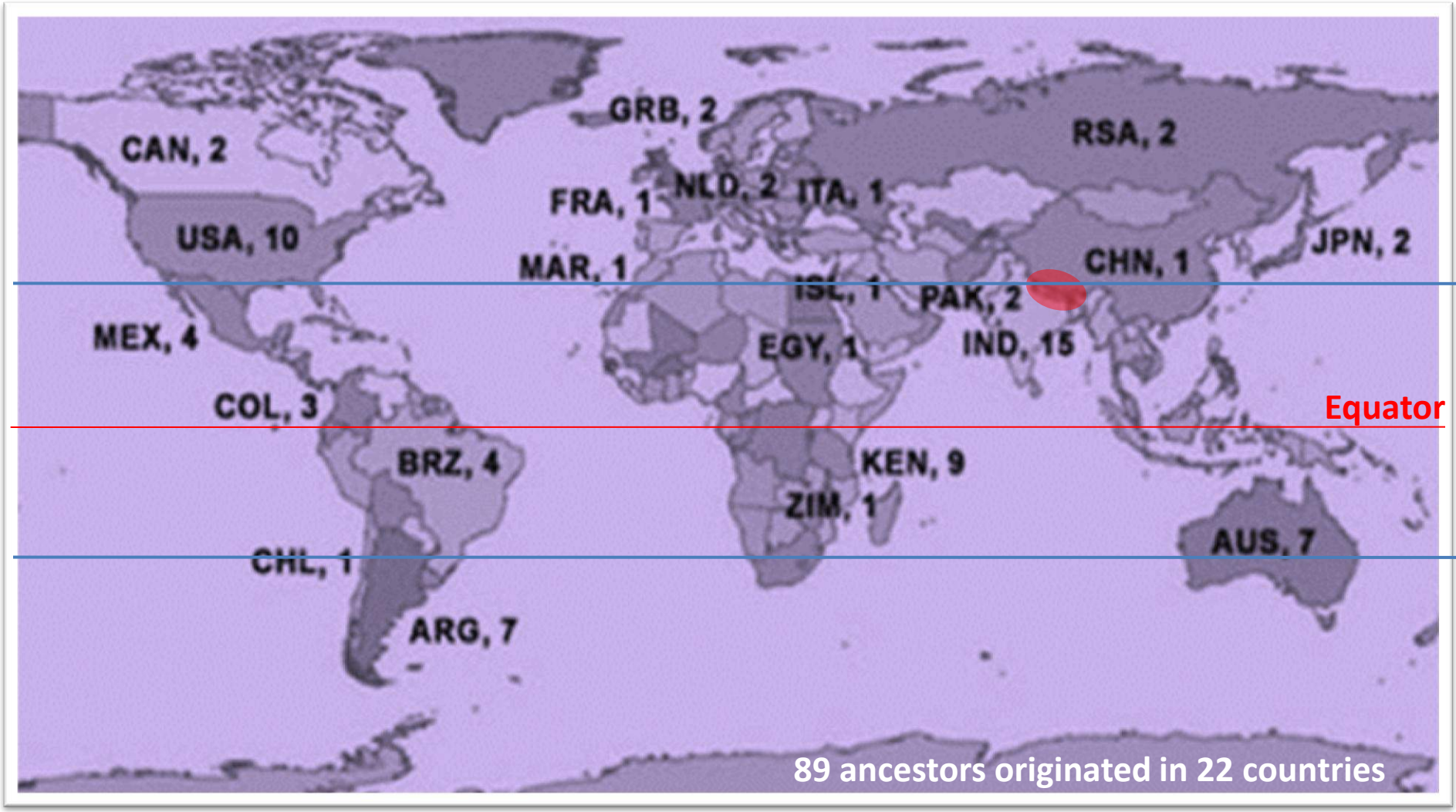
Country-wise Cumulative Contribution of Ancestors to Nepalese Wheat Varieties



