RAMA UNIVERSITY

www.ramauniversity.ac.in

FACULTY OF AGRICULTURAL SCIENCES AND ALLIED INDUSTRIES

DR. SUHEL MEHANDI

ASSISTANT PROFESSOR

GENRTICS & PLANT BREEDING

UGE 223, COMMERCIAL PLANT BREEDING

Maintenance of Nucleus seed and Breeder seed in self and cross pollinated crops

Nucleus Seed: is the handful of original seed obtained from selected individual plants of a particular variety for maintenance a nd purification by the originating breeder. It is further multiplied and maintained under the supervision of qualified pant breeder to provide breeder seed. This forms the basis for all further seed production. It has the highest genetic purity and physical purity.

Maintenance of nucleus can be divided into 2 groups

1. Maintenance of newly released varieties
2. Maintenance of established varieties

Maintenance of nucleus seed of pre -released or newly released varieties:

Harrington 1952 has outlined the procedure for multiplication of nucleus seed which is given below;

1. Sampling of a variety to obtain nucleus seed: In any crop not more than 15 new varieties should be sampled in any research station. Select approximately 200 plants from one of the yield trials. Discard poor diseased and inferior plants. The selected plants should be harvested 4 to 5 days before harvest to avoid shattering. All the 200 plants should be tied individually and wrapped in a cloth bag and stored till the yield results are obtained. The bundles of high yielding varieties are taken for further examination and the inferior varieties are discarded.
2. Table examination of samples: The bundles are threshed separately and the seed should be examined in piles on the purity work board. Piles with undesirable characters (diseased, off types etc.) should be discarded. The remaining pure seed of individual plants is sown in a variety purification nursery called as nucleus seed.
3. Location and seeding of nucleus seed: Select clean fertile and in the experimental station in which the same crop was not grown in previous one season. The land should be free from volunteer plants and it should be properly isolated. The 200 or less progenies should be sown in 200 double rows in 4 series of 50 double rows in each plot. Sufficient spacing should be there between and within the rows to facilitate examination of each row during the crop growth.
4. Inspection of nucleus double row plots and removal of off types: the double row plots should be critically examined from the seedling stage until maturity. If any plot differ distinctly from that of the nucleus seed variety it should be removed before flowing stage. After flowering and during

maturity plots should be examined critically for other characters like flower colour, ear head shape, seed colour etc. and the offtypes should be removed before harvest. When a plant is removed after flowering all the plants or plots within 3 meters
should be removed as they may contaminate the surrounding plants.

5. Harvesting and threshing: The remaining plots (between 180-200) should be harvested individually and tied into a bundle. The individual plots are threshed cleaned and dried separately. The seed of each plot should be placed on the purity work board in piles and examined for uniformity of seed characters. If any pile appears to be of off type or diseased it should be discarded. All the remaining plot seed should be mixed together into one lot treated with fungicide and insecticide bagged, labeled and stored as breeder stock seed for next year.

Maintenance of B/s or pre -released or newly released varieties:

1. Breeder stock seed should be sown on clean fertile land on which the same crop was not grown in previous one season.
2. The field should be properly isolated to avoid natural crossing and spread of diseases.
3. Adopt latest farm practices to raise a good crop.
4. B/s should be produced at the experimental station in the area where the variety is to be released.
5. Sufficient spacing should be provided between and within the rows to examine individual plants and for removal of offtypes.
6. Roughing should be done before flowering and when plants are removed after flowering all the surrounding plants within one meter should be removed.
7. Harvesting the B/s should be done with utmost care. The equipment used for harvesting, threshing and cleaning should be clean to avoid mechanical mixtures. The seed should be stored in new gunny bags. The seed produced should be of 99.99 % pure and it is used for producing F/s. A portion of B/s should be retained to sow a continuation of B/s.

Maintenance of breeder seed of established varieties:

The B/s can be maintained satisfactorily by any one of the following methods

1. By raising the crop in isolation: B/s can be maintained by growing them in isolated pots and by following rigorous roughing during various stages of crop growth. The methods of handling the B/s is same as that described earlier.

2. By Bulk selection: Genetic purity of established varieties could be satisfactorily improved by bulk selection. In this method select 2000 to 2500 plants which are typical to that of the variety. Harvest and thresh them separately. The seed of each plant are examined and any plot which shows off types or dissimilar ones are discarded. The seed of individual plant may be gown in double rows or may be bulked to form the breeder stock seed.

Maintenance of Nucleus and Breeder seed in cross pollinated crops:

The maintenance of varieties of cross pollinated crops is much more complicated than self pollinated crops. Maintenance of nucleus seed of inbred lines: after a hybrid has been thoroughly tested and if it is suitable the seed of parental lines must be increased in the following manner;

1. Hand pollination: method of maintaining nucleus seed of inbred lines involves self pollination, sib pollination of combination of both. Generally maintenance by sibbing is preferred because it does not reduce the vigour. It is also preferable to maintain some parental material by alternate selfing and sibbing from one generation to the next. The individual selfed or sibbed ears should be examined critically. Those which are offtypes or inferior in any regard of differing in any character such as texture, seed size, color, shape etc. should be discarded. The individual selfed or sibbed ears may then be threshed separately and sown in ear to row method in double row plots. The advantage of ear to row planting is that the offtypes from individual ears can be easily detected and controlled.

2. Seeding of hand pollinated seed: The hand pollinated seed should be sown in fertile land which is free from volunteer plants. The same crop should not be grown in previous one season. The seed should be sown in the area where the hybrid is to be released.

3. Isolation: Proper isolation distance should be provided to avoid natural cross pollination and spread of diseases. The isolation distance varies from crop to crop and depends on nature of contamination and direction of the prevailing wind. Generally more isolation is required at this stage than the later stages.

Distance or time isolation can be practiced to avoid contamination.

4. Inspection of double row plots and roughing : Despite of making all the efforts taken to maintain purity in inbred lines by hand pollination and adequate isolation distance still it is not possible to achieve perfection. The double row plots must be carefully checked for offtypes prior to pollen shedding. It is very easy to recognize the off types because they are more vigorous than the inbred lines.

5. Harvesting drying and shelling : the nucleus seed crop can be harvested soon after it attains physiological maturity if artificial drying facilities exist. It is better to harvest the ear to row lines separately an oils made in front of each progeny. These piles should be critically examined for ear characters and all off colored, off textured and diseased or undesirable ears sorted out. If the overall percentage of offtypes is more than 0.1%, hand pollination should be
done again. After discarding the undesirable ones, remaining ears may be bulked and dried in clean dry bin at a temperature not exceeding 43oC. After drying shelling should be done in a cleaned machine to avoid mechanical mixtures at this stage. After shelling the seed may be cleaned treated with fungicide, insecticide, properly labeled and stored under ideal storage condition.

Maintenance of breeder seed of inbred lines: for increasing B/s the breeder stock seed obtained from nucleus seed is planted in an isolated field. During increase of B/s adequate attention must be paid to

1. Land requirement
2. Isolation
3. Roughing
4. Field inspection
5. Harvesting and drying
6. Sorting of the ears.

Care should be taken on the above points so as to produce breeder seed of maximum genetic purity.