

# PRINCIPLES OF SEED TECHNOLOGY

## INTRODUCTION:

The history of agricultural progress from the early days of man has been the history of seeds new crops and crop varieties. In the early days progress, achieved through the cultivation of indigenous useful plants and introduction of new crop species. The second stage of progress was due to selection of superior types from the cultivated plants, many useful selections were made, and there was gradual but steady progress. Later on, using well-known techniques of selection and hybridization many new and better varieties were made available. However, the pace of progress remained slow. In the mid sixties, a revolution took place in Indian agriculture, with development of dwarf varieties, better responsive to high fertilizer doses in self pollinated crops rice and wheat and exploitation of heterosis in cross pollinated crops and development of hybrids of maize sorghum, Bajra, which made significant, advances in yield.

However, to the farmer, all this scientific research would be of little value unless he gets genetically pure seeds with desirable qualities high germination percentage, high purity, more vigour and better seed health. This laid down the need of seed technology. Good agriculture depends upon good seeds. The pace of progress in food production there fore depend upon the speed with which we are able to multiply and market good quality seeds of high yielding varieties.

**Seed** is a crucial and basic input to increase crop yield per unit area and to improve the agricultural economy of the country.

### **What is seed?**

- Any part of plant used for propagation is called a seed.
- It may be a true seed or any vegetatively propagating material such as seedlings, cuttings, bulbs, tubers rhizomes, root etc.
- Seed have a life.
- True seed is an embryo, a living organism embedded in the supporting and food storage tissue.
- A true seed is defined as “*a fertilized mature ovule consisting of embryo, storage material and protective coats.*”
- It can be clearly seen from the above that seed pertaining to material meant for sowing/planting purpose; the essential function being the reproduction.
- The business of Seed Technology is to protect this biological entity and look after its ‘welfare’,
- While the focus of Food Technology is on the second component – the supporting tissue.

### **What is a grain?**

A grain is used for consumption as a food by human beings and feed by animals. If it have a life it can also be used for sowing. Grain may or may not have life.

**The major differences between scientifically produced seed and the grain (when use as seed) are as under.**

<b>Scientifically produced seed</b>	<b>Grain (used as seed)</b>
(1) It is the result of well planned seed programme.	(1) It is the part of commercial produce, saved for sowing or planting purposes.
(2) It is the result of sound scientific knowledge organized efforts, investment on processing, storage and marketing facilities	(2) No such knowledge or efforts are required.
(3) The pedigree of seed is ensured. It can be related to the initial breeders seed.	(3) Its varietal purity is not known.
(4) During production, efforts are made to rogue out off types diseased plants, objectionable weeds and other crops plants at appropriate stages of crop growth which ensures satisfactory seed purity and health.	(4) No such effort is made so the purity and health status may be poor.
(5) The seed is scientifically processed treated and packed and labeled with proper lot-identity.	(5) It is manually cleaned. Not properly treated, labeled and packed.
(6) The seed is tested for planting quality namely germination, purity, mixtures of weed seeds and other crop seeds, seed health and seed moisture content.	(6) Routine seed testing is not done.
(7) The seed quality is supervised by seed Certification agency.	(7) There is no quality control.
(8) The seed must meet the quality standards prescribed. The quality is well known.	(8) No such standard is applied here hence the quality is unknown.
(9) The labels/tags on the seed containers serves as quality marks.	(9) There is no such label or tag which ensure quality of seed.

### **What is Seed Technology?**

- ✚ Seed technology can be defined as techniques comprises of seed production, seed processing, seed storage, seed testing, seed certification, seed marketing, distribution and the related research of these aspects.
- ✚ Feistritzer (1975), defined seed technology as “The method through which the genetic and physical characteristics of seeds could be improved.
- ✚ According to Cowan (1973), Seed Technology is “a discipline of study having to do with seed production, maintenance, quality and preservation.”

**Thus, Seed Technology is essentially an interdisciplinary science, which surrounded by a broad range of subjects.**

In broadest sense, “Seed Technology includes

- The development of superior crop plant varieties, their evaluation and release,
- Seed production, processing,
- Seed storage, seed testing, seed certification,
- Seed quality control, seed marketing and
- Seed distribution, and

- Research on seed physiology, seed production and seed handling based on modern botanical and agricultural sciences.”

