SEED QUALITY TESTING

SEED TESTING

It is an analysis of some physical parameters and the physiological quality of a seed lot, based on a representative Sample

Quality is the measure of potential performance of a seed lot under optimal conditions

Sampling

The quality of a seed lot is measured by testing a representative sample of that lot. Sampling is the first and the most important step in seed testing. The entire sample of seed on which a seed analysis has to be done need not necessarily be brought to the seed testing laboratory as it may be bulky and hence not very convenient to transport.

Primary Sample
Composite sample
Submitted sample
Working sample

Trier

Seed weight – 1000 seeds

Purity – Weight of pure seed X 100
Total weight of working sample

Purity Work Board →

Moisture Content - Fresh weight – Dry weight X 100
Fresh weight

Indirect Tests of Viability

Cutting Test – Direct inspection of endosperm and embryo of cut open seed

Excised Embryo Culture

embryo is carefully excised after soaking and softening of the seed coat, then cultured on moist filter or blotter paper in covered dishes under light for 10 to 14 days at temperatures 18°C to 20° C.Viable embryos remain firm and white, begin growth or turn green within this period, while dead ones turn dark or become covered with mould

Indirect Viability Test

TTZ Test – 2,3,5 Triphenyl Tetrazolium Chloride

By measuring the metabolic (dehydrogenases) activity in the seeds

Metabolically active tissue stains either red or bright pink

Radiographic methods

X-ray method permits detection of empty, mechanically damaged and abnormally developed internal structures and assessment of seed viability with a contrast agent (e.g. $BaCl_2$, $CHCl_3$)

Germination Test – To estimate the maximum number of seeds which can germinate in optimum conditions.
Direct test on pure seed fraction, set in 4 replications of 100 seeds each.
Substratum – Top of Paper, Between Paper, sterilized white sand
Temperature - 30^0C, 20^0C or alternating 30/20 ^{0}C

Normal germinants
Abnormal germinants
Ungerminated seeds
- **Hard seeds**
- **Fresh seeds**
- **Dead seeds**

Tolerance- Difference between highest and lowest germination of 100 seed replicates

Seed Germinator

Viable and non-viable seeds of *Schleichera oleosa* seeds based on TTZ staining patterns

DORMANCY IN SEEDS

A dormant seed does not have the capacity to germinate in a specified period of time under any combination of normal physical environmental factors that are otherwise favourable for its germination

Seed dormancy is nature's way of setting a time clock that allows seeds to initiate germination when conditions are normally favorable for germination and survival of the seedlings. For example, many temperate species (Cornus spp., Maples, etc.)

Physical dormancy

Physiological dormancy

Techniques to Break Dormancy

Seed Scarification - Seed coat (external dormancy) results from a seed's hard seed coat that is impervious to water and gases. The seed will not germinate until the seed coat is altered physically Any process of breaking, scratching, or mechanically altering the seed coat to make it permeable to water and gases is known as scarification.

Soaking them in concentrated sulfuric acid

For mechanical scarification, seed coats can also be filed with a metal file, rubbed with sandpaper, nicked with a knife

Hot water scarification

Physiological dormancy -- The second type of imposed dormancy found in seeds is internal dormancy regulated by the inner seed tissues.

Cold stratification (moist-prechilling) involves mixing seeds with an equal volume of a moist medium (sand or peat, for example) in a closed container and storing them in a refrigerator (approximately 3-5^{o}C).

Warm stratification is similar except temperatures are maintained at 20^{o}C to 30^{o}C, depending on the species.

Double dormancy

First scarification then stratification

Chemical and hormonal pretreatments

Several chemical compounds promote seed germination through interaction with the physiological mechanisms of some dormancy types. Growth regulators such as Gibberellic acid and Benzyl adenine, nitrogenous compounds like Potassium nitrate (KNO_3) and thiourea are some of the common chemicals used.

Thanks