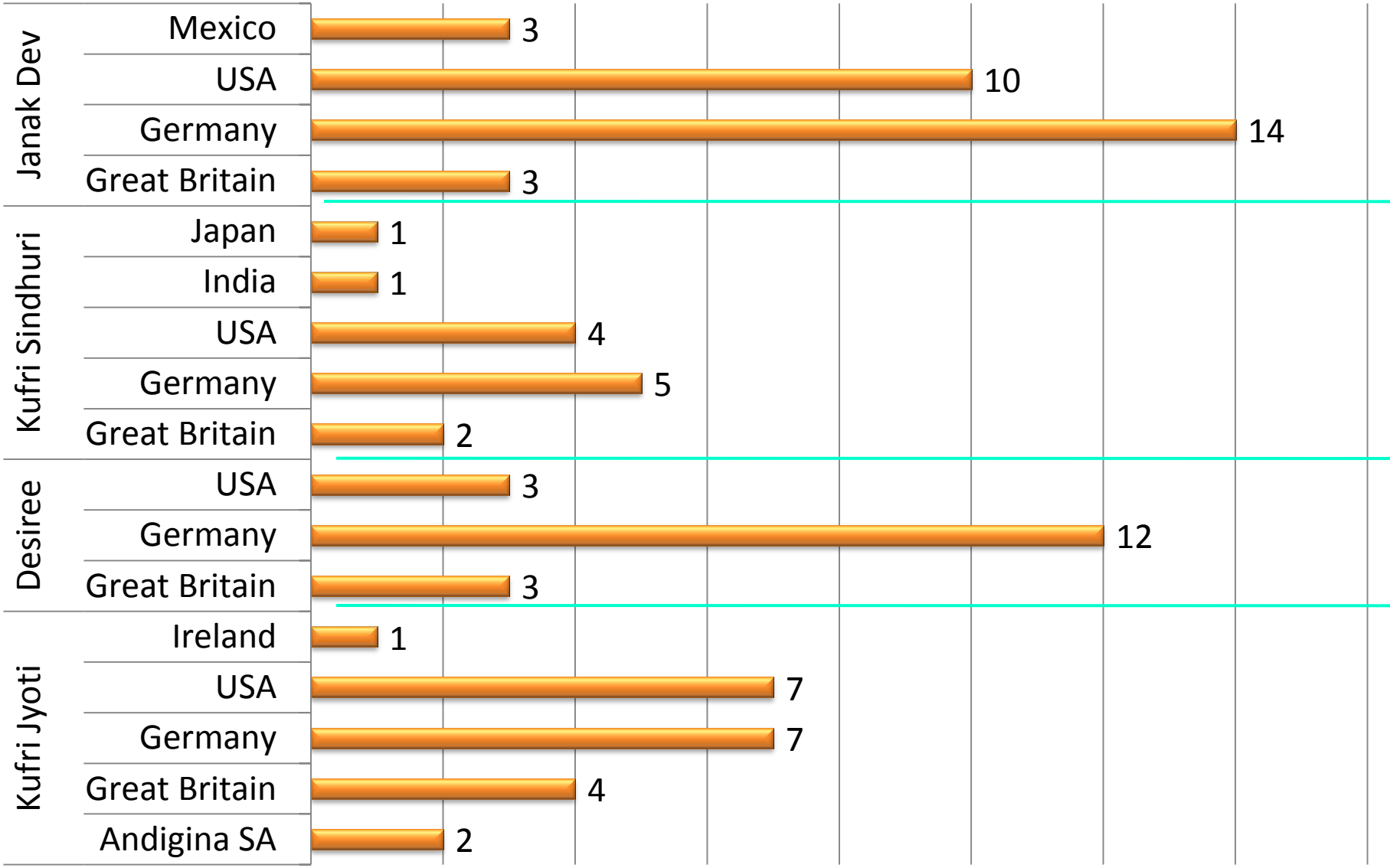
Based on 24 varieties

Origin of Ancestors of Wheat Varieties Released in Nepal

Based on 35 varieties



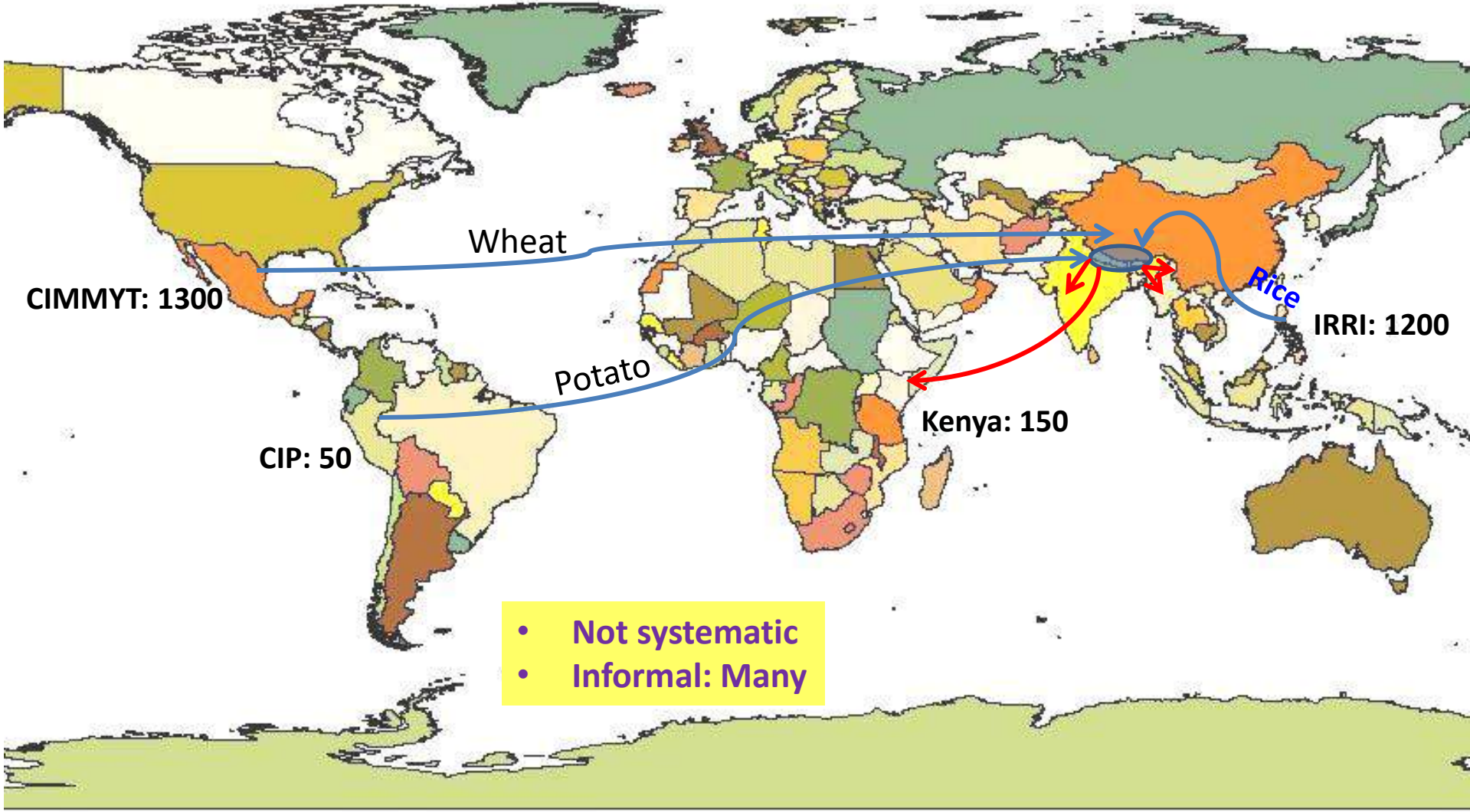
Origin of Ancestors used in Developing Potato Varieties



Frequency of Native and Exotic Parents used in Developing Modern Varieties (Rice, Wheat, Potato, Lentil)

SN	Variety	Native parent	Exotic parent	Coverage, %
1	Janaki	0	4	?
2	Chaite-4	0	17	?
3	Khumal-4	1	12	?
4	Rice (20 Hill set)	4	43	92
5	Rice (28 Tarai set)	1	34	
6	Wheat (35)	0	87	97
7	Potato (8)	0	All	85
8	Lentil (11)	1	All	?

Current Germplasm Flow in Nepal: Rice, Wheat & Potato



Interdependence and Access to Global Crop Gene pools

- **Nepal: 95-100% dependent on foreign germplasms**
- **Global interdependence on crop genetic resources will further increase under climate change**
- **Need access to global crop gene pools: MLS**

Benefit-sharing with India for FR13A
(a) Commercial practice?

- Standard commercial practice is to share royalties on sales with provider of germplasm contributing ≥25% of the commercial variety by pedigree
- Sub 1 gene from Indian local rice FR13A contributes ~3% by pedigree

→ no sharing of benefit for FR13A

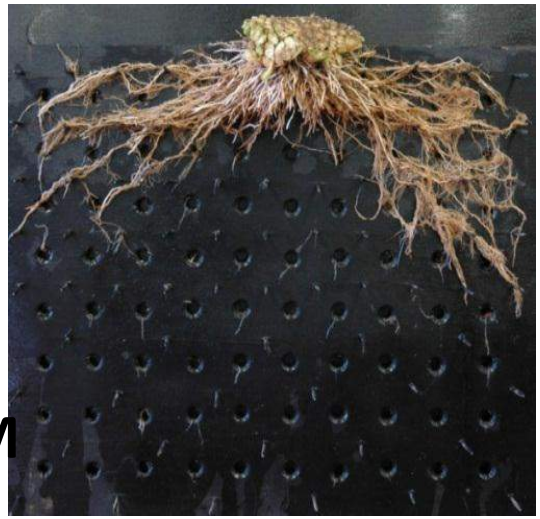
Pedigree tree of Swarna sub-1 rice of Nepal

http:\\rice.generationcp.org\germplasm\

Drought Tolerance (DRO 1)

