

## Exploration and Utilization of Germplasm of Vegetables Crops

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### **Introduction:**

As agriculture is becoming more and more intensive and location specific, breeding objectives are becoming more and more complex. Besides high yield, a modern variety is often expected to combine specific duration, nutritional attributes, adoption to varying soil and water regimes and resistance to insects/diseases. To meet these objectives, a wide range of germplasm must exist, and the breeder should be able to explore and utilize the germplasm.

### **Exploration:**

Explorations are trips for the purpose of collection of various forms of crop plants and their related species. Explorations generally cover those areas that are likely to show the greatest diversity of forms. The centres of origin are such areas. Exploration is the primary source of all the germplasm maintained in germplasm collections.

An expedition has to be meticulously planned. It must be based on a sound knowledge of biosystematics of the genera and species to be collected. A genetic reserve sample should contain the fullest possible representation of genetic variability of the target population.

Before launching a collection mission, it is necessary to:

- Survey the past effort and current status of conservation of germplasm of crop (s)
- Set up the bases of crop geography, biosystematics and ecology.
- Formulate sampling strategy
- Constitute an effective team comprising trained scientist and
- Arrange adequate funding and other logistic approach including full involvement of the host country if the collection is to be made abroad

The exploration and collection is a highly scientific process. This includes:

1. **Sources of collection:** Five important sources of germplasm collection viz. centre of diversity, gene banks, gene sanctuaries, seed companies and farmers fields
2. **Priority of collection:** Endangered areas and endangered species should be given priority for germplasm collection.
3. **Agencies of collection:** For indigenous collections, collection is undertaken by crop research institutes and state agricultural universities in collaboration with NBPGR, New Delhi. For global collection, it is done with the help of IBPGR, Rome.
4. **Methods of collection:** Four methods can be employed for collection i) Through expedition to the areas of genetic diversity ii) by personal visit to gene bank iii) through correspondence iv) through exchange of material
5. **Methods of sampling:** Two sampling methods are there. Random sampling is effective in capturing of alleles for biotic and abiotic stresses whereas non random/biased sampling is useful in collection of morphologically distinct genotypes. It is advised to adopt both methods to top maximum genetic diversity.
6. **Sample size:** As wide as possible range of habitats should be sampled for capturing maximum genetic diversity

#### **Merits of Exploration & Collection:**

1. It reduces the loss of genetic diversity due to genetic erosion
2. Sometimes, we get material of special interest during exploration trips
3. Sometime, we come across a new plant species

#### **Demerits:**

1. Collection of germplasm from other countries, sometimes leads to entry of new diseases, new insects and new weeds
2. It is a tedious job

#### **Conservation:**

Conservation refers to protection of genetic diversity of crop plants from genetic erosion.

- ✚ **In-situ Conservation:** Conservation of germplasm under natural conditions is referred to as in-situ conservation
- ✚ **Ex-situ Conservation:** It refers to preservation of germplasm in gene banks. It is most practical method.

**Maintenance of germplasm:**

If the germplasm is maintained correctly, the genetic constitution of the population at the same time of its collection should be preserved. Nevertheless, the maintenance of genetic integrity depends on how closely population genetics theory, biological, ecological and agricultural properties of the collections.

**Evaluation:**

The evaluation of germplasm can be done in field, green house and laboratory. It is essential

1. To identify gene sources for resistance to biotic and abiotic stresses earliness, dwarfness, productivity and quality characters
2. To classify the germplasm in various groups

**Utilization:**

The germplasm can be utilized in various ways:

**Cultivated germplasm:** It can be used in three main ways:

1. As a variety
2. As a parent in the hybridization and
3. As a variant in the gene pool

Some germplasm lines can be released directly as varieties after testing. In some cases, new variety is developed through selection from collections. Some lines are not useful as such, but have some special characters, such as disease resistance, good quality or wider adaptability. By hybridization, these characters can be transferred in commercial varieties by incorporating such germplasm in crosses

**Wild germplasm:**

The wild germplasm is used to transfer resistance to biotic and abiotic stresses, wider adaptability and sometimes quality such as fibre strength in cotton. Utilization of wild germplasm poses three main problems

1. Hybrid inviability – inability of a hybrid to survive
2. Hybrid sterility – inability of a hybrid to produce off-springs
3. Linkage of undesirable characters with desirable ones

Thus, utilization of wild germplasm for crop improvement is a difficult task.