



Quality Seed: Significance, Challenges and Improvement

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'All the flowers of all the tomorrows are in the seeds of today' - Swedish proverb

Seed is the basic and critical input in crop husbandry, which determines the expected dividends from all other inputs. Agriculturally seed is the unit of propagation and can be any part of the plant (zygotic seed or vegetative propagates) which has the capability to regenerate into a new plant, but botanically it is defined as matured ripened ovule comprising living embryo embedded in the supporting food storage tissue with a protective coat. It is primarily responsible for maintaining the physical, physiological and genetic characteristics of any variety / hybrid of any crop.

Role of Seed

Feistritzer (1975) described the role of seed as follows,

A carrier of new technologies

Introduction and popularization of any technology to enhance the crop productivity solely depend on seed. It may be the development of new varieties, evaluation of seed treating chemical, fertilizer, pesticide including the biotechnological developments.

A basic tool for secured food supply

In India for instance, the cultivation of high yielding varieties have helped to increase food production from 52 million tonnes to more than 200 million tonnes over a period of 50 years. The successful implementation of the High Yielding Varieties Programme (HYVP) in India has led to a remarkable increase in production and to a new assessment of future development potential. As a result, food imports from other countries have been substantially brought down inspite of the rapid population increase.

The principal means to secure crop yields in less favourable production areas

In areas inherent with biotic and abiotic stresses, the supply of good quality seeds of improved varieties contributes to secure higher crop yields.

A medium for rapid rehabilitation of agriculture in cases of natural disaster

At times, floods and droughts focused on threats of famine and starvation. In such situations Seed Reserve Stocks contribute a lot to reclaim the ill effects of natural calamities.

Definition-Quality Seed

The capacity of the seeds is fully exerted only when it possess its own quality in terms of physical, physiological, genetic and health aspects. Seed quality is a relative term and means the degree of excellence when compared to an acceptable standard. The seeds having required standards of purity, germination and other attributes are referred as quality seeds.

Seed Technology

- Seed technology is an interdisciplinary science, encompassing a broad range of subjects viz., breeding, agronomy, physiology, pathology, entomology, microbiology and engineering .
- It involves research aspects of seed growth and development, seed physiology, seed dormancy , germination, techniques on seed enhancement, quality seed production, seed certification, processing, seed treatment, storage, seed longevity, testing, seed pathology and entomology, quality control, marketing and distribution.
- In brief the role of seed technology in Agriculture sector is timely supply of quality seeds for reasonable price to farmers.

Characteristics of Quality Seed

Genetic purity

Genetic purity of seeds refers to the trueness to type. If the seed possesses all the genetic qualities that breeder has placed in the variety, it is said to be genetically pure. It has direct effect on ultimate yields. If there is any deterioration in the genetic make up of the variety during seed multiplication and distribution cycle, there would definitely be proportionate decrease in its performance. It is, therefore, necessary to ensure genetic purity during production cycles.

Physical purity

Physical purity of a seed lot refers to the physical composition of seed lots. A seed lot is composed of pure seeds, inert matter, weed seeds and other crop seeds. Higher the content of pure seed the better would be the seed quality. Pure seed considered together with seed germination determine the planting value of the seed.

Seed germination

Seed germination refers to the ability of a seed when planted under normal sowing conditions to give rise to a normal seedling.

Seed vigour

The seed vigour refers to the sum total of all the attributes that gives effective plant stand in the field.

Seed health

The health of seed refers to the presence or absence of disease organisms/insect pests on seeds. The quality of a seed lot very much depends on its health.

In addition it also should possess the following characters:

1. It should have good shape, size, colour, etc., according to specifications of variety
2. It should be free from other crop seeds,
3. It should be free from objectionable weed seeds.
4. It should be free from designated diseases
5. It should possess high longevity and shelf life
6. It should have optimum moisture content for storage
7. It should have high market value

The availability of quality seeds in time and at affordable price is a prime factor to produce uniform, healthy and vigorous crop that results in higher productivity. In horticulture, quality seed has got the following significance.

Significance of Quality Seed

- Ensures genetic purity of specific crop.
- Quality seeds alone ensures higher yield.
- Higher income to farmers
- Produce vigorous seedlings in nursery

- Tolerant to pest and disease to certain extent
- Maintains desired plant population
- Responds to added inputs like fertilizer, pesticide, irrigation and other crop management techniques
- Ensures uniform growth and maturity
- Withstands biotic and abiotic stresses

Seed Quality Control Factors

- **Seed moisture**

The seed moisture affects seed storability. Seeds with low moisture store longer and remain free from insect pests.

- **Germination per cent**

Seeds are sown to provide next generation crops. Germination percentage thus, indicates the potential of seeds for developing and establishing into seedlings in the nursery bed (open or polythene) or in the main field. This attribute is given as germination per cent. The combination of pure seed percent and germination per cent is called as Pure Live Seed (PLS) having better viability.

- **Vigour**

It indicates the ability of seed to emerge in varying environments or micro-climate of fields where it is grown. It is generally believed, but not always true, that high germination percentage is associated with high seed vigour.

- **Storage life**

Seed moisture content is the most important factor influencing loss of viability during storage. Most of the vegetable seeds which are costly are packed in suitable moisture vapour proof attractive containers and are not or least affected in storage or in transit but the seeds of some large sized seeds e.g. garden pea, beans etc. are packed in porous containers, hence the seed moisture content fluctuates with the change in relative humidity of the atmosphere.

- **Seed health**

Vegetable seed should be free from seed borne diseases and insects infestation. Insect infestation normally destroys the embryos thus making the seeds unfit for sowing. Similarly most of the virus and bacterial diseases are seed borne. They are not only contaminate the crop but also help in spreading the disease fast. Hence, seeds must be free from pest and disease and treated with pesticide/fungicide to prevent contamination and spread.