### **The relationship of seed technology to other sciences**

- 1) **Genetics and Plant Breeding** : The Plant Breeders and Geneticists develop new crop varieties which are high yielding and superior in resistance to diseases and pests as compared to existing ones. They are also associated with the maintenance of nucleus and breeder seeds and grow out tests etc.
- 2) **Agronomy** : The agronomist provide suitable package of practices for growing, harvesting and handling of seed crops in order to obtain maximum seed yields and best possible seed quality.
- 3) **Horticulture** : The horticulturist provide the suitable package of practices for growing, harvesting and handling vegetable, flower and other horticultural crops to ensure maximum seed yields and best possible seed quality.
- 4) **Plant Pathology** : The role of plant pathologist in seed production is to produce and distribute disease free seed and hence they provide package in regard to seed treatment and plant protection measures, to be adopted in order to produce disease free seeds. They are also involved in the development of the Seed Health Testing Techniques for detection of seed borne disease and plant quarantine.
- 5) **Entomology** : The entomologist provide the package with regard to pest control during seed production and seed storage to ensure good seed quality and minimum losses due to storage. They are also involved in the development of seed health testing techniques for the detection and determination of insect, pests infestation and plant quarantine.
- 6) **Taxonomy** : The taxonomist provide information necessary for identification of various crops and weed seeds and cataloguing of Germplasm, varieties etc.
- 7) **Plant Physiology** : The physiologist help in understating various planting seed quality problems, seed development and maturation, and seed storage problem and their possible solutions. They are associated with the development of techniques for seed germination, seed vigour, seed viability testing.
- 8) **Agricultural Economics** : They provide necessary guidance in relation to seed marketing problems and helps in devising suitable marketing and distribution system. They are also concerned with the management aspects and in the determination of cost/benefit ratio, seed price fixation etc.
- 9) **Agricultural engineering** : The agriculture engineers are associated with the development of suitable seed planting, harvesting machinery for seed crops and also the seed drying, seed processing machinery, seed handling and seed testing equipments.
- 10) **Agricultural extension** : The extension agencies are involved in popularizing the use of high quality seeds of high yielding varieties amongst the farming community and also gave feedback to the researcher for the problems of farmers.

### **Role of seed technology/ Importance of Seed production**

*Feistrizer (1975) outlined the following roles of Seed Technology*

1. Improved seed – a carrier of new technology
2. Improved seed – a basic tool for secured food supply
3. Improved seed – the principal means to secure crop yield in less favourable production areas.

4. Improved seed – a medium for rapid rehabilitation of agriculture in cases of natural sudden great failure.

***Improved seed – a carrier of new technology:***

- The introduction of quality seeds of new varieties wisely combined with other inputs significantly increases yield levels e. g.
- In India, for instance the cultivation of high yielding varieties have helped to increase food production from 52 million tones to nearly 180 million tones in last four decades. Thus the introduction of new high yielding varieties boosted the food production.
- Yields increased to the extent of 112% in Cereals, 124% in Potatoes and 142% in Sugarbeet in Central Europe through the use of improved seeds and agricultural inputs.
- In the USA, the results achieved were still better.

***Improved seed – a basic tool for secured food supply:***

The successful implementation of the high yielding varieties programme in India has lead to a remarkable increase in production and to a new assessment of future development potential. As a result, food import from other countries have substantially brought down in spite of the rapid population increase.

***Improved seed – the principal means to secure crop yields in less favourable area of production:***

The supply of good quality seeds of improved varieties suitable to these areas is one of the few important continuations that Seed Technology can make to secure higher crop yields.

***Improved seed – a medium for rapid rehabilitation of agriculture in cases of natural disaster:***

Widespread floods and droughts in various parts of the country and elsewhere have focused attention to these recurrent crises. The relief operations by FAO show that it would be much more economical of the Government have National Seed Research Stocks at their disposal. The establishment of National Seed Reserve Stocks should receive high priority for meeting natural calamities.

**National Seed Stocks would have a two-fold role to play:**

1. They would provide improved seeds in emergency periods to production area for rapid production of food grains.
2. They would supply seeds to disaster regions for re-sowing; as no seed would normally be available in such regions.

**Goals of seed technology**

The major goal of seed technology is to increase agriculture production through the spread of good quality seeds of high yielding varieties. The goals of The goals of seed technology could be fulfilled in the manner as under.

- (1) Rapid multiplication of seeds of improved high yielding varieties. The seed should be made available to the farmers in the quickest possible time.
- (2) Timely supply of improved seeds of new varieties to the farmers well in time so that they may get timely planting and harvest the benefit of quality seeds.
- (3) Assured high quality seeds : In order to obtain the expected dividends from the use of seeds of improved variety the seeds must ensure high quality.

- (4) Reasonable price : The cost of high quality seed should be within the reach of the average farmers i.e. price should be so reasonable that average farmer can easily buy it.

### **Characteristics of good seeds**

The features or characteristics that determine the quality of seed are as under :

- (1) High genetic purity
- (2) High germination percentage
- (3) Higher vigour that give effective plant stand in the field
- (4) High physical purity i.e. it should be free from other crop seeds and weed seeds.
- (5) Sound seed health : free from insect, pests and organism that causes disease, free from seed borne disease
- (6) Wider adaptability : It can be grown and perform better under wide environmental and soil conditions.
- (7) Always possess high yielding ability.
- (8) Quality for special characters : should maintain its superiority for the characters/traits for which bred.
- (9) Response to fertilizers and other inputs :should give higher response to high fertilizer dose and able to give higher yield.
- (10) Possess uniform seed size, weight, seed colour and specific gravity.