

Determination of Germination Percentage of the Supplied Seed Sample

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Germination

Seed germination is the process of resumption of active growth by the embryo resulting in the rupture of the seed coat and emergence of young plant under favorable conditions.

In a laboratory test, the emergence and development of the seedlings to a stage where the aspect of its essential structures indicates whether or not is able to develop further into a satisfactory plant under favorable conditions of soil.

Germination test

The test by which supplied seeds may be determined whether they germinate or not under favorable conditions.

Percentage of germination

The percentage of germination indicates the proportion by number of seeds which have produced normal seedlings within specified period under favorable conditions. It is calculated by using the following formula-

$$\text{Percentage of germination} = \frac{\text{No. of normal seedlings}}{\text{No. of seeds set for the test}} \times 100$$

Objectives

1. To determine the optimum seed rate.
2. To determine the planting value of seed.
3. To determine the market value of seed.
4. To determine the stage of dormancy of seed.
5. To compare the value of different seed lots.

Working sample for the germination test

The seeds used for the germination test must be taken from the pure seed fraction of purity test. The working sample contains 400 seeds and these are planted in replicates (batches) of 4x100 or 8x50. Seeds should be counted at random.

Substrata/media used: Filter paper, sand, soil, saw dust etc.

Materials required:

1. Seed sample
2. Filter paper
3. Water
4. Petri dish
5. Wash bottle
6. Forceps.



Sanitary conditions of substratum and materials

The substratum and materials should be kept as clean as possible in order to minimize the growth and spread of fungi and bacteria on test.

Procedure:

Four hundred seeds were counted at randomly from the well-mixed pure seed which was supplied. Care was taken so that there is no selection of seeds thus causing biased results. The total students were grouped into four. Each grouped placed one hundred seeds in one Petri dish. Thus four hundred seeds were placed in four replications. Filter paper was placed in the Petri dish and moistened by drops of water from a wash bottle before seed placement. The seeds were placed maintaining uniform distance from one another to reduce any competition between seeds.

Then the Petri dish was kept in a well ventilated room at room temperature for certain period (prescribed test period by ISTA). We observed the tested seed everyday and counted normal seedling which were separated on the basis of intact seedlings i.e., seedlings with all their essential structures were well developed, complete in proportion and healthy. According to the International Rules of ISTA, for germination test the prescribed test period is as follows:

Seed	First count (days)	Final count (days)
Rice	5	14
Wheat	4	8
Maize	4	7
Barley	4	7
Chick pea	5	8
Black gram	4	7
Lentil	5	10
Field pea	5	8
Cowpea	5	8
Soybean	5	8
Groundnut	5	10
Mustard	3	7
Linseed	3	7
Cotton	4	12
Jute	3	5
Tobacco	7	16

Evaluation of seedlings

A. Normal seedling

1. A well developed root-system including a primary root except for those plant normally producing seminal roots.
2. A well developed and intact hypocotyle and epicotyle without damage to the tissues and normal plumule.
3. In the poaceae (gramineae), a well developed primary leaf within or emerging through the coleoptile.
4. One cotyledon for seedlings of monocots and two cotyledons for seedlings of dicot.



B. Abnormal seedling

1. Seedling which was lacking in any one of its essential structures or the structures grown were not balanced.
2. All damaged, deformed and decayed seedlings.
3. Seedlings short and weak or spindly or watery.
4. Seedling which fails to develop a green color.

C. Hard seed

Seeds of Fabaceae (Leguminosae) and Malvaceae, which remain hard at the end of the prescribed test period because they have not absorbed water due to an impermeable seed coat, are classified as hard seeds.

D. Dead seed

Seeds which at the end of the test period are neither hard nor fresh and have not produced seedlings are classified as dead seed.

Replications	No. of seeds set for the test	No. of normal seedlings	No. of abnormal seedlings	No. of hard seeds	No. of dead seeds
R ₁					
R ₂					
R ₃					
R ₄					
Total					

Results**Calculation**

$$\begin{aligned} \text{Percentage of germination} &= \frac{\text{No. of normal seedlings}}{\text{No. of seeds set for the test}} \times 100 \\ &= \\ &= \\ &= \quad \% \end{aligned}$$

Precautions

1. At least four hundred seeds should be taken for the test.
2. The testing seeds should be taken from pure seed sample.
3. Counting of 400 seeds should be done without discrimination as to size and appearance.
4. Careful attention should be given to the spacing of seeds in the Petri dish to reduce the possibility of contact with each other.
5. The sub-stratum and other materials should be clean as possible.
6. Petri dish should be kept in a growth chamber maintaining the temperature of 18-22°C and relative humidity of about 75%.