- **Mechanism of control**

The generally accepted system of seed certification involves inspections, sample testing, also enforcement of minimum standards which constitute the mechanism of quality control in seed.

Seed Production in India

The central government's 'Indian Seeds Programme' recognises three stages of seed production, namely, breeder, foundation, and certified seeds. Breeder seeds are produced by the Indian Council of Agricultural Research (ICAR) and that leads to foundation seeds which are produced by National Seeds Corporation (NSC), State Farm Corporation of India (SFCI), State Seeds Corporation (SSC) and private seed producers and the certified seeds are produced and distributed by state governments.

There are mainly three varieties of seeds used in Indian agriculture - traditional, hybrid and Genetically Modified (GM) seeds. Traditional seeds are those which can be stored by farmers for re-sowing in the next crop season. Hybrid seeds are obtained by cross pollination of different varieties of related plants and combine the desirable properties of their parent plants. On the other hand, GM seeds are developed in laboratories by genetic

engineering by combining merging genes of different organisms (like bacteria genes with plants) so as to yield the desired characteristics.

Problems in Seed Industry

Four major problems faced by the seed industry in India.

1. Distribution Problems:

i. Short Shelf Life of the Seeds:

Normally, certified seeds are valid for one season only and they have to be revalidated for use in the next season. The retailers are not equipped to store the seeds for one whole year.

ii. Unpredictability of the Demand:

It is very difficult for the dealers (private or co-operative) to exactly predict the demand of certified seeds owing to the unpredictability of Nature, changes in the commodity prices and other reasons.

2. Lack of Effective Monitoring Mechanism:

There is no effective monitoring mechanism for controlling the quality of seeds at the selling points. The dealers even sell those seeds whose samples have failed in the laboratory tests by SSCs. The producing and marketing agencies of seed do not have any control on their production once the product is sold. This is mainly because the monitoring of selling of seeds is neither possible nor economical.

3. Lack of Infrastructure:

Availability of seeds in time still remains a problem for the farmers. The problem is compounded by poor infrastructure in distant villages, the lack of purchasing power at the time of sowing and the uncertainty of rainfall, on which the sowing is largely dependent.

4. Poor Extension Services:

The various extension services offered by the Agriculture department leave much to be desired in terms of effectiveness of the programmes offered by them, for popularising the modern agricultural practices, which includes improved seeds practices.

Agricultural supervisors generally are seen active only for showing their targets that are fulfilled, by distributing the mini kits and conducting field demonstrations rather than emphasizing on the result oriented approach. The popularization of a variety in a prolonged period has reasons other than the slow activity of the extension network like the performance of the crop and availability of the seed variety.

Challenges of Indian Farmers relating to Seeds

Among various challenges faced by Indian farmers, the most important are quality, price, and availability of seeds on time. Most Indian farmers are economically weak and find it difficult to purchase seeds as they have to invest heavily in pesticides and fertilizers. Therefore, they are mainly dependent on traditional seeds. The major advantage of these seeds is that the farmers need not purchase them every year from seed companies. Additionally, these seeds are not harmful for the environment. "Indigenous seeds are more cost effective as compared to any other variety of seeds and the farmers are self-dependent in case of production of these seeds. They are natural and have a high nutritional value." However, the main problem with these seeds is low productivity. Indigenous seeds are less productive compared to other varieties and thus are unable to feed the ever increasing population of the country."

In a country like India where food shortage is still prevalent, the problem of traditional seeds can be addressed by hybrid seeds. Hybrid seeds are more productive and faster growing as compared conventional seeds. These seeds are less susceptible to pests and plant diseases. Another advantage of hybrid seeds is that they are more adaptive to environmental changes. However, hybrid seeds have certain drawbacks. The main disadvantage of hybrid seeds is that they are not regenerative and the farmers are bound to

purchase them every crop season, “As hybrid seeds cannot be saved for the next crop season because of their segregating character in the F2 generation, farmers are bound to depend on big seed companies. This pushes up their input costs.”

The government has tried to address these issues through GM seeds. GM seeds can solve the problem of food shortage in India as these seeds can increase agricultural productivity drastically. Moreover, it requires less water, fertilizers and pesticides compared to hybrid and conventional seeds. GM seeds are of very advanced variety and are capable of satisfying the food requirements of our country. The main drawback of GM seeds is that it risks the ecosystem because the traits produced from genetic engineering can result in the disruption of the natural flow of genes.

Strategies for Seed Improvement

Exploitation of Hybrid Vigour

It is the best approach for varietal increase in production of crops. The area under hybrids is about 27 per cent while their contribution to yield is 40 per cent.

Description of Notified Varieties

The implementation of plant variety protection would necessarily require detailed characterization of all varieties. The variety registration would have on DUS criteria. Efforts are being made to characterize all the crop varieties under seed production chain.

Enhancement of Seed Replacement Rates

The socio-economic status of the farmer does not permit to purchase quality seeds. Therefore the seed replacement rate is very low. The realistic indents and production of breeder seed of different crop varieties by maintaining quality can enhance SRR.

Seed Replacement Rate is the rate at which the farmers replace the seeds instead of using their own seeds.

Enhancement of Seed Multiplication Ratio

SMR is nothing but the number of seeds to be produced from a single seed when it is sown and harvested, which can be altered by adoption of proper seed and crop management techniques. However, according to expert group of seeds (1989), the seed multiplication ratios for different crops are as follows.

References

1. Business economics: <https://businesseconomics.in/challenges-seed-production-india>
2. <https://www.agricultureinindia.net/seed-industry/problems-faced-by-the-seed-industry-india-agriculture/16589>
3. <http://ecoursesonline.iasri.res.in/mod/page/view.php?id=17470>