5 CM

10 CM



IR64

Dro1-NIL

Kinandang Patong

Shukha Dhan-4 and 6

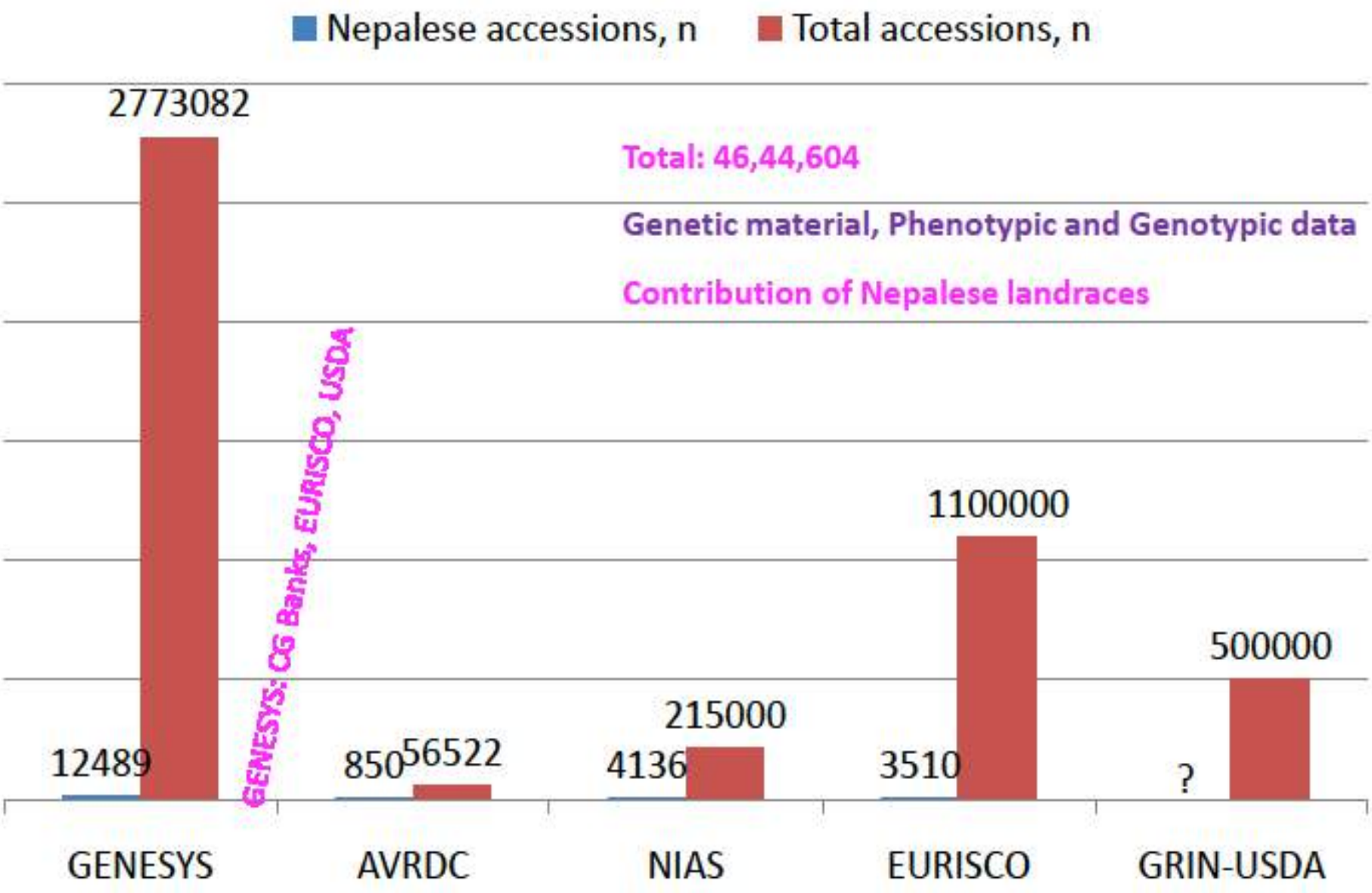
Economic benefits to developing countries from CGIAR research on rice

Study	Country / Region	N Accessions	Annual total benefit ($m)	Annual benefit / accession ($k)
ACIAR 2011	Indonesia	9124	$642.4m	$70.4k
ACIAR 2011	Philippines	4457	$204.4m	$45.9k
ACIAR 2011	Vietnam	3019	$613.2m	$203.1k
Hossain 2003	**Asia**	**91307**	**$4310m**	**$47.2k**
Hossain 1998	Bangladesh	5894	$152.9m	$25.9k
Sanint and Wood 1998	LAC	1903	$285.5m	$150k

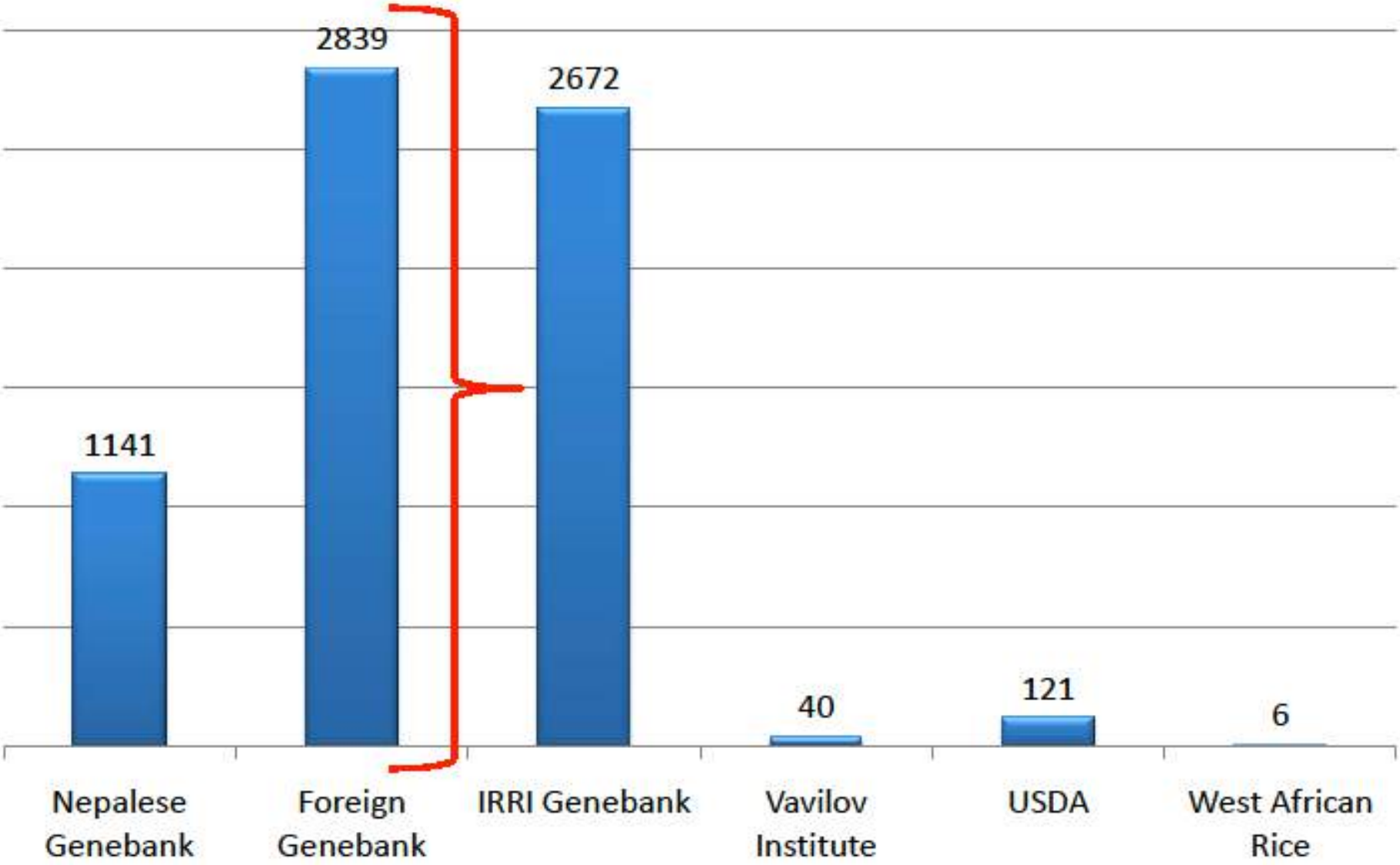
Preparing Nepal Annex-1 Crops

- **Criteria, Database search, Trait and distribution analysis**
- **Several rounds of discussion and consultation meetings (key group, user groups)**

