

Global Strategies for Safeguarding the Genetic Diversity of Food Legumes

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Introduction

The third largest family of flowering plants, Fabaceae or Leguminosae known as the legume, pea, or bean with over 20,000 species. It is a nutritious staple food of the world. It is a low-cost source of protein, fibre, carbohydrates, and vitamins. A *legume* is any plant from the Fabaceae family which include their leaves, stems, and pods. The edible seed of a legume plant is the *pulse*. It includes beans, lentils, and peas. The legume plant is often used as a cover crop or as a feed for livestock or green manure, while the seeds or pulses are used as food for man. Various Beans in their different forms like chickpea, kidney, pinto, black, navy are all one type of pulse. The Food and Agriculture Organization (FAO) declared 2016 as the International Year of Pulses that focused on the contribution of pulses in food production and nutritional diversity to reduce malnutrition and hunger. Legumes have several of traits that make them sustainable crop.

According to the FAO, benefit to dry environments where food security is often a challenge, drought-resistant species of legumes perform better. It will reduce wastage of food, because of its property to be stored in dried condition for longer periods without losing its nutritional properties. Legumes are representative crops from family Leguminosae and is

used as pulse, oilseed, fodder, green manure, medicinal, fibre, fruit, vegetable, seed vegetable and spices. Fodder Legumes: Lucerne, Egyptian clover, Cowpea and Rice bean.

Globally, the harvested area under pulse crops is about one-tenth the harvested area under all cereal crops and a high proportion of pulse area harvested is under rainfed-low input systems compared to cereal crops.

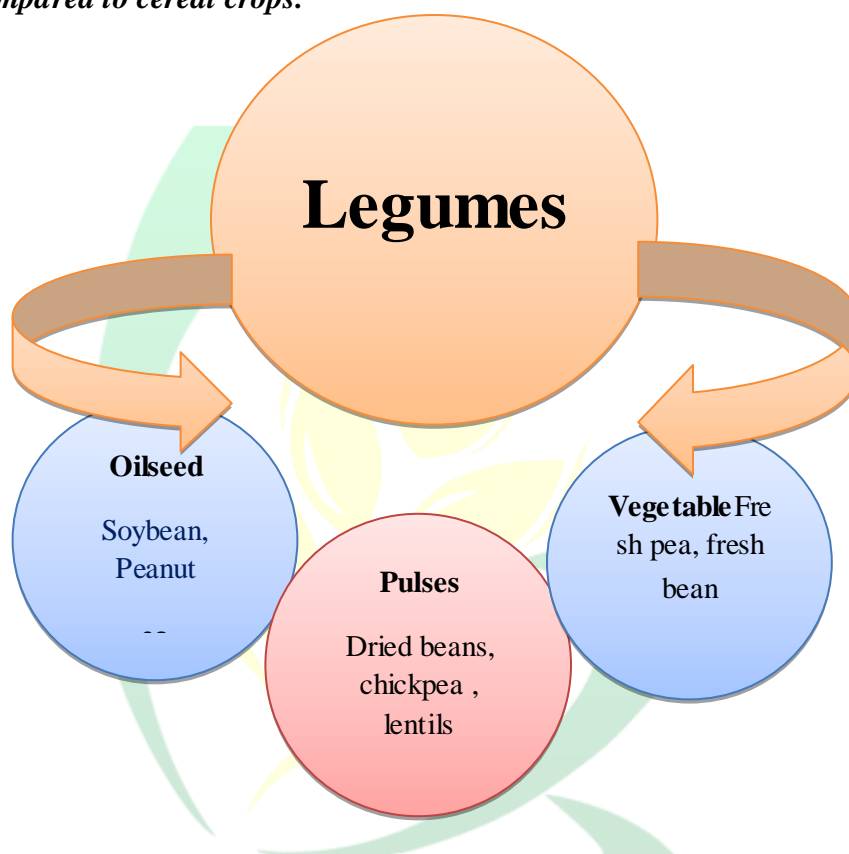


Fig 01. Legume classification

What is Crop Genetic Diversity?

- Genetic Diversity refers to both, the vast number of different species as well as diversity within the species.
- 2,50,000 flowering plant species approx. 200 have been domesticated, 25-30 crops of major world importance.
- The legume family is the third largest flowering plant family with approximately 650 genera and nearly 20,000 species.

Agriculture depends largely on genetic diversity within the species; the myriad of varieties developed over millennia by farmers and plant breeders.

Importance of Crop Genetic Diversity

- It is the foundation of current and future food and nutritional security.
- It is a key resource underpinning sustainable agricultural development and environmental protection.
- Crucial to the ability of agriculture to adapt to environmental and other changes.
- Major contributor in alleviating poverty.

Table 01: Center of Origin and Diversity of Important Food Legumes

Legume	Center of Origin	Center of Diversity
PULSES		
Pea	South western Asia	Central Asia, Near East Abyssinia, Mediterranean
Chick pea	Central Asiatic center	Indian center
Faba bean	Mediterranean	Afghanistan, Ethiopia
Mung bean	Central Asia	Hindustan region
Urid bean	Central Asia	Hindustan region
Pigeon pea	Indian Center	Indian center
Lentil	Middle East	Near Eastern Region, Asian region
OILSEEDS		
Soybean	Chinese center	Chinese and Japanese region
Groundnut	Brazil	Brazil, Bolivia, Paraguay, African region
FODDER		
Egyptian clover	Mediterranean center	Egyptian clover
Cow pea	Ethopia	African region
Rice bean	Indo-chinese region	Southern China

Why to safe guard the Genetic Diversity?

- Crop diversity is a raw material for improving and adapting crops to meet all the future challenges.
- Diversity is being lost and with it our ability to keep agriculture productive.

