

**FACULTY OF AGRICULTURAL SCIENCES
AND ALLIED INDUSTRIES**

SEED GERMINATION TEST

It is defined as the emergence and development from the seed embryo, of those essential structures, for the kind of seed in question, indicates its ability to produce a normal plant under favourable conditions.

Principles

Germination tests shall be conducted with a pure seed fraction. A minimum of 400 seeds are required in four replicates of 100 seeds each or 8 replicates of 50 seeds each or 16 replicates of 25 seeds each depending on the size of seed and size of containers of substrate.

The test is conducted under favourable conditions of moisture, temperature, suitable substratum and light if necessary. No pretreatment to the seed is given except for those recommended by ISTA.

Materials required

A. Substratum

The substratum serves as moisture reservoir and provides a surface or medium for which the seeds can germinate and the seedlings grow. The commonly used substrata are sand, paper and soil.

I. Sand

a. Size of sand particle

Sand particles should not be too large or too small. The sand particles should pass through 0.80 mm sieve and retained by 0.05 mm sieve.

b. Toxicity

Sand should not have any toxic material or any pathogen. If there is presence of any pathogen, found, then the sand should be sterilized in an autoclave.

c. Germination Tray

When we use the sand, germination trays are used to carry out the test. The normal size of the tray is 22.5 x 22.5 x 4 cm. They tray may either zinc or stainless steel.

B. Method of seed placement

1. Seeds in sand(s)

Seeds are planted in a uniform layer of moist sand and then covered to a depth of 1 cm to 2 cm with sand.

2. Top of sand (TS)

Seeds are pressed into the surface of the sand

C. Spacing

We must give equal spacing on all sides of facilitate normal growth of seedling and to avoid entangling of seed and spread of disease. Spacing should be 1-5 times the width or diameter of the seed.

D. Water

The amount of water to be added to the sand will depend on size of the seed. For cereals, except maize, the sand can be moistened to 50% of its water holding capacity. For large seeded legumes and maize sand is moistened to 60% water holding capacity.

II. Paper

Most widely used paper substrates are filter paper, blotter or towel (kraft paper). It should be have capillary movement of water., at vertical direction (30 mm rise / min.).It should be free from toxic substances and free from fungi or bacteria.It should hold sufficient moisture during the period of test.The texture should be such that the roots of germinating seedlings will grow on and not into the paper.

A. Methods

a. Top of Paper (TP)

Seeds are placed on one or more layers of moist filter paper or blotter paper in petridishes. These petridishes are covered with lid and placed inside the germination cabinet. This is suitable of those seeds which require light.

b. Between Paper (PP)

The seeds are germinated between two layers of paper

c. Roll Towel Method

The seeds are placed between two layers of paper and rolled in towels. The rolled towels are placed in the germinator in an upright position.

d. Inclined Plate Method

Germination on glass plate with germination paper and kept at an angle of

45°

III. SOIL

Should be non-caking, free from any large particles. It must be free from weed seeds, bacteria, fungi, nematode or toxic substances. Soil is not recommended for reuse.

B. TEMPERATURE

Required temperature is maintained (most seeds germinate between 20-30 °C).

C. LIGHT

Light should be provided for seeds requiring light for germination (e.g.) lettuce and tobacco.

GERMINATION REQUIREMENTS FOR DIFFERENT CROPS

Crop	Substratum	Temperature (°C)	First count days	Final Count days	Pre-treatment
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Paddy	BP,TP,S	20-30	5	14	Preheat (50°C)soak in H ₂ O or HNO ₃ 24 hrs.
Maize	BP,S	20-30	4	7	-
Bajra	TP,B	20-30	3	7	0.2 % KNO ₃ (2-3 hrs) Prechill
Sorghum	P	20-30	4	10	-
Pules	TP,BP	20-30	4	6	-
Red gram	BP,S	30	4	7	-
Black gram	BP,S	20-30	5	8	-
Green gram	BP,S	20-30	5	8	-
Bengal gram	BP,S	20	5	8	-
Cowpea	BP,S	20	7	14	-
Peas	BP,S	20-30	5	10	-
Castor	BP,S	20-30	4	10	-
Groundnut	TP	20-30	4	12	Remove shells
Sunflower	BP,S	20-30	7	14	Ethrel (25 ppm) 48 hrs.
Sesame	TP,B	20-30	5	14	(Hot water 85° C 1
Cotton	P	20-30	7	14	min) KNO ₃
Brinjal	TP,B	20-30	4	21	KNO ₃
Tomato	P	15-20	6	21	Prechill
Chillies	TP,B	20-30	7	14	prechill
Bhendi	P	20-30	4	10	Prechill,
Onion	BP,S	20-30	5	10	KNO ₃ light
Carrot	TP,B	30-35	5	14	-
Radish	P	20-30	4	14	-
Cabbage	TP,B	20-30	4	14	-
Cauliflower	P				
Ash gourd	T				
Bitter gourd	P				
Bottle gourd	S				
	BP,S				
	BP,S				

GERMINATION APPRATUS

1. Germination Cabinet / Germination

This is called chamber where in temperature and relative humidity are controlled.

We can maintain the required temperature.

2. Room Germinator

It works with same principle as that of germinator. This is a modified chamber of larger one and the worker can enter into it and evaluate the seedlings. Provisions are made to maintain the temperature and relative humidity. This is used widely in practice.

3. Counting Board

This is used for accurate counting and spacing of seeds. This consists of 2 plates. The basal one is stationary and top one is movable. Both top and basal plates are having uniform number of holes viz., 50/100, when the plates are in different position. After taking the sample, the top plate is pulled in such a way that the holes are in one line so that the fixed number of seeds fall on the substratum.

4. Vacuum Counter

Consists of a head, pipe and wall. There are plates of 50 or 100 holes which can be fitted to the head. When vacuum is created the plate absorbs seeds and once the vacuum is released the seeds fall on the substrate.

5. Impression Board

Made of plastic / wood with 50 or 100 holes/pins. Here the knobs are arranged in equal length and space. By giving impression on the sand it makes uniform depth and spacing for seed.

D. Seedling Evaluation

ISTA classified the seedlings into different categories based on the development of essential structures.

IMPORTANT QUESTIONS:

1. Explain the requirements of germination test.
2. Define Germination test.
3. Describe the types of germination chambers used in germination test.
4. Briefly explain the factors which affect seed germination.