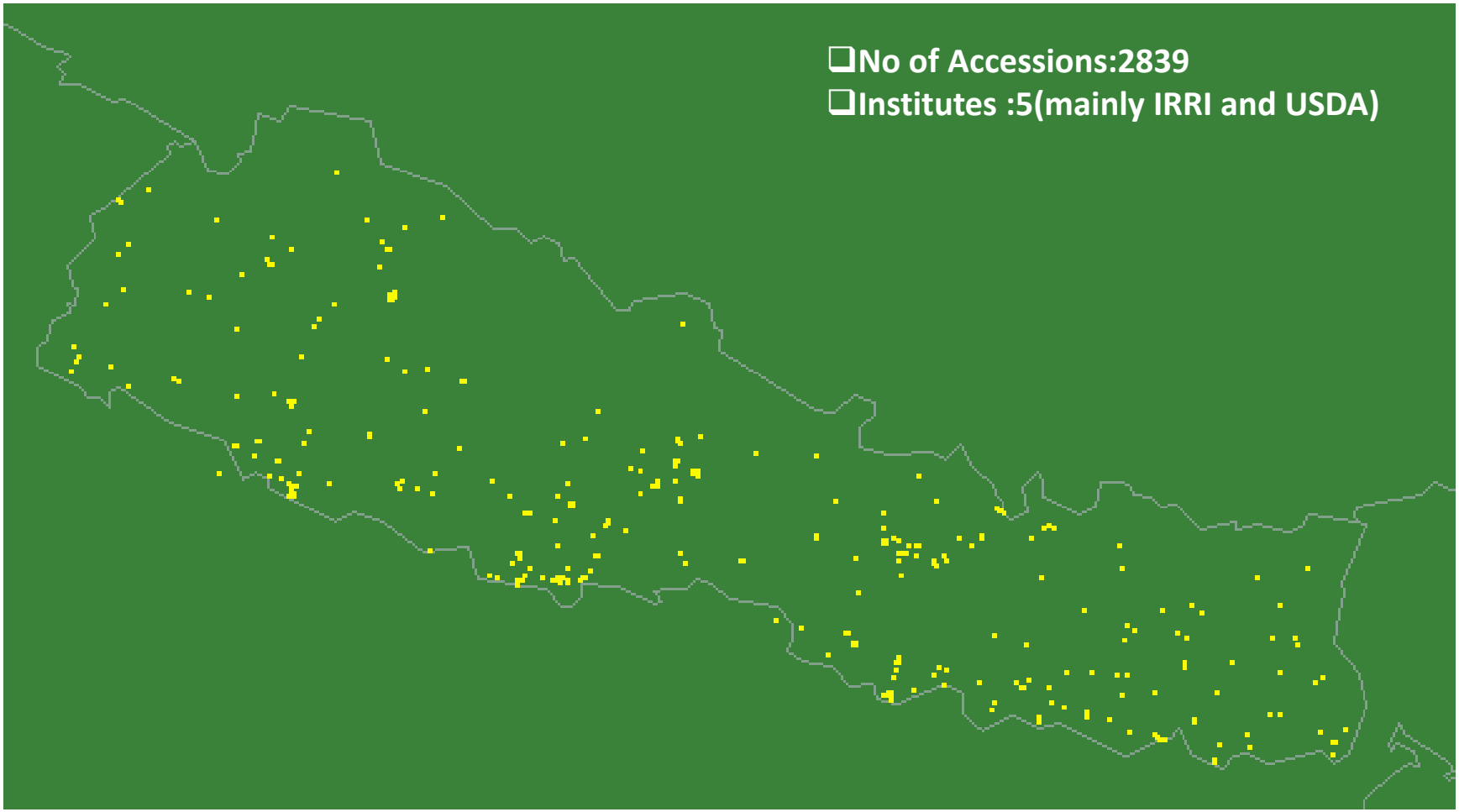
Accessible Global Crop Gene Pools



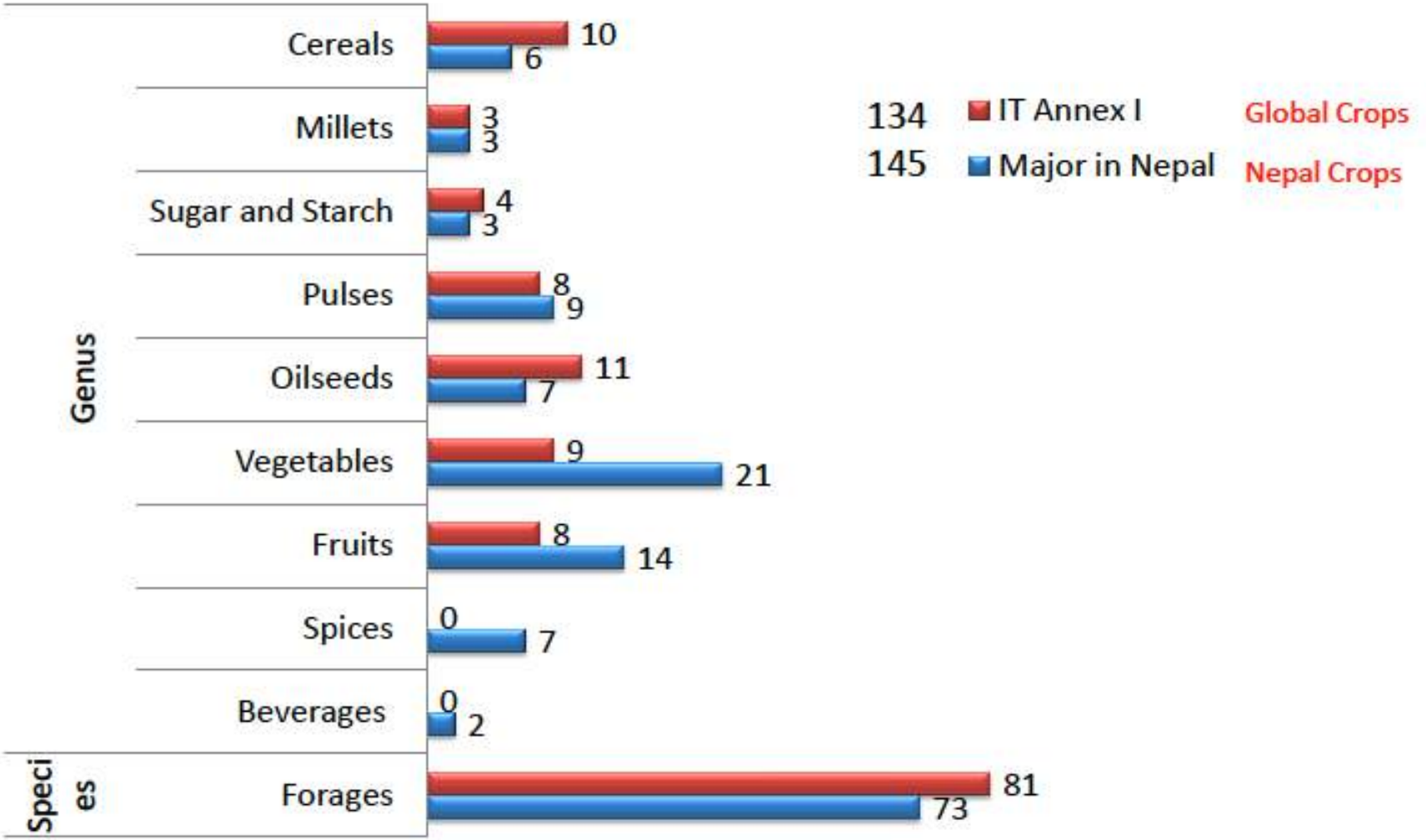
Nepalese Rice Accessions in Different Genebanks



