

Seed and Seed Certification Perspective in Food Security and Sustainable Agriculture Growth

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Abstract:

Seed is an embryo, embedded in the food storage tissue, it is the most important and vital input for agricultural production. Seed Certification is a legally sanctioned system for quality control of seed multiplication and production for the Identification of new superior varieties, provision of supply of quality seeds by careful maintenance, designed to ensure physical and genetic purity, freedom from weed seeds and diseases with good germination ability of the certified seed. Certification of Seed shall be completed in six phases as follows Receipt and scrutiny of application, Verification of Seed Source, Field Inspection, Post harvest Supervision, Seed Sampling and Analysis, Label, tag, grant of Certification. The purpose of Seed Certification is to maintain high quality seeds and propagating materials, to ensure genetic purity, identity and make available to public, through Certification. The challenges confronting seed sector are now more than even before due to demand of quality seed of promising varieties to ensure food security. Therefore a good quality seed is the most basic and essential input .to provides food security for the future generations and to reach the sustainable agriculture growth and to end hunger.

Keywords: Agriculture, Certification, Food Security, Seed, Seed Acts, Sustainable Agriculture Growth,

Introduction:

Seed is a matured ovule which consists of an embryonic plant with storage of food and surrounded by a protective seed coat. It plays a vital role in agriculture and acts as a carrier of the genetic potential of varieties. Seeds are food for mankind, animals, and other living beings (9).(Fig.1). Globally 95% of the total food comes from the seed. About 250 species of seeds are used as food for human and animal beings. Majorly six species of seeds that are used for human consumption are Rice, Wheat, Berley, Oat, Maize, Rye etc. Seed is the store house of Carbohydrate, Starch, Hemicellulose, Sugar, Fats and oils, Protein, Mineral and Vitamin etc. Seeds are the basic commodity of agriculture, Seeds are the vehicle of life or means of propagation, used for medicinal purposes, supplies raw materials to industry. Seeds protect and sustain life and seeds are the national asset and may be compared with a country's currency.

Investing in good quality seeds is a critical step in achieving a sustainable productive harvest, good quality seeds have high germination rates, which means more of your seeds will grow into strong, healthy plants. This can lead to higher yields and improved crop quality while reducing the need for chemical fertilizers and pesticides.

Seed Certification is a legally sanctioned system for quality control of seed multiplication and production for the Identification of new superior varieties, provision of supply of quality seeds by careful maintenance, designed to ensure physical and genetic purity, freedom from weed seeds and diseases with good germination ability and viability of the certified seed, it is the starting point to a successful crop as well as an important risk management tool (1).

The challenges confronting seed sector are now more than even before due to demand of quality seed of promising varieties to ensure food security. Every cultivar should be able to access healthy seeds which are genetically pure, with high seed vigour and good germination percentage, timely availability of good quality seeds at reasonable price ensures good yield and profit to the farmers and to achieve the sustainable growth in Agriculture.

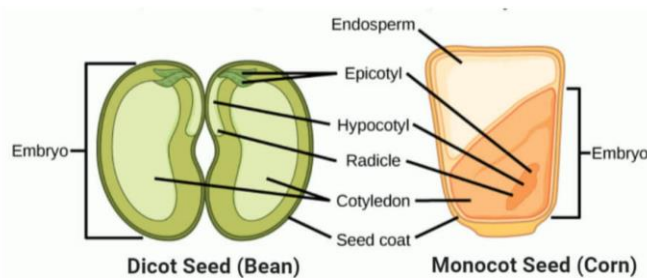


Figure-1: Structure of Seed (Dicot & Monocot)

Seed Certification:

Seed is the most important and vital input for agricultural production. It is the most efficient means of increasing agricultural production. The direct contribution of quality seed alone to the total production is about 15-20% depending upon the crop and it can be further raised up to 45% with efficient management of other inputs.

