

## **HYBRID SEED PRODUCTION**

**LHH 144** : This is a cross between PIL 43 (Female parent) having okra lobed leaves and PIL 8 Miah (male parent). The hybrid seed is produced by hand emasculation of flower buds of female parent and pollination by flowers of male parent. The seed of parental lines should be purchased from Punjab Agricultural University every year to maintain genetic purity. The emasculated flower bud is covered with soda straw pipe and the male flower is tied with a 3" piece of a thread in the evening. The tied male flowers are used for pollinating the emasculated female buds in the morning. A piece of thread is tied to the stalk of the bud after pollination which serves as a marker for crossed boll.

### **Characteristics of Parents**

**PIL 43** : The female parent of LHH 144 has bushy plant habit with 3-4 monopods, okra type narrow lobed green leaves, creamy white flower and pollen. It has bold seeds. It mature in about 185 days.

**PIL 8** : The male parent of LHH 144 has compact plant type with 0-1 monopod and about 130 cm plant height. It has medium lobed green leaves, creamy white flowers and matures in about 165 days.

**Isolation of hybrid seed plot** : The hybrid seed production field should have an isolation of 50 metres from other American cotton varieties and 5 meters between male and female plots to ensure the genetic purity of the seed.

**Seed Rate and Spacing in Hybrid Seed Plot** : One acre hybrid seed production plot requires 6 kanal area under female parent and 2 kanal area under male parent with the following seed rate and spacing :

Parental lines	Seed rate (kg/acre)	Spacing (cm)
Female	3.0	LHH 144 67.5 x 90
Male	1.5	67.5 x 60

The skipping of one row after every two rows in female plot gives better setting of crossed bolls. In LHH 144 hybrid seed production 50 per cent of the male parent should be sown along with female parent and the remaining 50 per cent 10-15 days later to get sufficient number of male flowers for crossing.

### **Roguing :**

Off-type plants based on plant colour, leaf shape, flower colour etc., if any, should be rogued to maintain purity of parental lines.

### **Seed Production Technique :**

The F1 hybrid seed is produced by the placement of functional pollen of the desired male parent on to the receptive stigma of the emasculated female at right time. Emasculation of flowers is done from 3 PM to 6 PM by removing the anthers with thumb nail before maturity (anthesis) and pollinate the next morning from 9 AM to 11 AM when stigma is receptive. Avoid too young or too old buds. The male flowers to be taken for pollination should be selfed the previous evening to avoid contamination by insects. For identification of crossed bolls at maturity the crossed flower buds should be tagged. In order to enhance the setting percentage unattempted flowers and naturally formed bolls should be removed. Hybrid seed plot should be kept free from weeds and special care should be taken to prevent damage due to insect pests and diseases.

### **Picking, Storing and Ginning :**

The kapas from crossed healthy and marked bolls should be picked, stored and ginned separately. The cleaned seed should be labelled and stored in a clean dry place. Its genetic purity and germination should be tested before use.

## Hybrid Seed Production

### Moti and PAU 626 H : Desi cotton Hybrids :

Moti hybrid is produced by crossing DS-5 (female parent) with LD 210 (male parent) and PAU 626 H is produced by crossing DS 5 (female parent) with LD 694 (male parent). DS-5 is a genetic male sterile line and, thus there is no need of emasculating the female flowers. Crossing is accomplished by applying pollen from freshly opened flowers of the male parent on the stigma of the freshly opened flowers of the female parent.

### Maintenance of Parental lines

**Female parent (DS-5) :** The male sterile line is maintained by pollinating the male sterile plants with pollen from male fertile plants of the same line. Since male sterility in DS-5 is controlled by a single recessive nuclear gene, so we always get a mixture of male sterile and male fertile plants in 1:1 ratio.

The male sterile plants are identified on the basis of their small, whitish and shriveled anthers.

The male fertile plants have well developed anthers and after flower opening the anthers are covered with bright yellow pollen grains. Freshly opened flowers on male sterile plants are pollinated with pollen from male fertile plants in the morning (9.00-11.00 AM). Pollination is done by rubbing the anthers of fertile flowers on the stigma of male sterile flowers. For identification of these artificially pollinated flowers, a thread is tied to the pedicel of the flowers immediately after pollination.

**Male parents (LD 694 and LD 210) :** These are normal male fertile genotypes. These are maintained just like other varieties by following normal seed production and certification norms. Care should be taken to maintain maximum genetic purity.

### Characteristics of Parents

**DS-5** It is a genetic male-sterile line. The male-sterile plants are identified on the basis of their small, shriveled and whitish anthers. It has green plant body with narrow deep cut leaves, creamy white flowers and monopodial plant habit.

**LD 694** This male parent has dark-red pigmented plant body, narrow lobed leaves, pink flowers and red spot inside the petal.

**LD 210** Green plant body with narrow lobed deep cut leaves, white flowers, semi sympodial plant habit.

### Production of hybrid seed

**Isolation of hybrid seed Plot :** The hybrid seed production plot should have an isolation of 50 meters from other *desi* cotton varieties and 5 meters between male and female plots to ensure genetic purity of the seed.

**Seed rate and Spacing in hybrid seed plot :** One acre hybrid seed production plot requires 6 kanal area under female parent and 2 kanal area under male parent with the following seed rate and spacing.

<i>Parental lines</i>	<i>Seed rate (kg/acre)</i>	<i>Spacing (cm)</i>
DS-5 (Female Parent)	2.0	67.5 x 45 cm
LD 694 and LD 210 (Male Parents)	1.0	67.5 x 45 cm

The skipping of one row after every two rows in female plot gives better setting of crossed bolls.

**Rouging :** In the female parent, 50% plants are expected to be male-fertile. These plants are identified by examining the first opened flower and rouged out. This is necessary to obtain a pure stand of the male-sterile plants.

**Crossing Procedure :** For production of hybrid seed, freshly opened flowers of the male parent (LD 694 or LD 210) are used as source of pollen. Pollen is applied in the morning (9.00-11.00 AM) by rubbing anthers of the male flower on the stigma of freshly opened flowers of female parent (DS-5). For identification of crossed bolls, threads are tied to the pedicel of cross pollinated flowers.

In order to enhance the setting percentage, unpollinated flowers and naturally pollinated bolls

should be removed. Hybrid seed plot should be kept free from weeds and special care should be taken to control insects and diseases. The crop should not suffer from moisture stress at flowering stage as it will lead to shedding of flowers/bolls.

**Picking, Storing and Ginning** : The *Kapas* from crossed healthy and marked bolls should be picked, stored and ginned separately. The cleaned seed should be labeled and stored in a clean dry place. Its genetic purity and germination should be tested before use.