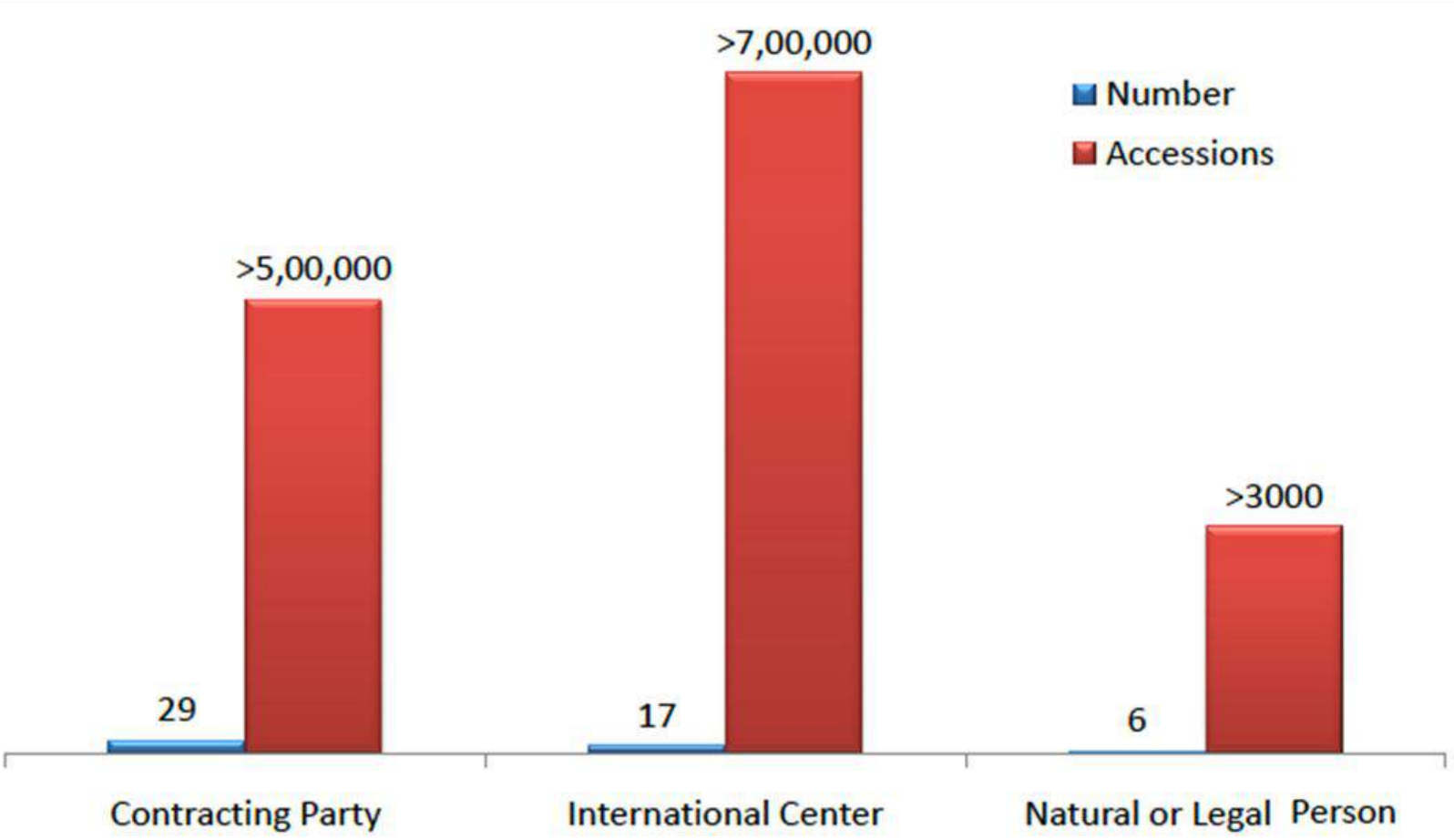
Nepalese Rice Accessions in GENESYS



Major Crops and Forages in Nepal and List in Annex-1



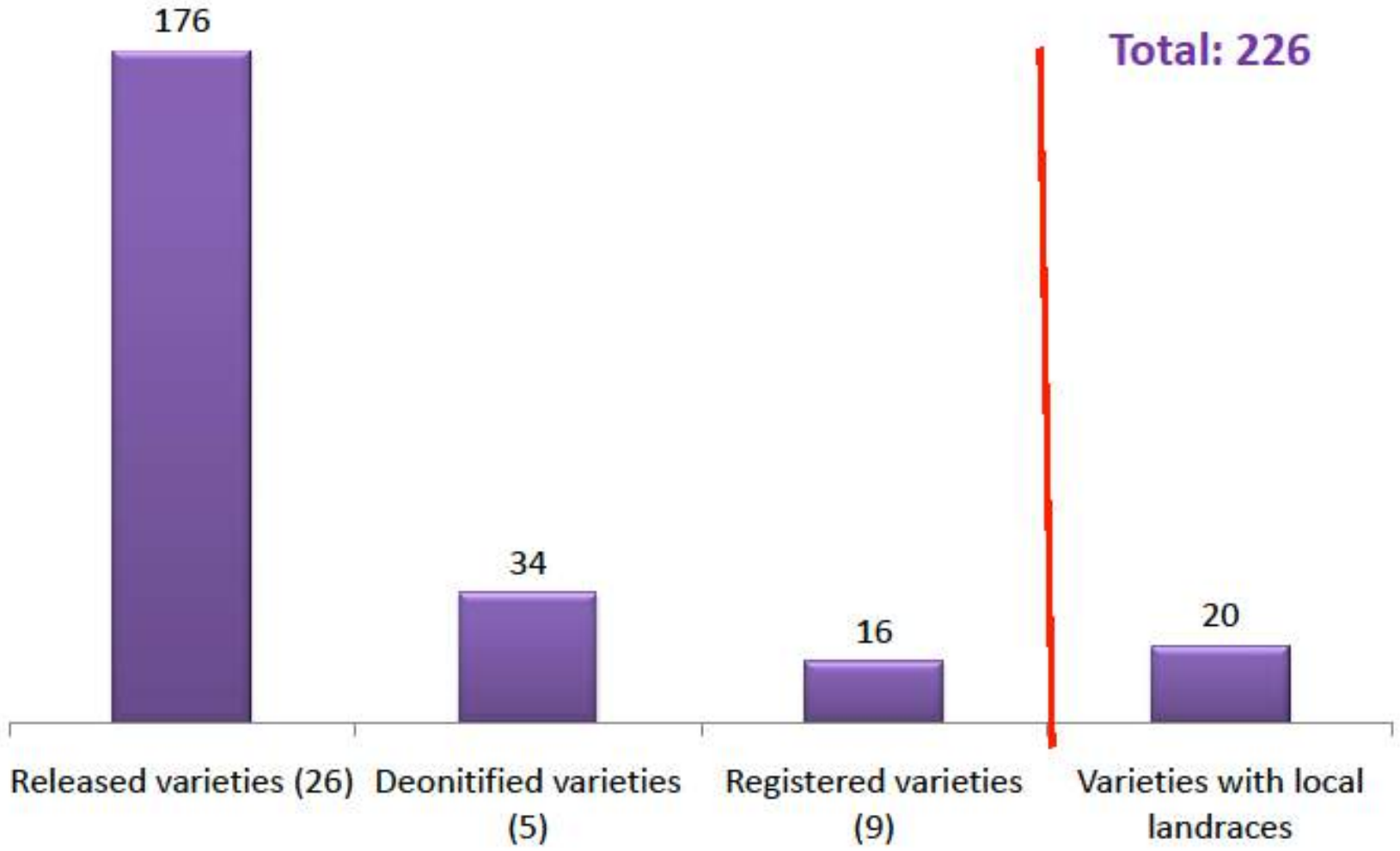
PGRFA included in the Multilateral System of Access and Benefit-sharing