The seed certification concept grew out of the increased concern for the rapid loss of identity of varieties during production cycles. It began with the visits of agronomists and plant breeders to the fields of progressive farmers who took the seeds of new varieties from the.. This was primarily to educate them on seed production. This initiated the process of field inspection and later on found to be very helpful in keeping varieties pure in the production chain. In 1919 formed an International Crop Improvement Association (ICIA), which later on 1969 changed its name to Association of Official Seed Certifying Agencies (AOSCA) paving the way for modern day seed certification. In India the field evaluation of the seed crop and its certification started with the establishment of National Seeds Corporation in 1963. A legal status was given to seed certification with the enactment of first Indian Seed Act in the year 1966 and formulation of Seed Rules in 1968. The Seed Act of 1966 provided the required impetus for the establishment of official Seed Certification Agencies by the States. At present almost all the States in the country have their own Seed Certification Agencies established under the Seed Act, 1966. In great majority of the countries in the World, including India (2 & 3).

Seed certification is a legally sanctioned system for quality control of seed multiplication and production. to maintain and make available to the general public continuous supply of high quality seeds and propagating materials of notified kinds and varieties of crops, grown and distributed to ensure the

physical identity and genetic purity. The purpose of Seed Certification is to maintain high quality seeds and propagating materials, to ensure genetic purity, identity and make available to public, through Certification. Seed certification process is consist of six phases as follows Receipt and scrutiny of application, Verification of Seed Source, Field Inspection, Post harvest Supervision, Seed Sampling and Analysis, Labeling, tagging, sealing and Grant of Certification (Fig.-2). In India, seed certification is optional, and labeling is compulsory (10).

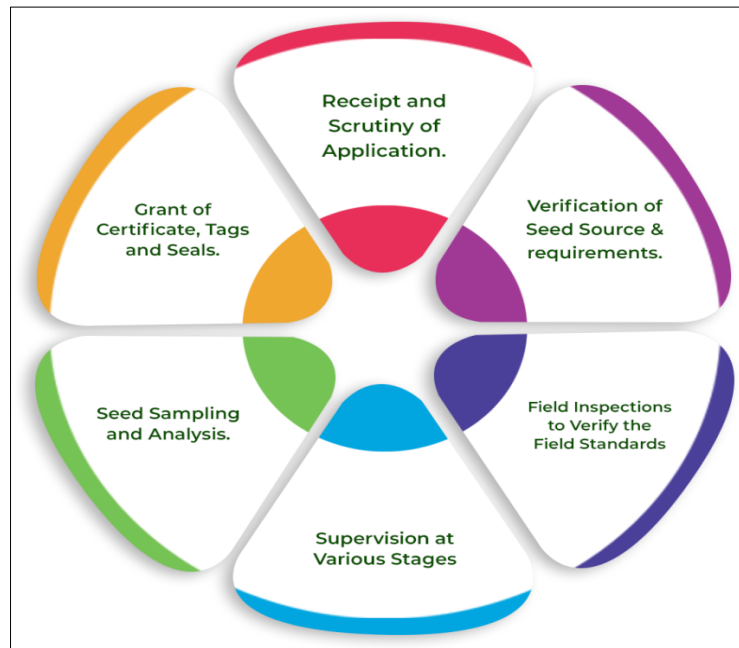


Fig-2: Seed Certification Process (6) Stages

. The Indian Minimum Seed Certification Standards (IMSCS) comprise General Seed Certification Standards and Specific Seed Certification Standards. The General Seed Certification Standards are applicable to all crops which are eligible for certification. The Specific Seed Certification Standards are applicable for the individual crops. Indian seeds programme recognizes three generations of seeds namely breeder, foundation and certified seeds. Foundation and Certified class seeds come under Certification. Breeder seed is exempted from certification as it is produced by the plant breeder which is inspected by a monitoring team consisting of the breeder, representative of seed certification o[agency (DDA), representative of NSC. Seeds of only those varieties which are notified under section 5 of the Seeds Act, 1966 shall be eligible for Certification (6 & 7) (Fig-3).

