## **GENETIC CONSERVATION AND NEW CROPS**

- Occurrence of a large number of different species of organisms adapted to specific areas is called **bio-diversity.**
- **Vavilov** proposed 8 centres of origin of cultivated plants called Gene centres which were later extended to 12. Thus there are **12 centres of megadiversity**.

| Centres of Origin |                        |   |   |
|-------------------|------------------------|---|---|
| S.No.             | Old World              | Major Crops   | Other Crops                                     |
| 1                 | Asia Minor             | Almond, Apple, Pear, Lentis,<br>Rye, Pistachio, Pomegranate         | Pea, Mustard.                                   |
| 2                 | South-West Asia        | Wheat   | Coconut.  |
| 3                 | South-East Asia        | Rice, Sugarcane, Banana,<br>Mango, Orange, Brinjal, Black<br>Pepper | Grape, Cardamon, Radish,<br>Carrot.             |
| 4                 | China                  | Tea, Onion, Soyabean  | Cucumber.                                       |
| 5                 | Mediterranean          | Cabbage, Beet, Lettuce, Oat, Olive.                                 | Water Melon, Date, Jute, Poppy.                 |
| 6                 | Ethopia                | Coffee, Barley, Sorghum.  | -   |
| 7                 | European Siberia       | Cherry  | Cichory, Hops                                   |
| 8                 | Australia              | Macadonia Nut   | Oil Plam, Okra.                                 |
|                   | New World              |   |   |
| 9                 | Peru/Peruvian andes    | Potato, Tomato  | Sapota (cheeku), Cola,<br>Pumpkin, Kidney Bean. |
| 10                | Brazil                 | Rubber  | Tapioca, Cocoa, cashewnut.                      |
| 11                | U.S.A.                 | Sunflower   | Guava, Papaya, Red Pepper.                      |
| 12                | Mexico/Central America | Maize   | Groundnut.                                      |

## Some important terms:

- (i) Primary Crop: Its cultivation came from the beginning e.g. Wheat, Rice.
- (ii) Secondary Crop: It represents wild relative of the primary crop which became article of domestic use in areas of unfavourable growth of the primary crop.
- (iii) Natural Home: It is the place of origin of a cultivated plant where its wild relatives and maximum genetic diversity occurs.
- (iv) Secondary Home: It represents Major centre of production of a crop plant that is away from centre of origin and lacks wild relatives.
- (v) Primary Introduction: If Exotic variety is directly used for cultivation then it is called primary introduction.
- (vi) Secondary Introduction: In this type exotic variety is first grown in selected areas after that it is introduced to other areas only after selection or hybridisation.
- (vi) In situ (on site) Conservation: This type of conservation performs inside the natural habitat or man made ecosystems to save biodiversity.
- (vii)Ex situ (on situ) Conservation: It is conservation of selected rare threatened plants/animals outside their natural homes.

- It involves offsite collections and gene banks.
  - (a) Offsite collections : These are live collections of wild and domesticated species in man made botanical gardens, zoological parks, wildife safari parks, arboreta (= arboretums) aquaria, etc.
  - (b) Gene banks : These are institutes that maintain stocks of viable seeds (seed banks), live growing plants (orchards), tissue culture and frozen germplasm with the whole range of genetic variability.
- Seeds are of two types
  - (1) Recalcitrant seeds

## (2) Orthodox seeds

- (1) **Recalcitrant seeds:** They are those seeds which get killed on reduction of moisture and exposure to low temperature, **e.g. tea, cocoa, jackfruit, coconut.** They can be stored for shorter duration after treatment with fungicides in rooms having humid air and normal oxygen.
- (2) Orthodox seeds: They are those seeds which can tolerate reduction in moisture content (upto 5%), anaerobic conditions and low temperature of -10° to -20°C or even lower for prolonged periods, e.g. cereals, legumes. At intervals the seeds are allowed to germinate, form plants and develop fresh seeds for storage.
- **Tissue culture:** It is carried out through callus formation, embryoids, pollen grain culture and shoot tip culture for those plants which are either seedless, have recalcitrant seeds, variable seed progeny or where clone is to be maintained.
- The method is useful in maintaining a large number of genotypes insmall area, prepaid multiplication of even endangered species and for hybrid rescue.
- Shoot tip culture maintains virus free plants. It is used for international exchange of germplasm in vegetatively multiplied cultivars, e.g. Banana, potato.
- **Cryopresevation: It is preservation in liquid nitrogen at -196°C**. It can maintain tissue culture, embryos, animal cells/tissues, spermatozoa indefinitely.

## New Crop:

- (i) Triticale. It is man-made cereal of two types:
- (a) Hexaploid (tetraploid Durum Wheat × diploid Rye) followed by chromosome doubling.
- (b) Octoploid (Hexaploid Bread Wheat × diploid Rye) Followed by chromosome doubling. It is being used as forage crop because grains are wrinkled and flour does not form chapatis.
- (ii) Winged Bean (= Goa Bean, *Psophocarpus tetragonolobus*): Leguminous vine with tuberous roots and long pods with four wings. Shoots and tuberous roots are eaten like Asparagus, leaves as pot herb, steamed flowers as mushroom, tender pods as green vegetable, unripe seeds in soups and roasted ripe seeds like peanuts with 30–40% protein and 18% oil.
- (iii) Jojoba (= Hohoba, Simnondsia chinesis): Shrubby dioecious plant of Mexican deserts which can be grown in arid areas. Female plants start bearing fruits at 3/4 yrs age with maximum at 10 years. Seeds have 50% Liquid wax (similar to spermaceti/sperm whale oil) which can be used as high performance lubricant of machinery involving pressure but not temperature changes. The oil can also be empolyed in cosmetics and external medicines as it can penetrate outer layers of human skin.
- (iv) Guayule (= Wayule, *Parthenium argentatum*): It is resin and latex containing shrub which can be grown in poor desert soils. Seven year old plants are harvested alongwith roots cut into pieces and dipped in hot water to coagulate latex, remove leaves, pulped to separte latex (12% by weight) and resin. Latex content can be increased to 20%. It produces rubber similar to Para rubber.
- (v) Leucaena (Subabul, Leucaena leucocephala): Quick growing small leguminous tree with edible unripe fruits and seeds. Pods and leaves constitute fodder for cattle, sheep and goats. Wood is source of timber, paper pulp and rayon. Narrow branches are a source of fuel and charcoal. It is grown in marginal soils, in social forestry as no reseeding is required. The stump gives rise to multiple shoots.