



Figure 2: Agro morphological characterization of Rice



Figure 3: Agro morphological characterization of Wheat

SEED VARIETY IDENTIFICATION USING DNA FINGER PRINTING TECHNOLOGY

DNA finger printing is a new advancement tool in molecular techniques and its application helps breeders and seed analysts in crop research, conservation of biodiversity and seed varietal identification. The centre is providing DNA finger printing using SSR marker in cereals, legumes and vegetable crops for variety release and registration process.

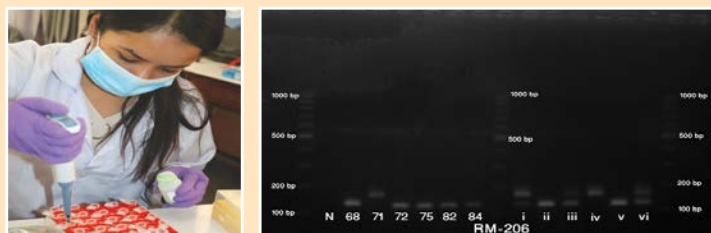


Figure 4: DNA extraction in molecular lab

GENERAL SEED TESTING

Following quality testing services are provided to seed producers, groups, seed companies and researchers etc.

- ✦ Moisture test
- ✦ Physical purity test
- ✦ Germination test
- ✦ 1000 grain weight test
- ✦ Proficiency seed sample test.



Figure 5: Germination test of rice seed



Figure 6: Germination test of maize seed

SPECIAL SEED TESTING

- ✦ Tetrazolium salt test
- ✦ Vigor test
- ✦ Viable test
- ✦ Cold testing
- ✦ Ageing test
- ✦ Biochemical test
- ✦ DNA fingerprinting



Figure 7: Vigor test



Figure 8: Biochemical test



Figure 9: Tetrazolium salt test

MAJOR ACTIVITIES

- ✦ Biochemical test for varietal identification of vegetable species for genuineness of cultivars.
- ✦ Descriptors of pre release varieties were developed based on agro-morphological traits.
- ✦ Establishment of seed production technology as per seed production environment.
- ✦ DNA fingerprinting using SSR marker for identifying genetic diversity among promising genotypes of different crops.

MAJOR ACHIEVEMENTS

- ✦ DNA fingerprinting of Garima rice variety was done and documented.
- ✦ Suitable hermetic storage structures (Super grain bag, PICS bag and Safe grain bag) identified for grain storage.
- ✦ Zeolite beads identified as suitable drying storage tool for vegetables and high value crops.
- ✦ Seed germination percentage and viability increased if maize seed and roasted wheat is kept in ratio is 5-6:1 in air tight container or plastic bag.
- ✦ Seed pre-treatment techniques for rice, finger millet, sesbania etc. established to break the seed dormancy/hard seed.
- ✦ Genetic and physiology of seed dormancy in improved rice varieties identified using SSR markers.

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INTRODUCTION

Seed Science and Technology Research Unit was established as first seed testing laboratory in 1962 in Agronomy Division under the Department of Agricultural Development (DoAD). It got accredited to the International seed Testing Association (ISTA) in 1964. In early seventies, seed testing laboratory moved to Agriculture Botany Division (ABD) to work in close with the breeders. Seed Technology and Improvement Program (STIP), Central Seed Science and Technology Division (CSSTD) were the upgraded modalities and given the divisional status for bridging between research, extensions and end users of seed through seed certification, field inspection, seed testing, seed technology research and planning and monitoring of source seed production. On inception of Nepal Agricultural research Council (NARC), Seed Research as a Unit merged again in ABD and is entitled to conduct seed research on practical problems and support in strengthening national seed system in use and distribution of quality seed.

Seed Science and Technology Division (SSTD) as an independent division under NARI had approved by the 41st NARC Council meeting. It had been effective as central division of seed in Khumaltar from 2010/11 fiscal year. Later on in fiscal year 2019/20, 59th NARC Council meeting changed its name as “National Seed Science Technology Research Centre (NSSTRC)” with mandates. It acts as focal center for seed components in NARC assisting the use and production of quality seed through research for agricultural development and work on seed in close association and coordination with stakeholders of seeds under National Seed Board (NSB).

OBJECTIVES

- To carry out the seed technology research on problems associated with quality seed on seed production, harvesting, post-harvest handlings, storage, seed morphology and seed physiology based on seed quality testing protocols.
- To develop and standardize seed testing techniques through research supporting the seed certification system.
- To establish and coordinate the source seed production in NARC farm/stations and its distribution.
- To provide seed testing services to seed producers, seed companies, I/N/GOs with seed component, research entities, farmers etc.
- To work in close collaboration with the different stakeholders (central and provincial) of national and provincial level on seed problems in coordination with seed quality control centre, central seed testing laboratory and provincial seed testing laboratory.

