

## VARIETAL RUNDOWN AND RENOVATION

### 1) Causes for varietal run down or Genetic deterioration in released varieties

Normally the farmers are advised to renew the cultivars once in three years. The main reason is that a variety may undergo genetic deterioration by a number of ways. They are :

1. Presence of crossable genera or species in the near by field or bunds  
E.g. (1) In the rice field there may be other graminaceous grasses which can hybridise with rice./ Presence of red rice in varieties is due to this.  
(2) Presence of Johnson grass (*Sorghum halepense*) as weed in sorghum (*S. bicolor*) field will lead to varietal contamination due to natural crossing.
2. Lack of isolation distance in the seed production plots  
Each crop variety requires proper isolation distance for maintenance of varietal purity.  
For Eg.            Sorghum            : 400m  
                         Red gram            : 200m  
                         Sunflower           : 600m  
Lack of isolation distance lead to natural crossing and genetic deterioration.
3. Genetic drift due to sampling error  
The genetic equilibrium in a variety will be disturbed due to improper selection. This is high in case of small populations. This can be prevented by adopting proper selection procedure and following phenotypic disassortative mating.
4. Natural mutation :  
Though the frequency of natural mutation is very low, it is also one of the causes of varietal rundown. Micro mutations which cannot be detected easily will lead to genetic deterioration in crop plants.
5. Admixture due to Farm machinery :  
Improper cleaning of farm tools and machinery like threshers will also lead to varietal admixtures, natural crossing and rundown.
6. Threshing floor admixtures :  
Threshing floor must be free from cracks and crevices so that while threshing and drying there is no chance for left over seed in threshing floor. Otherwise some seeds may be caught up in cracks and get admixed with other varieties.
7. Store room admixtures :  
The gunny bags and other container used for seed storage must be properly cleaned; otherwise it will also lead to admixture.
8. Physiological stresses:  
Extreme drought conditions will prevent panicle exertion in full e.g. sorghum. Growing rice in colder months may lead to physiological awning.
9. Not following proper crop rotation practices :  
The left over seeds may germinate and contaminate the subsequent crop varieties. Eg. groundnut after groundnut.

## 2) Steps to prevent genetic deterioration

### 1. Nucleus seed production and maintenance

Cent per cent purity is to be maintained in nucleus seed production plot. Different methods are advocated for different crops in maintenance of nucleus seeds. For eg. in cotton mass pedigree method is followed for maintenance of nucleus seed. In this method 1000 to 2000 single plants are raised in replicated progeny row trial. Each and every single plant is examined for pollen colour and petal colour to maintain genetic purity. If off types are seen, then the whole line in all the replication will be rejected. Selfing is done to prevent contamination Harvest is done on single plant basis and progenies are selected on single norm.

### 2. By providing proper isolation distance for seed multiplication plots

For eg. for sorghum nucleus seed production plot 800 metre isolation distance is maintained. The single plants are raised and allowed for sibmating.

### 3. Removal of all grasses from field as well as bunds :

This is to be followed especially in case of rice.

### 4. By following proper crop rotation

### 5. By proper cleaning of farm equipments, tools, threshing floor, gunny bags and store room

### 6. By following proper selection procedures in seed production plots

For eg. in groundnut seed production plot, the plot mean for yield will be worked out. Then SE and CD will be worked out. The single plant yield which are around = 2 SE is to be selected for further maintenance.

### 7. By following the proper varietal maintenance technique

E.g. In sunflower, varietal renovation technique as advocated by *Pustovoit* will have to be followed.

## 3) Varietal renovation in sunflower

Russian scientist Pustovoit has given the method of varietal renovation. It is called as Pustovoit method of renovation. Sunflower varieties all called as population. Due to heterozygous nature, the variety to be renovated is raised under isolation of 600m. Rouging should be done. About 10,000-12,000 plants are selected based on head size, seed size, seed yield and oil content. The mean and standard deviation is calculated for each character. The average was taken. In all the characters value for an individual must exceed the value of mean +2 SD. Then that individual is selected.

Then the selected plants are studied for disease resistance and progeny row testing. Progeny row testing is replicated twice. In each time the plants are selected and the characters are recorded and Standard Deviation (SD) and mean are worked those individuals whose character value exceeding mean + 2 SD are selected. While using for progeny row testing only half of the seeds are reserved. After selecting the plants the remnant, seeds of the selected plants are used for raising super elite seeds at 600m isolation. Rouging should be done before and after flowering. Super elite seeds are used for raising the elite seeds or Stage I foundation seed. These seeds are used for raising Stage II foundation seed. These seeds are used for raising certified seeds and then for commercial cultivation. This seed renovation method maintain yield and oil content and also sometimes upgrade them.