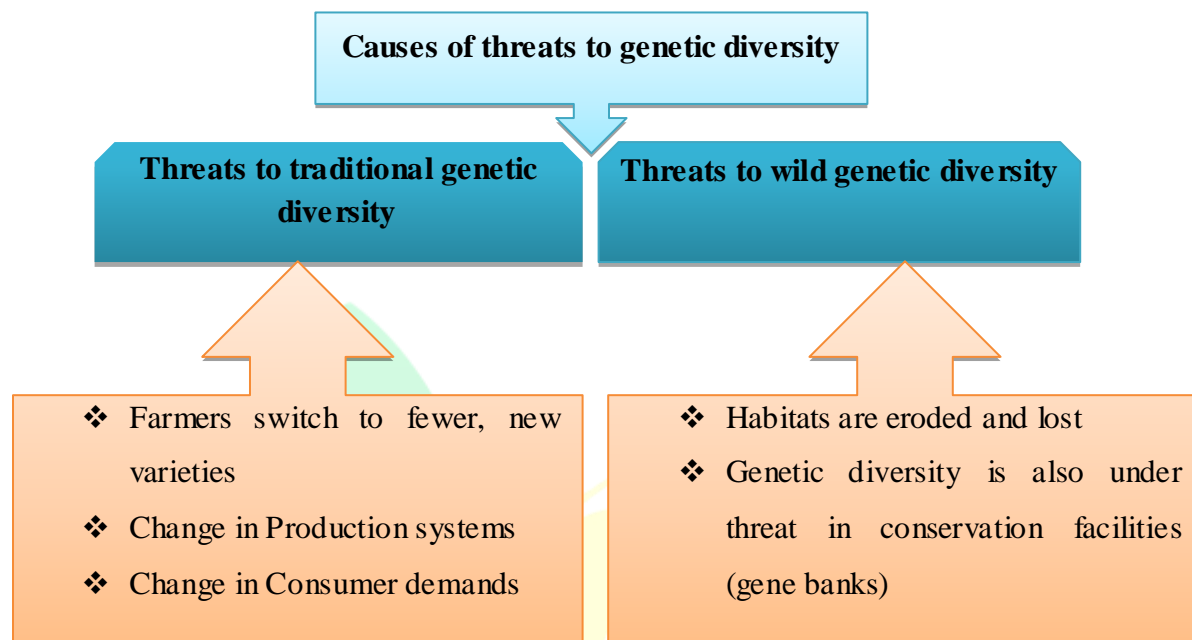


Fig 02: Global action plan for diversity conservation

Global action plan for diversity conservation



Fig 03: Global action plan for diversity conservation

***In-situ* conservation and development**

- ❖ Surveying and inventorying plant genetic resources for food legumes.
- ❖ Supporting on-farm management and improvement of plant genetic resources.
- ❖ Assisting farmers in disaster to restore agricultural systems.

- ❖ Promoting *in-situ* conservation of wild crop relatives, and wild plants for food legume production.

***Ex-situ* conservation**

- ❖ Sustaining existing *ex-situ* collections.
- ❖ Regenerating threatened *ex-situ* accessions.
- ❖ Supporting planned and targeted collecting of plant genetic resources for food legumes.
- ❖ Expanding *ex-situ* conservation activities.

Why- Need for *ex situ* conservation?

Both *in situ* and *ex situ* conservation are critically important but, play complementary roles. *Ex-situ* conservation is crucial. As a last resort “safety net”. For re-introduction to farms after loss, e.g. due to disasters (Afghanistan, Honduras, Somalia.) As a value-added resource for crop improvement and hence socio-economic development.

Global Crop Diversity Trust

A joined initiative of FAO and future harvest center of the Consultative Group on International Agricultural Research (CGIAR). Independent fund had been established under international law. There should be a Private-public partnership.

Functions of the Trust

The trust is a part of finding the strategy of the international treaty on plant genetic resources for food and agriculture. Germplasm collection in developing countries. Funds will also support upgrading collections and build the capacity of the national gene bank in developing countries. Its Ultimate goal is to support- forever-the conservation of a rational global system of *ex situ* plant genetic conservation of resources.

The trust’s strategic moves towards more rational *Ex-Situ* Conservation

- ❖ Widely used as a key resource for food security and sustainable development.
- ❖ Regionally and internationally important.
- ❖ Cover the major part of the gene pool of the crops concerned.
- ❖ Viable and healthy.

- ❖ Available under the terms of the international treaty.
- ❖ Maintained by institutions committed to their long-term conservation.
- ❖ Well documented and the information about them is freely and widely available.
- ❖ Duplicate in at least one other location for safety.

Table Agencies Engaged in Plant Breeding

Agencies	Country	Crops
Asian vegetable Research and Development Center (AVRDC)	Taiwan	Soybean & Mung bean
International Center for Agriculture Research in Dry Areas (ICARDA)	Syria	Chick pea, faba bean, tropical forages, lentil
International center for Tropical Agriculture (CIAT)	Colombia	Dry beans and tropical forages
International Crop Research Institute for the Semi-Arid Tropics (ICRISAT)	India	Chickpea, pigeon pea
International Institute of Tropical Agriculture (IITA)	Nigeria	Cowpeas, lima bean, pigeon pea, soybean, winged bean

Conclusion

Genetic diversity underpins agriculture and food security throughout the World – and is especially important as a resource for development. *Ex-situ* conservation is vitally important, yet many collections are highly threatened, especially in developing countries. The Global Crop Diversity Trust is a private-public partnership that aims to raise and distribute funds to ensure the survival of the world's most important collections. Trust supporting the development of strategies for increasing the efficiency and effectiveness of conservation. If successful, the trust will bring multiple benefits to the farmer's plant breeders and ultimately to everyone throughout the world.

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