MANDATE

- Promote and prioritize seed sector research and development.
- Develop road map, directives and monitor of seed science related programme at national level.
- Monitoring and evaluation of source seed production and seed quality under NARC stations.
- Preparation of seed science related programme and policies to support national seed system.
- Conduct research on seed quality, seed testing and provide DNA finger printing service.
- Capacity building of manpower involved in seed sector research and development.
- Coordinate, liaise and collaborate with national and international organizations under the directives of NARC.

THEMATIC THRUST AREAS FOR RESEARCH

Seed is the most essential and viable input in agriculture. Quality seed leads to increase in production and productivity by 15 to 20%. Its quality is affected by biotic and abiotic factors at various stages during production, harvesting, post-harvest handlings and storage. Based on agricultural research priorities and practical problems demanded by time, space (location specific) and clients, following basic and adaptive research areas on seed technology with practical implication have been identified.

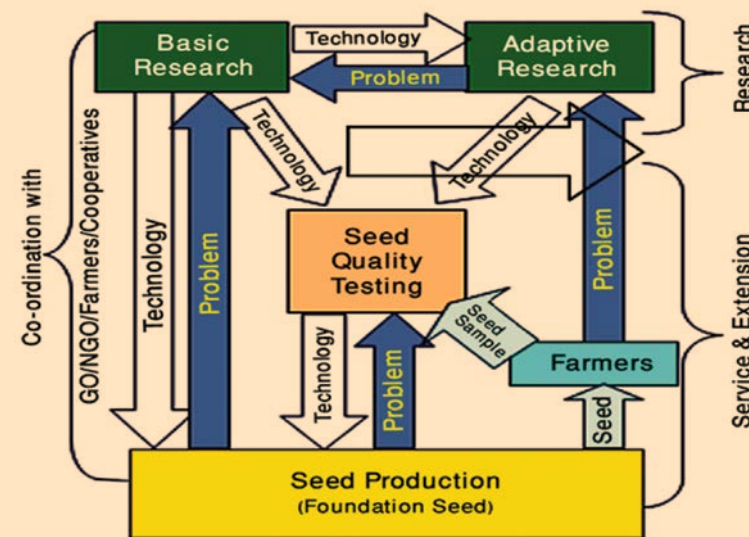


Figure 1: Working modality of NSSTRC

SEED PRODUCTION TECHNOLOGY

Seed production follows a definite sequence of steps and needs constant surveillances and immediate actions. Introduction of new varieties like hybrid, inbred, forage varieties; diverse cropping systems, cultivation of a range of crop species with different biology, climate change and incidence of diseases/pests and their threats are major factors that may create problems in seed production. Seed crop physiology, crop husbandry, the biology

of seed maturation, role of minerals and micronutrients are the important aspects in seed production which requires intensive research for harvest of quality seed. Following points should be considered to adopt the quality seed production:

- Appropriate site selection
- Suitable varieties/genotypes
- Optimum isolation distance
- Optimum fertilizer dose
- Regular monitoring and field inspection
- Rouging
- Harvesting
- Processing
- Seed certification / Truthful labeling
- Storage

SEED TESTING TECHNOLOGY AND SEED PHYSIOLOGY

Seed testing for moisture%, germination% and purity% is carried following the methods standardize by ISTA. Testing determines the planting value of seed. Timely filed inspection and lab testing procedures are required for seed certification and truthful labeling. However, discrepancies in test results do occur in seed testing. In these circumstances the center undertaken research to develop the appropriate testing technology in availing the assessment of quality seed and supports to develop the seed standards.

SEED MORPHOLOGY AND TAXONOMY

Genetic purity is one of the quality attributes of seed. It is maintained through isolation, field inspection and physical purity and pre and post-harvest control plot tests at laboratory. It is necessary to undertake the practical researches and develop the distinguishing and identifying characters of each named varieties to avoid the genetic contamination in the standing up field and seed. The center, therefore undertakes the genuineness cultivar testing through agro-morphological characterization, biochemical and molecular testing.

SEED POST HARVEST, HANDLING AND STORAGE TECHNOLOGY

Seed is a living material which deteriorates time over and finally dies. Seed processing, drying, seed moisture%, seed treatment, seed storage containers, storage condition and mechanism of seed dissemination have great effect on seed viability and longevity. The center facilitates in carrying research on these areas and it has also an experience of working in collaboration with the national and international seed technology institutions.