Methods to seed identification:

1- morphological method:

A- Seed form and shapes:

There are different kinds of seed shape:

- Globular e.g. Chick pea, Green gram.
- Lens-shaped e.g. Lentil.
- Kidney- shaped e.g. Broad bean and Kidney bean.
- Irregular e.g. Sugar beet seed.

B- Seed size:

Measuring the size of plant organs and parts is important in description and identification. Generally size of parts refers to linear measurements; millimeter units should use throughout measuring seed size and divided into five groups:

- Very small e.g. Tobacco.
- Small e.g. Barley, Wheat.
- Medium e.g. Green gram.
- Big e.g. Cow pea.
- Very big e.g. Broad bean, Ground nut.

C- Seed surface:

- Glossy: e.g. Kidney bean.
- Roughish: e.g. Chick pea.

D - Seed colors:

- White e.g. Safflower.
- Green: e.g. Green gram.
- Brown: e.g. Broad bean.
- Black: e.g. Black bean.
- Speckled: e.g. Cow pea.

2- Feeling method (by feel):

When the morphological structure unable to description the seed characters, the feel method follows by smelling or tasting or rubbing.

3-Laboratory methods:

A- Chemical testing (analyzing treatment):

This method uses to distinguishing between the many varieties in one species for example differentiation the varieties of wheat by phenol 1%.

B- Pathology:

Able to distinct varieties by its immunity.

C- Anatomy :

By the transverse or longitudinal sections of seed, can distinguish the embryo or cotyledons position in seed to determination.

D- Study of protein structure:

Protein contains and hormones analyzing process by using the electrophoresis method.

Advantage of seed identification:

1- The seed sizes using to limiting seed amount for lot of land (area) requirement for example, the broad beans need 20-30kg/donum, while for rape 1-2kg/ donum, when on the other hand to cultivation tobacco in green house needs only one table spoon of seed.

2- The relationship between seed size and soil preparation, the small seed cultivation needs good smothering, pulverization and a little depth for seeding to obtain better grow, and sequent plentiful yield.

3- Seed weight and size also has an important role to determination irrigation type and number with time of irrigation.

4- Seed form (shape) and its surface structure limit the germination period and a requirement of water and available water of soils. In other hand some crop seeds, e.g. most legume seeds needed maceration process before cultivation.

5- Seed types have different farming and seed bed.

Seed germination:

Seed germination is the growth of the embryo, resulting in emergence of a shoot (epicotyls) and root (radical), to germinate the seed must be a live, not dormant, have a suitable temperature, adequate moisture, an oxygen supply, and for some species light.

The (Factors) Conditions necessary for germination are:

1- **Moisture:** water is necessary for rapid germination, which the soil contains about 50-70% of its water holding capacity. Field crops seed start to germinate when their moisture content reaches 26-75%.

2- **Oxygen:** many dry seeds particularly peas & beans are impervious to gases, including oxygen.

3- **Temperature:** The temperature range for germination of field crop seeds is from 20-30 C°.

4- **Light:** Most field crop seeds germinate in either light or darkness. Many of the grasses germinate in the presence of light especially when the seeds are fresh.

Process of germination:

When seeds placed under the proper conditions:

1- Seed capable of immediate germination gradually absorb water and the seed swollen.

2- Soluble nutrient particularly diffused from cell to cell and biological process of germination will initiate.

3- Emerging seedling export to light begins photosynthesis early. The growing embryo ruptures the seed coat, the radicle first organ to emerge. It is soon following by the young shoot (plumule).

Type of germination:

1- Dicot Germination

The part of the plant that first emerges from the seed is the embryonic root, termed the radicle or primary root. It allows the seedling to become anchored in the ground and start absorbing water.

After the root absorbs water, an embryonic shoot emerges from the seed. This shoot comprises three main parts: the cotyledons (seed leaves), the section of shoot below the cotyledons (hypocotyl), and the section of shoot above the cotyledons (epicotyl).