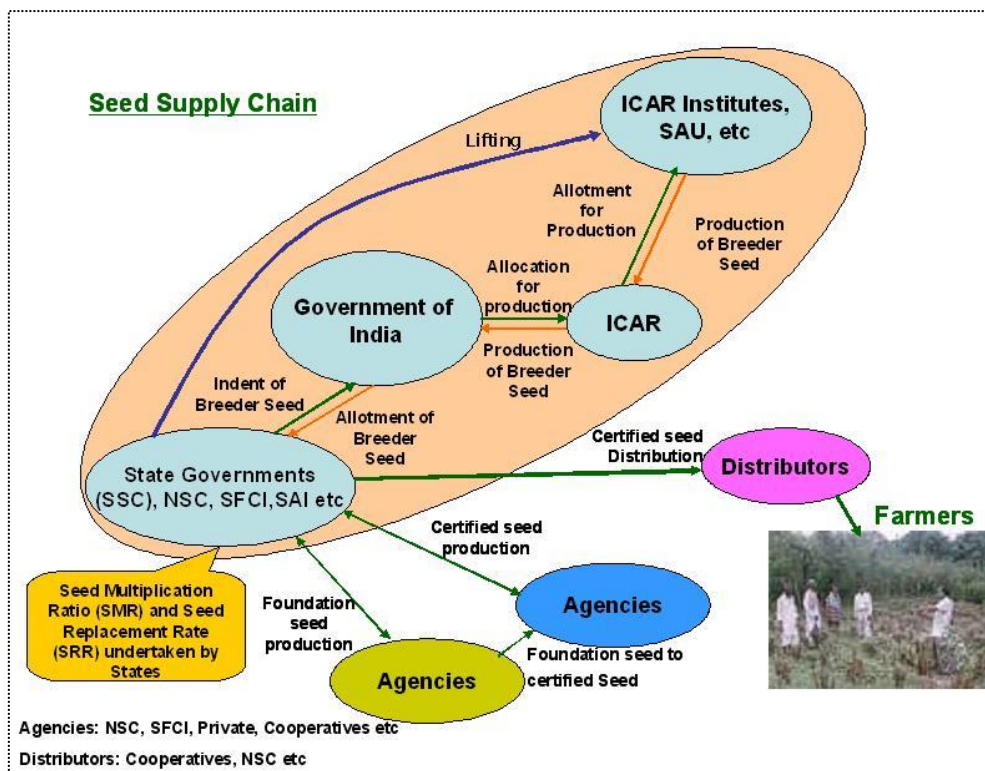


Fig.-3: Seed Supply Chain in India

The **Seeds Bill, 2019** provides for compulsory registration of “any kind or variety of seeds” that are sought to be sold, if the seed “fails to provide the expected performance under such given conditions”, the farmer “may claim compensation from the producer, dealer, distributor or vendor under The Consumer Protection Act, 1986”. Hence ensure that action at all stages, namely in field inspection, seed processing, plant inspection, analysis of samples taken and preparing tags, labels, seals, issue of certificates should be taken care with efficiency (5, 6 & 8)..

The source seed verification is the first level process in the seed certification process to ensure the seed quality, field inspection to evaluate the crop in the field for varietal purity, isolation of seed crop to prevent out-cross, the value of the seeds for planting will be assessed, allows them to undergo germination and other purity tests required for conforming to varietal purity., the evaluation to check homogeneity of the bulk seed produced as compared with the standard sample is carried out, sample source and final seeds are compared with laboratory tests.

Minimum numbers of field inspections are necessary to find out field standards of various factors in the seed farm. All the key points to be observed in vegetative stage (pre flowering), flowering stage, pre harvest and during harvest stages, Physical or Genetical Sources of contamination or factors to be observed. Should be taken care in Inseparable Crop Plants of different crops which have seeds similar to seed crop, Objectionable Weed Plants seeds which are difficult to be separated once mixed, Which are poisonous, which have smothering effect on the main crop, designated diseases which may reduce the yield and quality of seeds. In the post harvest session processing of seed lot need to be done to remove chaff, stones, stem pieces, leaf parts, soil particles etc from the raw seed lot, grading to bring out uniformity in the seed lot, seed treatment to protect it from storage pests & diseases. The sale of crop seeds with maximum of 3% factors can be taken into account of Immature seeds, Ill-filled seeds, Broken seeds, Stained seeds and Over fuzzy seeds. If it containing any prohibited noxious weed seeds may not

