



Hybridization and Selfing Techniques in Indian Mustard

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Brassica occupies a prominent place in world's agrarian economy as vegetables, oilseed, feed, fodder, green manure and condiment. Brassica (rapeseed-mustard) is the second most important edible oilseed crop in India. When compared to other edible oils, the rapeseed mustard oil has the lowest amount of harmful saturated fatty acids. It also contains adequate amount of the two essential fatty acids, linoleic and linolenic, which are not present in many of the other edible oils. Oilseed production assumes great importance in India because of gap in demand and supply of edible oils, which forced our country to import vegetable oils of millions of rupees, causing a heavy drain of the foreign exchange in past years.

The fundamental objectives of plant breeders is to evolve the variety which combine productivity with quality under favorable and stress conditions. However, this superiority of the improved type caused by certain specific gene combinations can be marshaled in a specific plant of variety and it depends on the system through which the genes in the material available are mobilized.

Floral Biology

The genus Brassica belongs to cruciferae family contains many species of. economic interest *B. napus*, *B. carinata* and *B. juncea* are self- fertile, although a great degree of cross pollination may occurs.

- The *brassica* flower has a typical floral formula $K_{2+2}, C_4, A_{2+4}, G_{(2)}$.
- The flower is regular, bisexual and hypogynous with four three sepals into two whorls.
- The *inflorescence* is racemose and flower is indeterminate, beginning at the lowest bud on the main regime.
- The flower being opening very early in the morning and fully opened by 8:00 to 9:00 am.
- The flowering period may last 2 to 3 weeks.
- That stigma is normally receptive for three days prior to three days after the opening of flower.
- As soon as the flower opens, the anthers become extrose and dehisce when the petals completely shade.
- All the pollens are shed on the day flowers open provided the dry weather occurs.
- The flower forms a funnel shaped structure during the evening.
- The pollen can be stored for 4 to 5 weeks without the loss of viability (Bach, 1917 Chiang, 1974).
- The pollen analysis of different Brassica species indicate that fertilization is affected within 24 hours after pollination.
- The syncarpous ovary develops into pod with two carpels separated by a false septum. The strains with three or four carpels. have also been reported in literature.

Hybridization and Selfing

For successful hybridization, selection young buds which are about of open for emasculatation.

- The bud is opened with the help of fine and pointed forceps. The sepals, petals and anthers are removed. Some breeders prefer to leave the petals and sepals as such, since they protect the stigma.
- Generally the musculation is accomplished during the day but evenings are mostly preferred or favoured.
- The number of buds to be emasculated depends upon the type of hybridization. In interspecific or intergeneric hybridization, large number of buds are emasculated to get few seeds.
- Protect the emasculated bud from the foreign pollen by using the plastic bags for up to one week following the pollination.
- If a number of different cross combinations are to be attempted on the same raceme, small plastic bags may be used to protect each flower.
- That small lighter tags are attached to the pedicel after pollination.
- Lastly, write the name of the cross and date of pollination on the take.

Pollination

- First of all collect the pollen from the male parent by using. The camel hair brush.
- Dust of the pollen on the tip of the stigma of the emasculated bud gently.
- Collected pollen can be stored up to five weeks without the loss of viability.
- Cover the emasculated bird after pollination with the plastic bag.
- Care must be taken to clean the camel hair brush between the different pollinations.

Selfing

- Select the young bird on the resume. Remove all the opened birds.
- In the self- fertile species *B. napus* and *B. juncea* self- pollinated seeds can be obtained by the simply enclosing the young buds with a glazine bags.
- Move the bags upto the raceme atleast twice or thrice during the flowering period.
- Remove the bags just after the transformation of bud into Siliqua.

Breeding Objectives

- Breeding for High Seed Yield
- Breeding for Disease Resistance
- Breeding for Insect-pest Resistance
- Breeding for Winter Hardiness and Forest Resistance
- Breeding for Shattering Resistance
- Breeding for Better Oil and Meal Quality