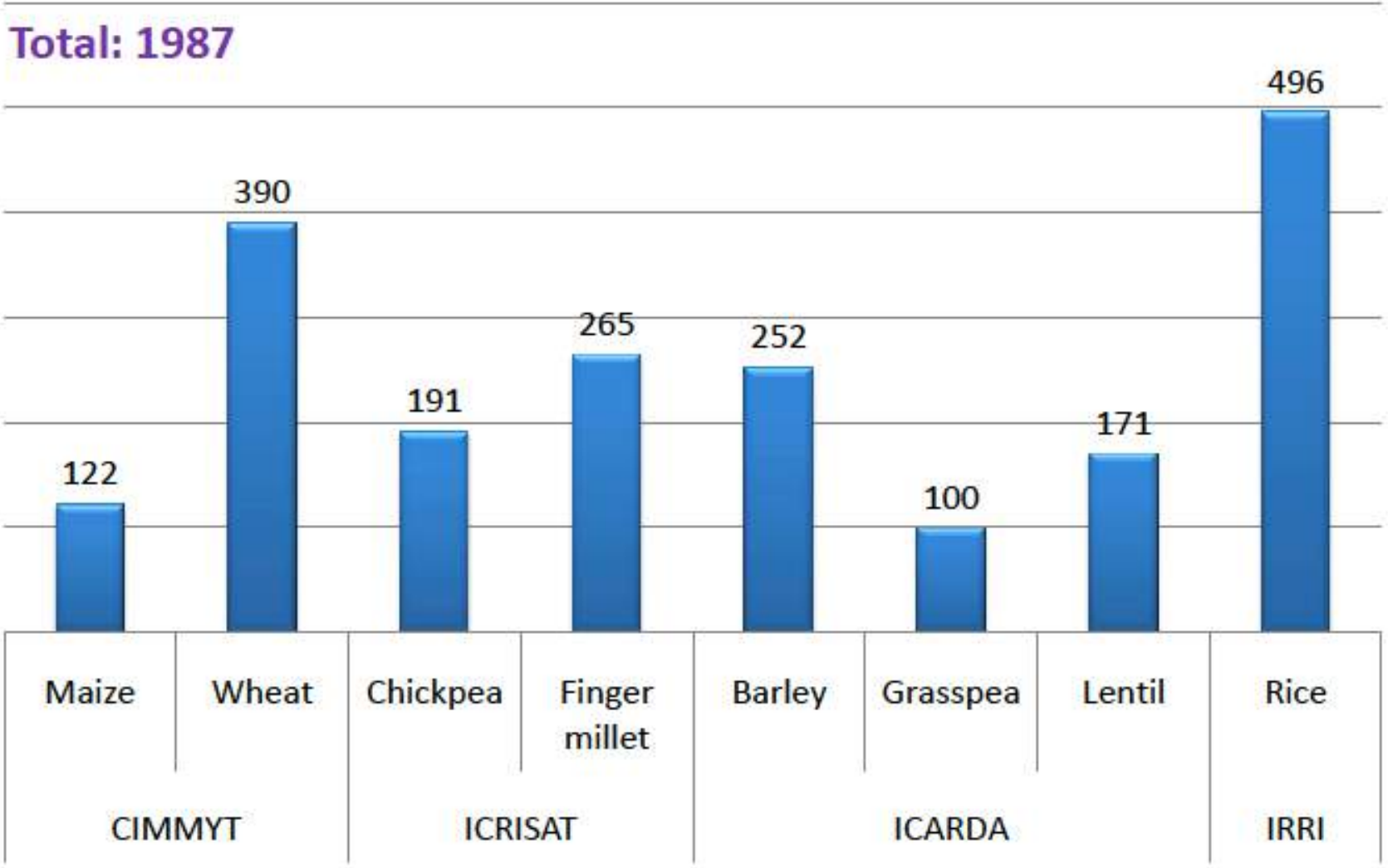
Nepal Annex-1 Crops

- **Nepal Annex-1 Crops: List of crop accessions to be included in the MLS**
- **Criteria:**
  - **Under public domain: (Geographical basis, Least study, Rare and endangered accessions, Less value, Localized, etc)**
  - **Released, Registered and De-notified Varieties**
  - **Accessions safety duplicated in CG Genebanks**
  - **Accessions that can contribute to Global food security**
  - **Accessions already in the foreign Genebanks**
  - **Materials under development including by farmers' shall be at the discretion of its developer (12.3)**
  - **Accessions that are being originated and maintain huge diversity in Nepal and with high economic value are not included**
  - **Mostly orthodox seed**