be sold with more than 1/4 of 1% by weight of restricted noxious weed seeds. Seed cannot be sold if it contains more than 2½% of all weed seeds. Moisture content level for Long term storage is 6 - 8 %, Short term storage is 10-13% and good quality. Seed genetic purity for Breeder /Nucleus - 100%, Foundation seed - 99.5%, certified seed - 99.0%. Finally for each class of certified seed labels will be given as follows Breeder Seed – golden yellow, Foundation Seed – white, Registered Seed - light purple, Certified Seed - light blue, Source Identified Seed – yellow (Fig-4). All certification tags will be issued by the certifying agency and printed with the following information: (no changes by the applicant are permitted) i.e. Variety name, Crop, Producer number, Lot number etc (Fig-5 & 6).. Every cultivar should able to access healthy seeds which are genetically pure, with high seed vigor and good germination percentage, timely availability of good quality seeds at reasonable price ensures good yield and profit to the farmers is the main objective of NSC. The seed production sector is a vital aspect of agriculture, supporting crop productivity, environmental sustainability, and economic growth.



Fig-4: Types of Seed Labels

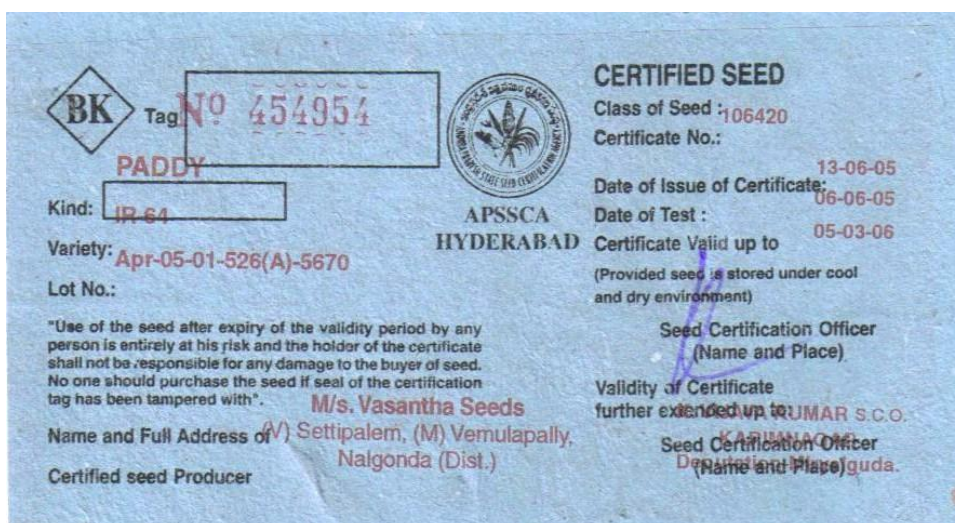


Fig-5: Modal Seed certification Tag

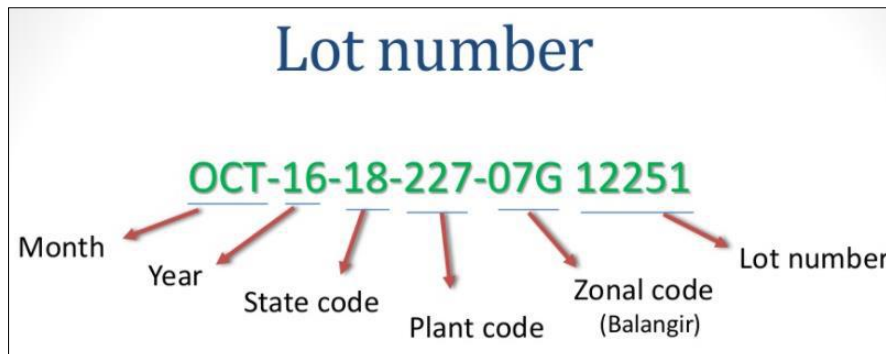


Fig-6: Modal Seed Lot Number

Seed in Food Security and Sustainable Agriculture Growth:

Seed is the basic and most critical input for sustainable agriculture. The response of all other inputs dependson quality of seeds to a large extent. An improved seed is a most dynamic instrument for increasing agriculture production and also economical input. Indian Seed Development Programme has now occupied a pivotal place in Indian agriculture and is well poised for substantial growth in the future. National Seeds Corporation, which is the largest single seed organization in the country with such a wide product range, has pioneered the growth and development of a sound seed industry in India. NSC, SFCI, States Seeds (8), (Fig. 7).



