SUGAR BEET
Beta vulgaris (2n = 18)
Chenopodiaceae

Place of origin : Northern Europe

Classification : The genus *Beta* includes thirteen species which have been grouped under Four sections. Viz.

1. Vulgares	B.vulgaris
2. *Caollinae*	B.maritima
3. *Nanae*	B.macrocarpa
4. *Patellares*	

Includes both 2n = 18 and 36 form

B.*nanae*

3 species all of them 2n = 18

The cultivated *Beta vulgaris* includes Beet Sugar, Vegetable beet root and forage beet root. All the members of section *vulgares* inter cross freely.

Bolting in Sugar beet :

Sugar beet is normally a biennial. It develops a large succulent root the first year and a seed stalk the second year. Occasionally a plant will produce a seed stalk the first year itself which is known as **bolting**. The **bolters** do not make a normal. root development and so the yield will be reduced. Bolting can be induced by prolonged cool periods which is utilised for seed production. Certain wild species are annual in habit.

For rapid generation advancement in breeding programme as well as for seed production the process of **Photothermal induction** is used. This involves continuous artificial light and cool temperature.

The procedure for photothermal induction of sugar beet is as follows

a) **Pre induction period** : The plants are grown in pots for two weeks in screen house. Provide a continuous light from 150 walt electric bulb which is 30 inches height from pot.

b) Induction treatment :

Continue the provision of light but it must be from 20" ht. This is done for ten weeks. During this ten weeks period temp. Maintained at 46 to 49^0F

c) **Post induction period** :

Transplant the seedlings in field. Continue the lighting for another two weeks. Prevent warm temperature. By this way we can get seeds with in 6 months. But seeds obtained will be smaller in quantity

Botany

Sugar beet is usually cross pollinated they exhibit a high degree of self incompatability which is the main reason for cross pollination. The flowers produced singly or in dense clusters. the flowers are small, without petals and perfect. Stamens five in number. Ovary generally one seeded. the perianth of clusters of flowers fuse together forming a **multi seeded condition**. i.e. Seed Ball.

The seed Ball when germinate produces cluster of seedlings which requires the humidity.   So mono seeded varieties are needed which is useful for the breeding objectives.

Crossing technique :
In self fertile lines selfing is done with paper covers.   Emasculation in such lines is done by pulling out anther with needle and forceps. Dusting of pollen can be done with in a **week's time**. In self sterile lines use of red color hypocotyl lines as pollinators (male parent) we can easily identity F_1s.

Breeding objectives :

1. Breeding for disease resistance
Curly top Virus, *cercospora* leaf spot and root rot.

2. Breeding for Non-bolting types
Which allow earlier growing F_1 consequent longer growth period.

3. Breeding for monogerm seed
Flowers are produced singly.

4. Breeding for quality :
Between harvest and processing sugar beets are generally kept for a long periods in large piles where considerable storage loss of sugar will occur. Breeding for improved storage quality includes.
a) Selection for **low respiration** rate in roots.
b) Resistance of roots to storage rot.

Other quality characters are **TSS, purity of juice, raffinose content, ash and nitrogen content.**

Breeding Methods :

1. Mass selection :
This is utilised in developing curly top virus resistant varieties.

2. Family line breeding :
It is more or less similar to ear to row breeding Cross mother beets are carefully chosen for yield, sugar content and they are tested in progeny rows. While testing for performance in progeny rows, part of seed is kept as resistant seed. After identifying best performers in progeny rows, the remnant seeds are utilised for further multiplication.

3. Hybridization and selection
This is a time consuming process because of biennial nature of the crop. By following photo thermal induction rapid generation advancement is made possible.