**PLANT INTRODUCTION**

**Definition of Plant Introduction**:

Plant introduction is a process of introducing plants (a genotype or a group of genotypes) from their own environment to a new environment. The process of introduction may involve new varieties of crop or the wild relatives of crop species or totally a new crop species for the area. Plant introduction refers to transposition of crop plants from the place of their cultivation to such areas where they were never grown earlier. In other words, it is the process of introducing crop plants into new areas. The place from where the variety or plant material is taken and the place where the material is introduced differ in agro climatic conditions. Plant introduction is an ancient method of crop improvement.

The main points related to plant introduction are briefly discussed below:

1. **Application:** Plant introduction is an oldest method of crop improvement. It is used in all three groups of crops, viz. self-pollinated, cross pollinated and asexually propagated. In other words, this method is applicable to all three types of crop species.

2. Plant introduction is usually done from one country to other. But sometimes it may take place between two climatic regions of the same country.

3. **Means of Introduction**: Earlier, the introduction of plants from one place to another used to be done by travellers, traders, invaders and merchants. Now specific organizations have been established for this work.

4. The plant material is obtained through expeditions, personal visit, correspondence, and ex­change of material, purchase or as a gift.

5. The material of seed propagated crops is introduced in the form of seed and that of vegetatively propagated crops in the form of cuttings or propagules.

6. Sources of Introduction: There are five important sources of plant collections: viz.:

(i) Centres of diversity,

(ii) Gene banks,

(iii) Gene sanctuaries,

(iv) Seed companies, and

(v) Farmers’ fields.

**2. Types of Plant Introductions:**

Plant introductions are generally classified on the basis of adaptation and utilization.

Based on adaptation, introductions are of two types, viz.:

(1) Primary introductions, and

(2) Secondary introductions.

Based on utilization, again introduction are of two types, viz.:

1. Direct introduction: new variety takes no time for establishment.
2. Indirect Introduction: New variety takes sometime for establishment.

**A brief description of each type is presented as follows:**

**(1) Primary Introduction:**

Introduction that can be used for commercial cultivation as a variety without any change in the original genotype is referred to as primary introduction. There are several crops in which direct use of introduced material has been successful. In wheat, varieties Sonora 64, Lerma Rojo are examples of direct release of introduced material in India.

These varieties were introduced from Mexico and released directly for commercial cultivation in India. Similarly in semi-dwarf rice varieties Taichung Native 1, IR 8. IR 20 and IR 36 are examples of primary Introduction. Many such examples can be cited from other field crops and fruit crops.

Introductions that are immediately adapted to the changed environment are known as direct introductions. Thus primary introduction can also be called as direct introduction. Any foreign variety which is directly recommended for commercial cultivation in the new environment (country) is called exotic variety.

(2) Secondary Introduction:

Introduction that can be used as a variety after selection from the original genotype or used for transfer of some desirable gene to the cultivated variety is known as secondary introduction.

In wheat, varieties Kalyan Sona and Sonalika were released after selection from the material received from Mexico. Several examples can be cited from other crops. Secondary introduction is more common than primary introduction. Those introduction that take some years for adaptation to the new environment are termed as indirect introductions. Thus secondary introduction can also be called as indirect introduction.

3. Purpose of Plant Introduction:

Plant material is introduced for five main purposes, viz.:

(1) Economic use,

(2) Study of origin and evolution of crop plants,

(3) Conservation of diversity,

(4) Genetic improvement of crop plants, and

(5) Aesthetic interest.

These aspects are briefly discussed below:

(1) **Economic Use**:

Various agricultural crops are introduced for use as new sources of food, vegetables, oil, fibre, wood or timber and fruits. In other words, new field crops, horticultural crops, forest species and medicinal plants are introduced from other countries.

(2) **Study of Origin and Evolution**:

Plant introduction also helps in the study of origin and evolution of crop plants. The distribution of crop plants and their wild relatives, in different geographical regions through light about their geographical origin, based on collection of crop plants from different regions of the world; Vavilov gave idea of centres of origin of cultivated species and other workers identified progenitors of different crop plants.

(3) **Conservation of Diversity**:

The genetic diversity of crop plants is gradually being eroded due to clean cultivation, deforesting, development of township and various other factors. Introduction and collection of crop plants is useful in conservation of crop genetic diversity and saving certain species from extinction.

(4) **Use in Hybridization**:

New plants are also introduced for genetic improvement of crop plants. Introduced material is used in breeding programmes for transferring desirable characters to the cultivated species.

(5) **Aesthetic Interest**:

Various flowering plants are introduced for beautification of gardens, parks, offices, houses, bungalows and roads in big cities. New ornamental plants are introduced for this purpose.