Fig. 8: Major Seed Producing States of India Map

India is one of the biodiversity hotspot. India's food, nutritional, livelihood and socio-economic security depends largely upon agriculture and land resources. Future of agricultural production will largely depend upon development of improved varieties/ hybrids in various crops, supported by efficient, cost effective seed production technology. Without good seed, investment like fertilizer, water, pesticides and other input will not pay the desired dividends.

The challenges confronting seed sector are now more than even before due to demand of quality seed of promising varieties to ensure food security. The 1966 legislation was enacted at the time of Green Revolution, when the country hardly had any private seed industry. The high-yielding wheat and paddy varieties, which made India self-reliant in cereals by the 1980s, were developed by the various ICAR institutes and SAUs. Than the public sector institutions have retained their dominance in breeding of wheat, paddy (including basmati), sugarcane, pulses, soybean, groundnut, mustard, potato, onion and other crops, where farmers largely grow open-pollinated varieties (OPV) whose grain can be saved as seed for re-planting. Indian agriculture has earmarked significant advances and the seed industry has played a key role in this endeavor.

The Department of Agriculture and Co-operation is implementing a Central Sector Scheme as 'Development and Strengthening of Infrastructure Facilities for Production and Distribution of Quality Seeds' since 2005-06 for the whole country is to ensure production and multiplication of high yielding certified/quality seeds of all crops in sufficient quantities and make the seeds available to farmers. The developments in the seed industry in India, particularly in the last 30 years, are very significant. Future of agricultural production will largely depend upon development of improved varieties/ hybrids in various crops, supported by efficient, cost effective seed production technology(7)..

For sustainable agriculture, a good quality seed is the most basic and essential input. Other inputs are contingent upon quality of seed for being optimally effective. The Indian seed industry has played a very critical role in the growth of Indian agricultural. Agriculture in India is backed by a strong seed improvement programme involving both the public and private sectors. The Indian seed sector is highly vibrant and energetic and is well recognized internationally.

The global community decided in 2015 to improve people's lives by 2030 by setting 17 global goals for sustainable development. The second goal of this community was to end hunger. Plant seeds are an essential input in agriculture and seed production is always the basic pre-requisite of any food security undertaking. World food production must increase 50% by 2050 to meet the needs of 9 billion people. The growing food demand and rapidly changing climatic conditions across the world motivates us to look for technological solutions to establish effective system for protection of plant varieties, the right of farmers and plant breeders and to encourage development of new varieties of plants that can provide food security for the future generations.

India is signatory of World Trade Organization (WTO). WTO has at least half a dozen intergovernmental agreements that directly affect agriculture. India become a member of OECD Seed Scheme from 23rd October, 2008 and participates in the five varietal certification schemes to facilitate International seed trade. In order to face the challenges of the international seed trade vis-à-vis to ensure

the availability of quality seed to Indian farmer, there is urgent need that the Indian scientist, policy makers, seed quality regulators and public and private sector seed producers may join their hands to make India a seed hub on global map.

Conclusion:

Seed is the basic and most critical input for sustainable agriculture. The response of all other inputs depends on quality of seeds to a large extent. It is estimated that the direct contribution of quality seed alone to the total production is about 15 – 20% depending upon the crop and it can be further raised up to 45% with efficient management of other inputs. Climate change, along with resource depletion and natural disasters, poses formidable challenges to Indian agriculture, largely sustained by smallholder farmers India's progress toward achieving Sustainable Development Goals (SDGs). Seed production helps to preserve biodiversity by maintaining and conserving genetic resources of crops, supports environmental sustainability which is critical for long-term food security. The seed production sector is a vital aspect of agriculture, supporting crop productivity, environmental sustainability, and economic growth. The developments in the seed industry in India, particularly in the last 30 years, are very significant. As India is signatory of World Trade Organization (WTO). WTO has at least half a dozen intergovernmental agreements that directly affect agriculture. Hence there is a need to Establishment of an effective system for protection of plant varieties, the rights of farmers and plant breeders and to encourage development of new varieties of plants that can provide food security for the future generations.

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