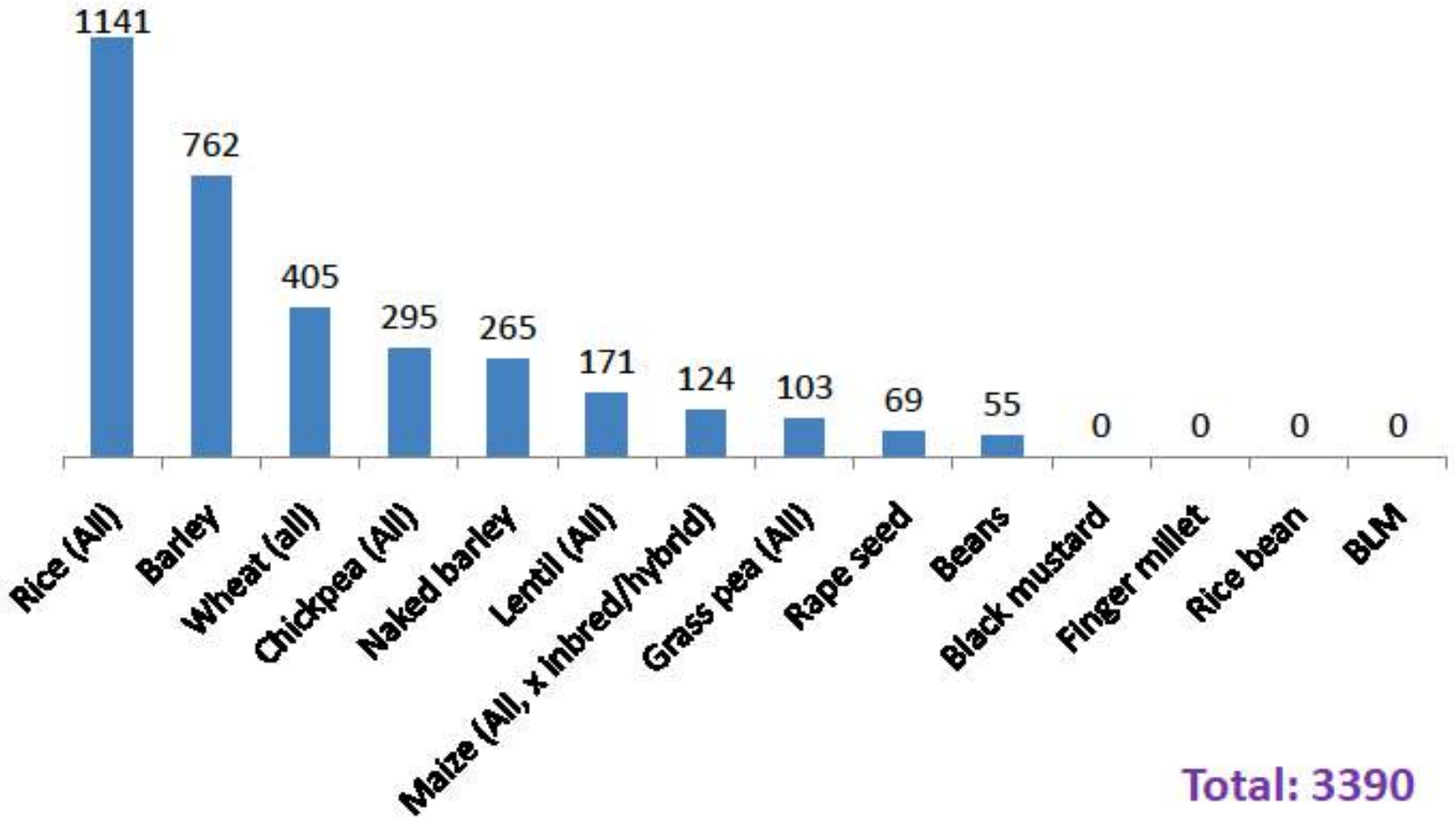
Released and Registered Varieties for Inclusion in the MLS



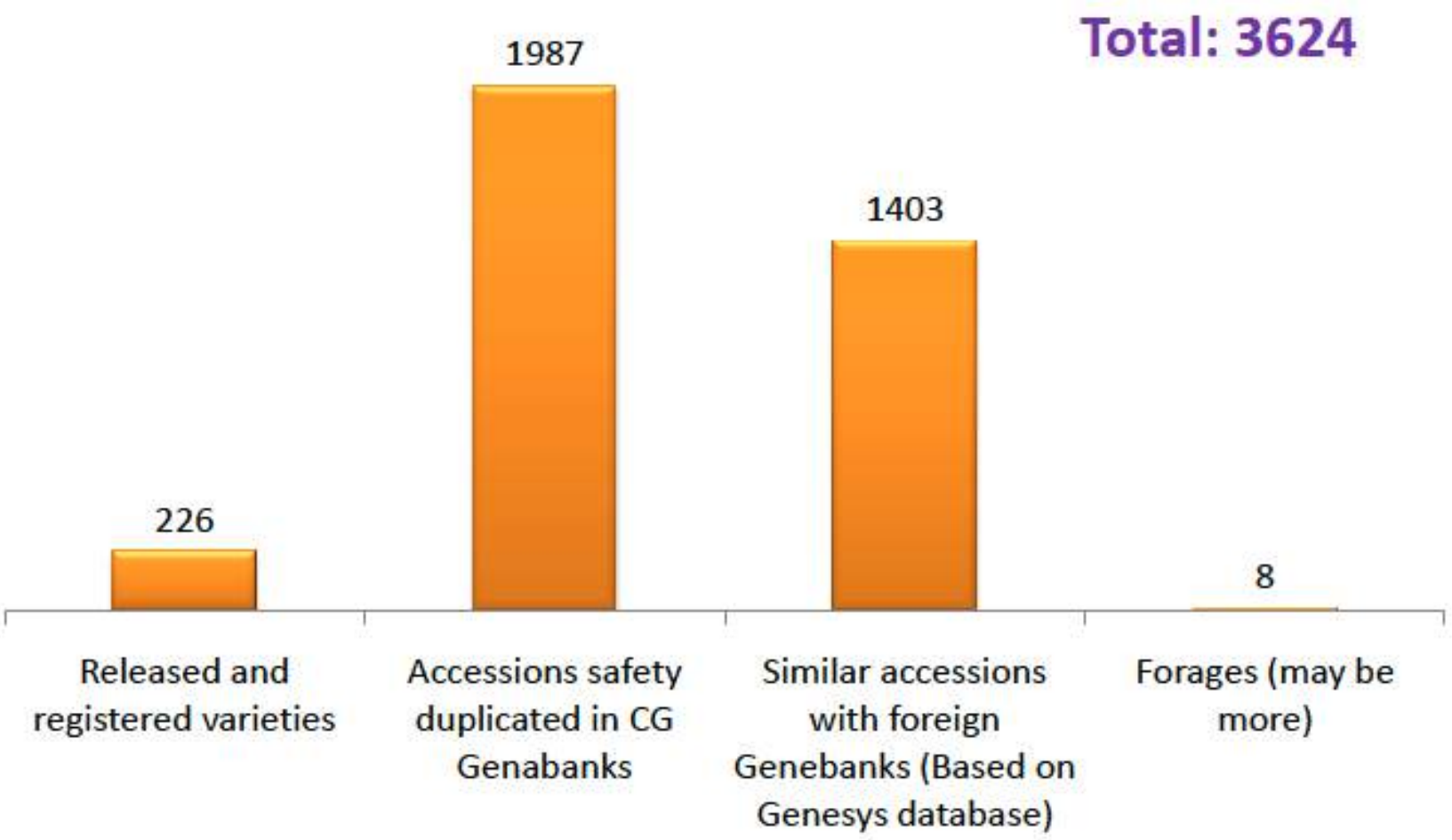
Safely Duplicated Accessions for Inclusion in the MLS



