RAMA UNIVERSITY

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FACULTY OF AGRICULTURAL SCIENCES AND ALLIED INDUSTRIES

Methods of breeding: Introduction and Acclimatization

The following are the methods of breeding for autogamous plants:

1. Introduction
2. Selection
   a) Pure line selection
   b) Mass selection
3. Hybridization and selection
   i) Inter varietal
   a) Pedigree Method
   b) Bulk Method.
   c) Single Seed Descent Method.
   d) Modified Bulk Method
   e) Mass - Pedigree Method.

ii) Interspecific hybridization

4. Back cross method
5. Multiline varieties
6. Population approach
7. Hybrids.
8. Mutation breeding
9. Polyploidy breeding
10. Innovative techniques

I. Plant introduction

Taking a genotype or a group of genotypes in to a new place or environment where they were not grown previously. Thus introduction may involve new varieties of a crop already grown in that area, a wild relative of the crop species or totally a new crop species for that area. E.g. a) Introduction of lRRl rice varieties.. b) Introduction of sunflower wild species from Russia c) Introduction of oilpalm in to Tamil Nadu.

Plant introduction may be of two types.

1. **Primary Introduction**

2. Secondary Introduction

1. Primary Introduction: When the introduced crop or variety is well suited to the new environment, it is directly grown or cultivated without any alteration in the original genotype. This is known as primary introduction. E.g. IR. 8, IR 20, IR 34, IR 50 rice varieties; oil palm varieties introduced from Malaysia and Mashuri rice from Malaysia.

2. Secondary Introduction: The introduced variety may be subjected to selection to isolate a superior variety or it may be used in hybridization programme to transfer some useful traits. This is known as secondary Introduction.E.g. In soybean EC 39821 introduced from Taiwan is

subjected to selection and variety Co 1 was developed. In rice ASD 4 is crossed with IR 20 to get Co 44 which is suited for late planting.

Objectives of Plant Introduction:

- To introduce new plant species there by creating ways to build up new industries.
- To introduce high yielding varieties to increase food production. E.g. Rice and wheat.
- To enrich the germplasm collection. E.g. Sorghum, Groundnut.
- To get new sources of resistance against both biotic and abiotic stresses.
- Aesthetic value – ornamentals are introduced for aesthetic value.

Plant Introduction Agencies

Most of the introductions occurred very early in the history. In earlier days the agencies were invaders travelers, traders, explorers, pilgrims and naturalists Muslim invaders introduced in India cherries and grapes. Portuguese introduced maize, ground nut, chillies, potato, sweet potato, guava, pine apple, papaya and cashew nut. East India Company brought tea. Later Botanic gardens played a major role in plant Introduction. A centralized plant introduction agency was initiated in 1946 at IARI, New Delhi. During 1976 National Bureau of Plant Genetic Resources (NBPGR) was started. The bureau is responsible for introduction and maintenance of germplasm of agricultural and horticultural plants. Similarly Forest Research Institute, Dehradun has a plant introduction organization, which looks after introduction, maintenance and testing of germplasm of forest trees. Besides

NBPGR the Central Research Institutes of various crops also maintain working germplasm. All the introductions in India must be routed through NBPGR, New Delhi. The bureau functions as the central agency for export and introduction of germplasm. At International level International Board of Plant Genetic Resources (IBPGR) with head quarters at Rome, Italy is responsible for plant introduction between countries. Procedure for plant Introduction The scientist / University will submit the requirement to NBPGR. If the introduction is to be from other countries, NBPGR will address IBPGR for effecting supply. The IBPGR will assign collect the material from the source and quarantine them, pack them issue phytosanitary certificate suitably based on the material and send it to NBPGR. The NBPGR will assign number for the material, keep part of the seed for germplasm and send the rest to the scientist. There are certain restrictions in plant introduction. Nendran banana from Tamil Nadu should be not be sent out of state because of bunchy top disease. Similarly we cannot import Cocoa from Africa, Ceylon, West Indies, Sugarcane from Australia, Sunflower from Argentina.

Functions of NBPGR

1. Introduction maintenance and distribution of germplasm
2. Provide information about the germplasm through regular publications.

3. Conduct training courses to the scientist with regard to introduction and maintenance of germplasm.
4. Conduct exploratory surveys for the collection of germplasm.
5. To set up Natural gene sanctuaries.

Merits of plant introduction

1. It provides new crop varieties, which are high yielding and can be used directly
2. It provides new plant species.
3. Provides parent materials for genetic improvement of economic crops.
4. Enriching the existing germplasm and increasing the variability.
5. Introduction may protect certain plant species in to newer area will save them from diseases. E.g. Coffee and Rubber.

Demerits

1. Introduction of new weed unknowingly.E.g. Argemone mexicana, Eichornia and Parthenium
2. Introduction of new diseases: Late blight of potato from Europe and Bunchy top of banana from Sri Lanka
3. New pests: Potato tuber moth came from Italy
4. Ornamentals becoming weeds: Lantana camara
5. Introduction may cause ecological imbalance E.g.Eucalyptus.

Acclimatization

When superior cultivars from neighbouring or distant regions are introduced in a new area, they generally fail initially to produce a phenotypic expression similar to that in their place of origin. But later on they pickup and give optimal phenotypic performance, in other words they become acclimatized to the new ecological sphere. Thus acclimatization is the ability of crop variety to become adapted to new climatic and edaphic conditions. The process of acclimatization follows an increase in the frequency of those genotypes that are better adapted to the new environment. The success of acclimatization depends upon two factors i) Place effect ii) Selection of new genotypes.