



Quality Seed: A Key to Thriving Agriculture

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Seeds are the first determinant of future plant development. These are crucial and essential inputs for success in cultivation. There is a clear reference in ancient literature, “**May the seeds be viable, may the rains be plentiful and may the grains ripen for days and nights.**” Only the seeds of assured quality can be expected to respond to fertilizers and other inputs in the expected manner, otherwise the seed of hope may turn into a seed of frustration. The quality seed is the first and prime requisite for grain production, which alone contribute about 30% of yield improvement.

In general, the quality of seeds is measured in many ways, including genetic and physical purity, germination, vigor, uniformity in sizes, freedom from seed-borne diseases, and many other factors that may affect seed performance in the field. Therefore, seed quality is a collective term for the conditions of seeds including genetic and physical purity, viability, vigour and seed health. Other characteristics such as specific chemical composition or resistance to certain diseases or insects also contribute to the quality of seeds.

Quality of seed in India is legally controlled by the Seed Act, 1966 and according to that, seeds of notified or popularized varieties sold to the farmers must meet the minimum standards of germination and physical purity. It should be packed in suitable container and must have requisite label on packaging. Information on crop, variety, germination, physical purity, date of testing, packaging lot and date, unit weight and price, name of seed producing agency or institution, and other requisite points is to be given on the label and packaging. The germination given on label is valid for nine month from test date and after which it has to be revalidated at six month period.

Pure seed is the basic and important input for healthy crops and good production. Seed should be pure, free from other contaminants, and should fit within minimum seed standard as recommended. For this purpose, a seed production system in India recognizes different class of seed viz., Nucleus, Breeder, Foundation and Certified seed with different seed quality standard to safe-guard the quality of large quantity seeds of Indian farmers. The maintenance of high quality seed of a variety is referred as ‘Maintenance breeding’, where a breeder is maintaining the seed purity of a released variety when it undergoes production year after year. This involves maintaining morphological, physical and genetic purity of a variety for a long period of time.

Major Seed Quality Characters

1. Physical purity

- The physical purity of the seeds should be maintained at 96-98%.
- The seeds should be devoid of inert matter like dust, stones, seeds of other crop varieties, broken seeds, weed seeds, etc.

- After harvest, seeds should be separated from chaffy seeds and insect or disease affected seeds in order to maintain the physical purity of the seeds.
 - The seed with physical quality should have uniform size, weight, and colour, and should be free from stones, debris, and dust, leaves, twigs, stems, flowers, fruit well without other crop seeds and inert material.
 - It also should be devoid of shriveled, diseased, mottled, molded, discolored, damaged and empty seeds.
- 2. Genetic purity**
- Genetic purity of the seed should be maintained in order to ensure the quality of the seeds. The traditional and inherent characteristics of the seed should be maintained from generation to generation and is referred as genetic purity.
 - It is the true to type nature of the seed. i.e., the seedling or plant from the seed should resemble its mother in all aspects.
 - This quality character is important for achieving the desired goal of raising the crop, either for yield, resistance or for the desired quality factors.
- 3. Physiological Quality**
- It is the actual expression of seed in further generation or multiplication. Physiological quality characters of seed comprises of seed germination and seed vigour.
 - The liveliness of a seed is known as viability. The extent of liveliness for production of good seedling or the ability of seed for production of seedling with normal root and shoot under favorable condition is known as germinability.
 - Seed vigour is the sum total of all the seed attributes that favours rapid and uniform standard establishment in the field under varying field conditions. In general, seeds with good germination capacity and uniformity in size will have good vigour.
 - Seed which perform well at sowing are termed as quality seed and based on the degree of performance in production of elite seedling it is classified as high, medium and low vigour seed.
 - Seed with good vigour is preferable for raising a good plantation as the fruits, the economic come out are to be realized after several years. Hence selection of seed based on seed vigour is important for raising perfect finalize plantation.
- 4. Seed Health**
- Health status of seed is nothing but the absence of insect infestation and fungal infection, in or on the seed.
 - Seed should not be infected with fungi or infested with insect pests as these will reduce the physiological quality of the seed and also the physical quality of the seed in long term storage.
 - The health status of seed also includes the deterioration status of seed which also expressed through low vigour status of seed.
 - The health status of seed influences the seed quality characters directly and warrants their soundness in seed for the production of elite seedlings at nursery or field.