Matched Accessions with Foreign Genebanks for Inclusion in the MLS

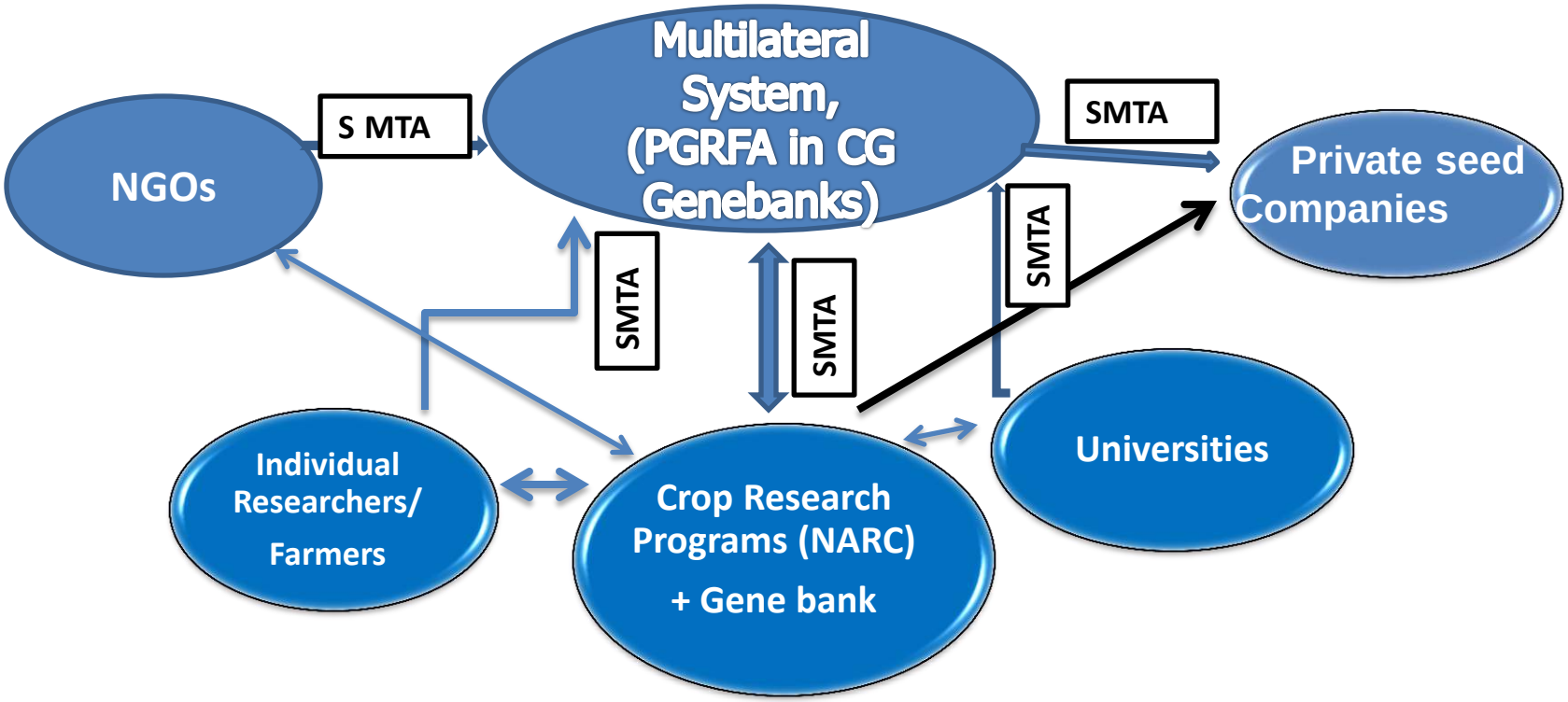


Total Nepalese Accessions Proposed for Inclusion in the MLS

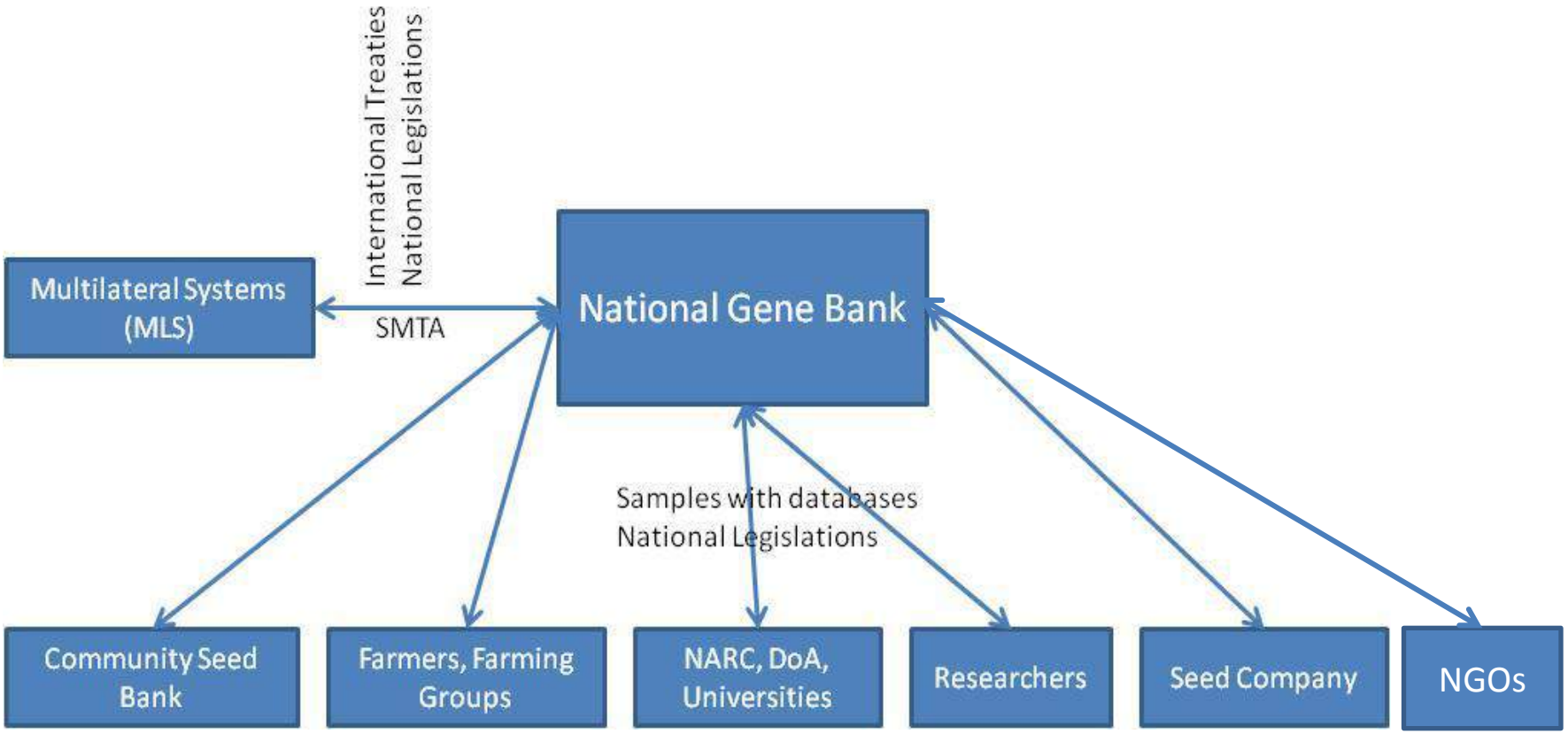


Existing system of MLS access of PGR in Nepal

➢**This system is in operation since 1970s and use of SMTA came into existence with the genesis of ITPGRFA in 2004**



Proposed Mechanism of Multilateral System



Opportunities and Challenges from the treaty for National and Community Seed banks and natural person

- Crop commodity research programs established during early 1970s
- Crop varieties developed so far are all public assets (all improved varieties including Lalka Basmati, Jethobudho etc)
- Nepal's PGRFA (with CG centers' genebanks) are easily access to Nepal
- PGRFA available at the national genebank are also easily access to any party for further use

Challenges

- Linking Community seed banks with national Genebank and MLS (Certificate of ownership, recognition to custodians)
- Mechanism of backup conservation of CSBs' PGR into national Genebank
- Material access to private parties
- IPR/Commercialization
- Strengthening National Plant Quarantine System
- Benefit sharing laws and mechanism of benefit sharing
- Conflict management

नमस्कार

Thanks

www.planttreaty.org