



Principles of Quality Seed Production of Cereal Crops

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Seed is the most vital input in agriculture and therefore the use of quality seeds could alone will increase productivity to the extent of 15-20 per cent. The seed quality is very important in agriculture and it should not be compromised at any cost. It is the quality seed that should be given first of all attention before going to seed production of any crop. Without quality seed there is wastes of using other inputs on the crop.

Introduction

Seed is the most vital input in agriculture and therefore the use of quality seeds could alone will increase productivity to the extent of 15-20 per cent. The seed quality is very important in agriculture and it should not be compromised at any cost. It is the quality seed that should be given first of all attention before going to seed production of any crop. Without quality seed there is wastes of using other inputs on the crop. Cereal crops possess all the three types of pollination behavior viz., self pollination, cross pollination and often-cross pollination. Among cereals wheat, rice and barley are highly self-pollinated due to cleistogamous nature of flowers. Pearl millet and maize are cross pollinated crops due to protogyny and protoandry, respectively. Sorghum is often-cross pollinated crop. The degree of cross pollination varies from crop to crop. Cross pollination is caused mostly by wind in cereals. So, population of pollinating agents and prevailing environment also affect degree of cross pollination. In sorghum natural cross pollination takes place even up to 10%. Cross pollination also affects the quality of the seed. The genetic purity of the seed is affected by so many factors. Following principals should be taken care during quality seed production.

1. Seed Standards

The seeds meeting required standards of purity (genetic and physical purity), germination and seed health are referred to as quality seeds. Quality seed production should meet out the following standards:

- a) **Genetic purity:** It must be genetically true to type and expected to possess certain diagnostic characters to distinguish from other varieties. It should fulfill general identity i.e. distinctness, uniformity and stability (DUS). Genetic purity is maintained by isolation of crop by a specified distance from the other variety of the same crop or contaminants. Isolation distance helps in avoiding undesirable cross and admixture at the time of harvesting and threshing.

- b) **Germination and vigor:** It must be viable and meet out the germination and purity standards. Germination potential of seed determines the seedling emergence, crop stand and ultimately the yield. Mishandling of seed at the time of harvesting, threshing, processing and storage may deteriorate its germination.
- c) **Physical purity:** Seed must be physically pure. Physical purity means there should not be any kind of mixture like other crop seed, weed seed and inert matter. It must be free from objectionable weed seed and other crop seeds.
- d) **Seed health:** Seed must be free from grain pests and seed-borne diseases. The healthy seed not only helps in raising disease free crop with good germination, but also helps in checking further spread of disease

2. Seed Source

The source of seed is very important in the production of quality seed. The seed should be pure and obtained from approved source otherwise it may deteriorate the quality of the seed.

3. Prevention from Mechanical Mixing

Mechanical mixture is the most important factor in deterioration of varieties. All seed production efforts will render futile if sufficient care is not taken in field operations to avoid mechanical mixing. The field operations viz., sowing, roguing, harvesting, threshing, processing and bagging are required to be given quite attention. Before sowing, the seed drill should be properly cleaned. Harvested material of two or more varieties should not be left in adjacent fields to avoid any mixing of plants due to wind. During threshing, the threshing machine and the threshing floor should be properly cleaned. Processing machine should be thoroughly cleaned to avoid mixture.

4. Isolation

To maintain genetic purity, the seed production plot must be distant from plots of other varieties by a certain minimum distance known as isolation distance. Though, in general legumes are self-pollinated crop even then to avoid mechanical mixture from adjoining plots proper isolation distance should be maintained. Isolation requirement varies from a few meters (3 m for groundnut and soyabean, 10 m for green gram, black gram, cowpea, chickpea, lentil, field pea etc. to 200 hundred meters in pigeonpea for foundation seed production). But where honeybee population is more, the isolation distance should be increased to produce genetically pure seed.



Pearl millet



Maize



Wheat



Barley

5. Roguing

Roguing is the process of removing undesirable plants from the seed crop to maintain genetic purity of a variety at field level. The rogues may be weeds, off-types, other variety plants; plants affected with diseases, pollen shadders, etc.



Sorghum



Rice

Any plant which does not conform to the characteristics of the variety is called an off-type. Off-types are generally considered to arise from segregation of residual heterozygosity, out-crossing with other varieties, admixtures or natural mutations. Off-types could be any character such as plant height, days to flowering, flower colour, growth habit, leaf colour, pigmentation, leaf size and shape, pod size and shape, seed colour, seed size, seed shape, days to maturity etc. Weeds, abnormal, volunteer, diseased and other species or variety plants should be removed up to maturity. Roguing should be a continuous process from sowing up to harvesting and after harvesting at processing yards during post harvest handling to improve the seed quality. Field roguing helps in maintaining or improving genetic purity, whereas, roguing at post harvesting stage helps in prevention of genetic purity. Roguing should be done at minimum possible interval to maintain genetic and physical purity. The rogued plants should not be left in the field particularly when roguing is done after flowering. The crop should be harvested at proper stage of maturity. As a general rule, the off-types should be removed and taken away from the seed production plot and destroyed. Roguing should be done in the morning hours and the back of the person doing roguing should be towards the sun. This facilitates easier detection of off-types. For perfect roguing it should be started from a definite place and should end at a definite place to avoid the repetition.

6. Seed Certification Standards

There are two types of standards: field standards, which applicable to standing crop and seed standards applicable at seed level. Field standards include isolation requirement, maximum permissible level of off-types. Inseparable other crop plants, objectionable weed plants, plants infected by seed borne diseases etc. Seed standards include genetic purity, physical purity, germination, other crop seeds, weed seeds, moisture content etc. In seed production of any

category, seed certification standards should not be compromised and it should be followed strictly.

7. Seed Testing

Testing of seed samples is an essential and indispensable part of seed certification and quality control. After processing of a given lot, the representative sample is sent to notified seed testing laboratory for analysis. Seed testing is done as per ISTA Rules. ISTA 1993 has developed uniform rules and regulations for testing. If the seed test report is satisfactory i.e. the seed meets the prescribed seed standards then a given seed lot is approved and tags (of prescribed colour and size) and certificates are issued by the certification agency to the seed producer. Such type of seed is ready for the sale to the cultivators. The validity period is nine months from the date of test at the time of initial certification. The validity period can be further extended for six months provided on retesting the seed conforms to the prescribed standards. Seed being a living entity is highly sensitive to ambient weather conditions viz. high relative humidity and temperature, which deteriorates its viability and vigour. Improper handling of seeds also causes mechanical injury and lower down its germination and storability. Therefore, during post-harvest processing and storage seed must be handled properly and protected from high relative humidity and temperature, insect pests and rodents. The main objective of seed testing is to serve the producer, seed industry and the consumer.

8. Labeling of Seed

During supply of seed it should carry prescribed label on the bags. The label is self explanatory about the information as per certification standards like name of crop, category of seed, variety, purity (%), other crop seeds per kg, weed seed per kg, other variety seed per kg, inert matter (%), moisture (%) in normal packing, germination (%) etc. Label colour and size have also been specified for each category of seed. If the tag is to be fixed on a smaller container then the size of the tag can be reduced proportionately (except for breeder seed). However, length and breadth ratio and contents would remain the same. Label colour and size should be as per following:

Table: 1: Label colour and size of label for different categories of seed.

S. No.	Class of seed	Label Colour	Label Size
1.	Breeder	Golden Yellow	12 cm x 6 cm
2.	Foundation	Both side White	15 cm x 7.5 cm
3.	Certified	Both side Azura Blue	15 cm x 7.5 cm
4.	T.L. Seed	Opel Green	15 cm x 10 cm

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