Centres of Diversity

Vavilovian Centres and Types for Crop Plants

1. Vavilovian Centres of Diversity

2. Types of Centres of Diversity.

Centre of diversity refers to the geographic region in which greatest variability of a crop occurs. A primary centre of diversity is the region of presumed origin, and secondary centres of diversity are regions of high diversity which have developed as a result of subsequent spread of a crop.

Vavilovian Centres of Diversity:

N.I. Vavilov (1926, 1951), a Russian geneticist and plant breeder, was the pioneer man who realized the significance of genetic diversity for crop improvement. Vavilov and his colleagues visited several countries and collected cultivated plants and their wild relatives for use in the Russian breeding programme to develop varieties for various agro-climatic conditions of USSR.

Based on his studies of global exploration and collection, Vavilov proposed eight main centres of diversity and three subsidiary centres of diversity given as follows:

1. Main Centres:

Main centres of crop diversity as proposed by Vavilov are:

(i) China,

(ii) India (Hindustan),

(iii) Central Asia,

(iv) Asia Minor or Persia,

(v) Mediterranea,

(vi) Abyssinia,

(vii) Central America or Mexico, and

(viii) South America.

2. Subsidiary Centres:

There are three subsidiary centres of diversity.

These are:

(i) Indo-Malaya,

(ii) Chile, and

(iii) Brazil and Paragua.

All these centres are known as centres of origin or centres of diversity or Vavilovian centres of diversity.

Vavilov could not adequately cover Africa. Moreover, Australia was not covered. These two continents have tremendous wealth of crop genetic diversity of several crop plants.

The main differences between centres of origin and centres of diversity are given below:

i. Centres of origin are geographical areas where crop plants have originated.

ii. A centre of diversity refers to a location where vast genetic variability for a crop and its wild species is found.

Thus, the centre of origin and centre of diversity for a crop may the same or may be different.

Types of Centres of Diversity:

The centres of crop diversity are of three types viz.:

(1) Primary centres of diversity,

(2) Secondary centres of diversity, and

(3) Micro-centres.

TABLE 4.1

Vavilovian centres of diversity of crop plants (after Vavilov, 1951)

Name of centre	*Main crops for which genetic diversity is found*
A. Main Centres	
1. China	Naked oat (SC), Soybean, Adzuki bean, Common bean (SC), Small Bamboo, Leaf Mustard (SC), Apricot, Peach, Orange, Sesame (SC), China tea, etc.
2. Hindustan	Rice, ChickPea, Moth Bean, Rice bean, Horsegram, Brinjal, Cucumber, Tree Cotton, Jute, Pepper, African Millet, Indigo, etc.
3. Central Asia	Bread wheat, Club wheat, Shot wheat, Rye (SC), Pea, Lentil, Chickpea, Sesame, Flax, Safflower, Carrot, Radish, Apple, Pear and Walnut.
4. Asia Minor or Persia	Einkorn wheat, Durum wheat, Poulard wheat, Bread wheat, Two Rowed barley, Rye, Red oat, Chickpea (SC) lentil, Pea (SC), Flax, Almond, Pomegranate, Pistachio, Apricot and Grape.
5. Mediterranea	Durum wheat, Husked oats, Cabbage, Olive, Broad bean and Lettuce.
6. Abyssinia	Durum wheat, Poulard wheat. Emmer wheat, Barley, Chickpea, Lentil, Pea, Flax. Sesame, Castor bean, African Millet, and Coffee.
7. Central America or Mexico	Maize, Common bean, Upland cotton, Pumpkin, Gourd, Squash, Sisal hemp and Pepper.
8. South America	Potato, Sweet potato, Lima bean, Tomato, Papaya, Tobacco and Sea Island cotton.
B. Subsidiary Centres	
9. Indo-Malaysia	Banana, Coconut, Yam, and Pomelo
10. Chile	Potato.
11. Brazil and Paraguay	Peanut, Rubber Tree, Cocoa (SC), Pineapple, etc.

SC = Secondary centre.

These are briefly discussed below:

(1) Primary Centres of Diversity:

Primary centres are regions of vast genetic diversity of crop plants. These are original homes of the crop plants which are generally uncultivated areas like, mountains, hills, river valleys, forests, etc.

Main features of these centres are given below:

i. They have wide genetic diversity.

ii. Have large number of dominant genes.

iii. Mostly have wild characters.

iv. Exhibit less crossing over.

v. Natural selection operates.

(2) Secondary Centres of Diversity:

Vavilov suggested that valuable forms of crop plants are found far away from their primary area of origin, which he called secondary centres of origin or diversity.

These are generally the cultivated areas and have following main features.

i. Have lesser genetic diversity than primary centres.

ii. Have large number of recessive genes.

iii. Mostly have desirable characters.

iv. Exhibit more crossing over.

v. Both natural and artificial selections operate.

(3) Micro-Centres:

In some cases, small areas within the centres of diversity exhibit tremendous genetic diversity of some crop plants. These areas are referred to as micro-centres. Micro-centres are important sources for collecting valuable plant forms and also for the study of evolution of cultivated species.

The main features of micro centres are given below:

i. They represent small areas within the centres of diversity.

ii. Exhibit tremendous genetic diversity.

iii. The rate of natural evolution is faster than larger areas.

iv. They are important sites for the study of crop evolution.