4. Procedure of Plant Introduction:

In India, plant Introduction for different crop plants is carried out by NBPGR, New Delhi. The indenor has to provide details about the plant material to be introduced and the place from where material has to be introduced to the NBPGR. Then NBPGR with the help of IPGRI arranges introduction of such material.

The sender has to issue phytosanitary certificate along with the material. This certificate indicates that the material is free from insects, diseases and weed seeds. The imported material is examined by quarantine department for the absence of diseases, pests and weed seeds before supplying to the users.

The material of seed propagated species is imported in the form of seed and those of asexually propagated species in the form of cuttings or propagules. Thus export and import of plant material is coordinated by NBPGR.

5. Organizations of Plant Introduction:

There are two types of organizations, viz. international and National, which deal with Plant Introduction. International Plant Genetic Resources Institute (IPGRI) located at Rome, Italy deals with Introduction of plant material on global level. Various International crop research Institutes also undertake Plant Introduction work in collaboration with IPGRI.

In India, plant Introduction work is undertaken by National Bureau of Plant Genetic Resources (NBPGR), New Delhi. NBPGR deals with the introduction of Agricultural and Horticultural crops.

In India, two more organizations, viz.:

(1) Forest Research Institute (FRI), Dehradun, and

(2) Botanical Survey of India (BSI), Kolkata, are also concerned with plant introduction work.

FRI deals with introduction of forest trees, whereas Botanical Survey of India is concerned with introduction of Medicinal and Botanical Plants. Various crop research institutes also introduce plant material but only through National Bureau of Plant Genetic Resources, New Delhi. Thus, NBPGR coordinates the work of Plant Introduction in India.

6. Uses of Plant Introductions:

Plant introductions are utilized in crop improvement in three main ways: viz.:

(1) Direct as a variety,

(2) As a variety after selection, and

(3) As a parent in the hybridization for the development of improved variety.

(1) As a Variety:

In some crops, the introduced material is directly released as a new variety. Examples of direct release of introduced material in India, include semi-dwarf varieties Sonora 64 and Lerma Rojo in wheat; semi-dwarf, Taichung Native 1, IR 8, IR 20 and IR 36 varieties in paddy; Bragg and Lee varieties in soybean. There are many more examples where introduced material was found of direct use and released as new variety for commercial cultivation.

(2) As a New Variety after Selection:

Sometimes, the introduced material is not found useful as such. In such case efforts are made to develop new varieties through selection. There are several crops in which new varieties have been developed through selection from introductions.

For example, in Egyptian cotton, variety Sujata was released after selection from the Egyptian variety Karnak, in Amercian cotton, variety PRS 72 was released after selection from Russian material, in wheat varieties Kalyan Sona and Sonalika are the result of selection from Maxican wheat introductions. Similarly, new varieties have been developed through selection from the introductions in pearl-millet (improved Ghana), cowpea, radish, sweet potato and many other crops.

(3) As a Parent in Hybridization:

Introductions are widely used as parents in the hybridization programmes for the development of new varieties in almost all important agricultural and horticultural crops. For example, all semi-dwarf varieties of wheat and paddy have been developed through the use of introduced material. Many varieties and hybrids in maize, Sorghum, and pearl-millet have been developed involving introduced material as one of the parents. The pioneer cotton hybrid H 4 has been developed form a cross between Gujarat 67 x American nectariless. Here the male parent is an introduction from America. Many other such examples can be cited.

7. Merits and Demerits of Plant Introduction:

Plant Introduction as a method of crop improvement has several merits and demerits which are briefly presented below:

Merits:

1. It is a very easy and quick method of developing new varieties especially when intro­duced material is used directly as a variety or after selection.

2. This method is useful in introducing new crop plants. For example, crops like maize, potato, tomato, groundnut, papaya, pineapple, triticale, etc. were introduced in India from other countries.

3. This is good method of collection and conservation of germplasm of different crops to protect the same from genetic erosion.

4. This is an effective method of conserving those crop species which have been threatened by the danger of extinction. Such species can be saved by shifting them to other areas.

5. This method is applicable in all self-pollinated, cross pollinated and vegetatively propagated crops.

Demerits:

The main demerit of this method is that there are chances of the entry of new diseases, insects and weeds in the country along with the introduced material. For example, Argimone mexicana weed, late blight of potato, bunchy top of banana, and coffee rust disease, and woolly aphis of apple and potato tuber moth insects were introduced in India along with introduced material. However, all these entered before the establishment of quarantine organization. Now chances of entry of new insects, diseases and weeds are remote due to quarantine regulations and checkup.

Some major examples of Introduction

Rice, Wheat, Sorghum, Ground nut, Oil palm