Factors affecting Quality Seed Production

1. **Selection of seed plot:** The plot selected for seed production must satisfy soil texture and fertility requirements of the seed crop. The same crop should not have been grown in the previous season and it should be free from other volunteer plants, weeds, soil borne diseases, insects, and nematodes.
2. **Land preparation:** Soil condition in the selected field should be suitable for the crop. The field should be ploughed thoroughly without any lumps. Green manure crops can be raised in the field in order to enhance the nutrient content of the soil. Organic manures like farm yard manure, compost and vermi-compost can be used to enhance the soil

fertility. Field should be irrigated well, within three days of sowing to avoid hardness of the soil.

3. **Selection of Species and Seed Source:** While selecting the seed variety, care should be taken to select the varieties preferred by the farmers in a particular area. Healthy and uniform sized seeds from a reliable source should be selected. Seeds should be selected based on the type of seed production as the breeder seeds are required for the production of foundation seeds; foundation seeds are required for the production of certified seeds. Selected seeds should be genetically pure with high germination percentage and vigour.
4. **Seed treatment:** Seed must be treated with appropriate fungicide and insecticide before sowing. Seed bio priming with *Trichoderma harzianum* or *Pseudomonas fluorescense* at 5g / kg is an eco friendly biological control method.
5. **Time and method of sowing:** The seed crop should be sown 1 to 2 weeks before the normal crop sowing. Sufficient moisture should be ensured during sowing to obtain better germination and optimum plant stand. Appropriate depth of sowing is most important for obtaining a good plant stand in the nursery.
6. **Weed Management:** Land selected for seed production should be maintained free from weeds. Weed seeds will remain dormant for a long period and grow faster than the main crop and produce seeds, which will reduce the purity of the seed crop. Removal of weeds at all stages in the seed production field is essential for maintaining the purity of the seeds.
7. **Pest and Disease Management:** Insects will spread disease causing microbes and particularly affect the seeds. Special care and attention should be given at every stage of the seed production in order to keep the field free from the pest and diseases.
8. **Intercultural Technologies:** The soil in between and around the crop should be tilled slightly for good aeration and better water holding capacity. Soil should be heaped or mounded near the root region of the plant. This will enhance the water and nutrient absorption capacity of the plant and also help the plant to stand upright. The fruits or grains in the plant will be free from soil borne pathogens.
9. **Seed germination:** Germination capacity of a seed lot refers to the capacity of the seeds in that lot to germinate normally and produce all parts of a healthy seedling and grows. The necessary parts of the seedling include well developed primary roots, young pair of leaves and one or two cotyledons.

A germination rate of 70-80% is an indication of high seed viability.

10. **Seed certification:** The purpose of seed certification is to maintain and provide high quality and genetically pure seeds of superior varieties to farmers. Only those cultivars with superior genetic makeup, multiplied to maintain purity and identity are eligible for government certification.

Conclusion

In conclusion, the importance of quality seeds cannot be overstated in agriculture. High-quality seeds are the foundation of successful crop production, offering numerous benefits such as higher yields, improved resistance to pests and diseases, and better adaptability to diverse environmental conditions. Investing in quality seeds ensures farmers have access to superior genetics, which ultimately leads to more robust and resilient crops. Additionally, quality seeds contribute to sustainable agriculture practices by minimizing input requirements and maximizing output, thereby reducing waste and environmental impact. By prioritizing the use of quality seeds, farmers can enhance their agricultural productivity, profitability, and overall livelihoods, while also contributing to global food security and sustainable development goals.