Roughing in Cotton crop for true to type cotton seed production

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Cotton which is a gift at the time arrival and departure (birth and death) in the form clothes and coffin. (Khan *et al* 2012). Cotton is also called as 6F plant which provide fiber, feed, fuel, fodder, forage and fertilizer at same time. (Afzal *et al* 2004).

Cotton seed is the seeds of cotton plants ovoid in shape 3.5 to 10mm long that are covered by somewhat more or less or non small fiber called linter. Cotton seed is the main source for next year crop. As more as we improve seed purity more will the seed cotton yield. For pure and healthy seed a practice called Roughing is of utmost important value.

ROUGING

According to Laverak and Turner 1995, the selective removal of undesirable plants from a seed crop on the basis of visual observations, in order to improve seed quality is called rouging.

Rouging is the removal off-types plants while off-types plants are those which have no correspondence with the desirable sown crop.. It is a practice to maintain purity and quality of the crop being grown. The removing plants must having dissimilarity with the varietal character/characters of sown variety or having some diseases etc. The practice of rouging is done to maintain a crop variety in pure and true-to-type form. For example the crop must showcase uniform phenotypic resemblance in the form of leaf and flower color, shape, size, sympodial/monopodial behavior, plant height and late/earliness etc.

Or removal of plants which may be off types/diseased/noxious weeds that are liable to multiply with the seed crop, thus effecting the purity of future generations are called rouging. Methodology of rouging is explained in detail below:

i.. Roughing at all stages of the crop in the field is an essential requirement to maintain the variety purity as it was at the time of release.
ii. Sometime rouged plants are not distinguishable before flowering, therefore roughing should be done as early as blooming starts.
iii. Doubtful plants should too be roughed
vi. The rouged plants should be removed from the field immediately after roughing and destroyed as they survive for a few days and may spread their pollens.

Stages of rouging

Rouging is practiced in three different stages as detailed below:

i). First Rouging (Pre flowering stage**).**

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The is generally done when the crop is after 45-50 days after sowing. In this period plant showing dissimilarity in the form leaf color, shape, size, sympodial/monopodial behavior etc must be removed.

ii). Second Rouging (flowering stage)

Sometime rogue plants are not distinguishable before flowering, therefore roughing should be done as early as blooming starts. In this stage flower shape size, pollen color must taken into consideration to uniform the crop. Any plant showing dissimilarity will be removed immediately. The presence of a single dissimilar plant may damaged the true to type nature of a variety.

iii). Third and last Rouging (Post flowering or before picking**).**

This is the last and very crucial stage of rouging. In this stage special attention must be given to plant height, erect or bushy nature of the crop, type of opening and late and earliness etc.

Major sources of off- type plant:

There are three main sources of off- type plants.

1). The off-type plant may be arising due to presence of recessive genes in heterozygous condition at the time of release of variety. (The recessive genes may also arise by mutation).
2). Off-type plants are due to volunteer plants or from seed produced by earlier crop.
3). Mechanical mixtures also constitute the major source of off- type plants

Rouging for Quality Seed Production:

Rouging is the removal of plants which are off type that is phenotypically different from the plants of the variety under production. It is an important aspect in seed production and is necessary to prevent out-crossing and mechanical mixtures. The off type plants are to be regularly removed from the field either by uprooting or by cutting at the ground level that regrowing may not disturb the purity of crop.

The off-type plants may differ in:

Taller or shorter than the sown crop'plant.

plant characters:

Presence or absence of petals spots nectar presence/absence.

Leaf character;

Difference in leaf color, shape (normal, Okra or semi okra) and size,

Flowering:

Difference in time (Early or late flowering), size and shapes of flowers.

Stigma Protrusion:

Stigma is protruded or not

Crop Maturity:

Difference in cotton crop maturation (Boll opening) and types of opening (fluffy, good or bad opening).

Leaf and stem color:

Rogue plants that have discolored or differently colored leaves, stems. Besides off-type plants, diseased plants or weeds plants , mechanically damaged plants etc. should also be removed or rouged out to obtain a clean seed production field. The upper view of a rouged plot should look fairly uniform, plain and distinct.

Rouging in Certified Seed Production;

The most important object of the seed production is to maintain genetic purity of the variety. For this purposes it is necessary to follow the practice of rouging vigorously which consist of removal of :

a). Off types plants

b). Plants of noxious weeds and other crops

c). Diseased plants affected by diseases like CLCuV, bacterial blight or any seed borne diseases growing in the seed production plot.

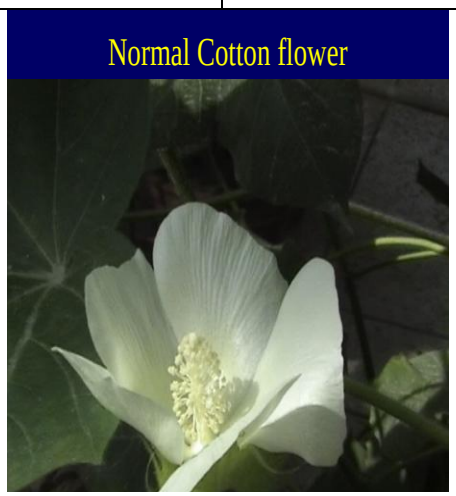
A. Variety with normal leaves yellow color arrow (no off type plant)
B. Variety with okra leaves shape red arrow showing one Off type plant of normal leaf shape.

Red arrows showing three off type plants

Cotton field with three off type plant in bulk population

Cotton variety showing uniformity in respect of plant height and leaf shape, size and color

Diversity in Cotton plant' parts

Leaf				
	Normal	**Okra**	**Semi okra**	
Flower				
	Normal	**With petal spot**	**Oblong**	
Cotton boll				
	Normal Boll	**Oblong boll**	**Red boll**	**Twin boll bearing**