

We are pleased to present this book entitled "Recent Approaches in Sustainable Agriculture Development and Food Security, Crop Management, Forestry, Food Technology and Environmentally Balanced Production Enhancement". Ratnesh Kumar Rao, Secretary, Mahima Research Foundation and Social Welfare are not new to Agriculture students. With his vast experience in Academic activities, he has dealt this complex subject and edited, with practical approach and simple language, to meet the requirement of the students and teachers of Agriculture.

The New Vision for Agriculture initiative, led by the Consumer Industries Community of the World Economic Forum, works to develop a shared agenda for action and foster multi-stakeholder collaboration to achieve sustainable agricultural growth through market-based solutions. The initiative has defined a vision that highlights agriculture's potential as a positive driver of food security, environmental sustainability and economic opportunity worldwide. The group believes that achieving this vision will require the leadership and capacity of all stakeholders—government, business, civil society, academia, farmers and consumers.

The large gap between potential and current crop yields makes increased food production attainable. India's low agricultural productivity has many causes, including scarce and scant knowledge of improved practices, low use of improved seed, low fertilizer use, inadequate irrigation, conflict, absence of strong institutions, ineffective policies, lack of incentives, and prevalence of diseases. Climate change could substantially reduce yields from rainfed agriculture in some countries. With scarcity of land, water, energy, and other natural resources, meeting the demands for food and fiber will require increases in productivity.

Though this book is mainly deals with the agriculture research and education, it will also be very handy for those who desire to start Agricultural Research in Food security.

We are sure this will be accepted very much by the students, teachers, scientists and Stakeholders of Agriculture all over the India. We solicit your encouragement in this endeavour.



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SEED PRODUCTION METHODOLOGY OF WHEAT FOR BETTER YIELD AND SECURE INCOME

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Agriculture is the lifeline of India and seed is the lifeline of any crop production system. In all agricultural inputs only seed had inbuilt potential, whereas other agricultural inputs i.e. nutrients, irrigation, and plant protection chemicals only contribute to the production potential of seed. If potential of seed is poor, optimum yield is not possible of judicious use of inputs. Many research results indicate that the 15-20 percent yield increase in wheat is attributed to good potential quality seed. Quality seed is a very important thing for increasing the production. It is necessary to maintain the varietal characteristics of seed, and control the seed borne disease for the production of high quality seed. "Seed" means a matured ovule having embryonic plant, food substance and protective cover or seeds or germ which can be used in sowing or planting to produce crop by reproducing in sexual or asexual mode. Seed is a live embryo in dormancy mode with or without cover, which can grow as a fully developed plant under a favorable environment. Wheat is most important food crop in India serving as staple food for more than 1 billion population. Quality seed of improved and high yielding wheat varieties has played key role in green revolution and made the country self-sufficient in food grains. For full exploitation of genetic potential of a variety, seed must have high genetic as well as physical purity; therefore, seed production requires systematic and technical efforts. The quality seed should have following qualities.

- Seed should be genetically pure and viable.
- It should have high germination, vigour, germination rate and sprouting capacity.
- It should have physical purity (Free from other crop seed, weed seed & inert matter).
- It should be free from disease and pest infestation.
- It should have good phenotypic appearance in terms of size, shape, colour and weight for producing good produce.
- It should have standard moisture level (maximum 12%) in wheat seed, which should clink while biting and shaking by hand.

Classes of Seed: The Indian seed programme largely adheres to the limited generations' system for seed multiplication in a phased manner. The system recognizes four generations namely nucleus, breeder, foundation and certified seeds. This ensures adequate safeguards for quality assurance in the seed multiplication chain to maintain the purity of the variety as it flows from the breeder to the farmer.

Nucleus Seed: The process of development of certified seed for distribution to the farmer of a distant variety is called nucleus seed. This is the cent percent pure seed at genetic and physical levels. Seed produced by the plant breeder who evolved the variety without any impurity. The seed is produced strictly under isolation and maintained by the institute that developed the variety. This is the source of breeder seed.

Breeder Seed: Breeder seed is the progeny of nucleus seed of a variety and is produced by the originating breeder or by a sponsored breeder. Breeder seed is subjected to monitoring which is conducted by breeder concerned and personnel of seed certification agencies. It provides cent percent genetic and physical purity for the production of the foundation seeds. The golden yellow tag is issued for this category by the seed certification agencies. The monitoring committee consists of representatives of state seed certification agencies, national or state seed corporations, ICAR nominee and the concerned breeder.

Foundation Seed: Foundation seed is the progeny of breeder seed and is required to be produced from breeder seed or from foundation seed which can be clearly traced to breeder seed. The responsibility for production of foundation seed has been entrusted to the NSC, SFCE, State Seeds Corporation, State Departments of Agriculture and private seed producers, who have the necessary infrastructure facilities. Foundation seed is required to meet the standards of seed certification