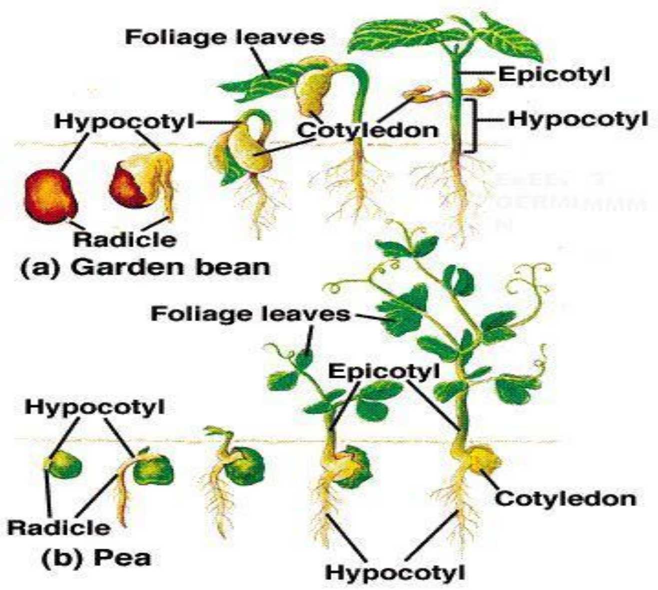
The way the shoot emerges differs among plant groups.

- Epigeous (or epigeal) germination:

In epigeous, the hypocotyl elongates and forms a hook, pulling rather than pushing the cotyledons through the soil. Once it reaches the surface, it straightens and pulls the cotyledons and shoot tip of the growing seedlings into the air, e. g. Beans.

- Hypogeous (or hypogeal) germination:

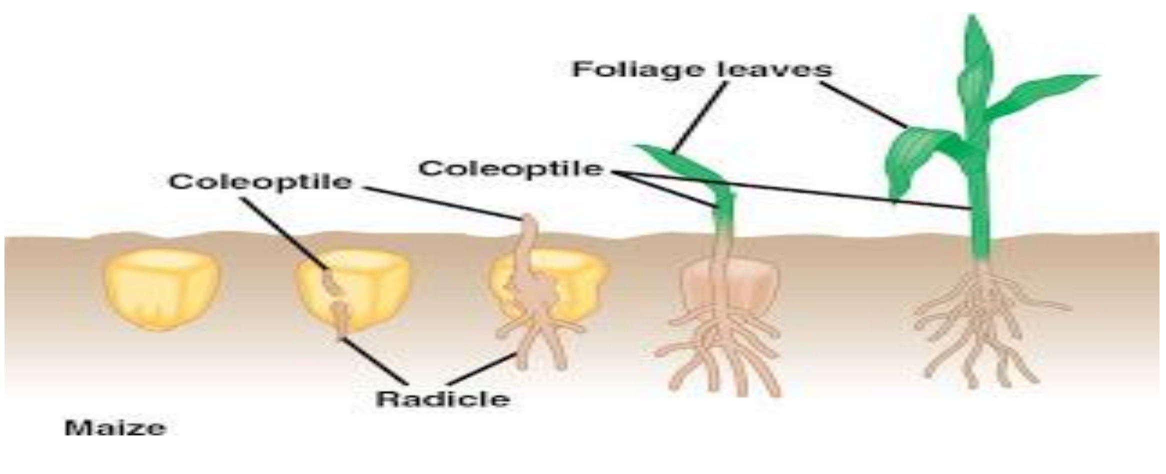
  In hypogeous, the epicotyl elongates and forms the hook. In this type of germination, the cotyledons stay underground where they eventually decompose, e. g. Peas.



a)Epigeal germination
b)Hypogeal germination

2- Monocot germination

In monocot seeds, the embryo's radicle and cotyledon are covered by a coleorhiza and coleoptile, respectively. The coleorhiza is the first part to grow out of the seed, followed by the radicle. The coleoptile is then pushed up through the ground until it reaches the surface. There, it stops elongating and the first leaves emerge.



Dormancy in seeds:

A dormant seed is one that is unable to germinate in a specified period of time under a combination of environmental factors that are normally suitable for the germination of the non-dormant seed.

Causes of dormancy:

Dormancy may result from seed characteristics or environmental conditions as follows:

1- Thick or hard seed coats prevent intake of water and oxygen, e.g. legumes.
2- Seed coats interfere with the absorption of oxygen, e.g. oats & barley.
3- In some species the embryo is still immature.
4- The embryo in still other seeds appear to be mature but must undergo certain changes before they will germination.
5- Germination inhibitors which must undergo natural or applied chemical changes to permit germination.
6- High temperature during seed maturity may induce dormancy.

Mechanisms for maintaining and breaking dormancy:

1- Drying.
2- Cold.
3- Disruption of the seed coat (scarification).

1- Germination % $= \dfrac{\text{no. of sprout seeds from a certain time}}{\text{no. of total (whole) seeds}} \times 100$

2- Germination speed according to Maguire (1962) method:

$$G.S = \frac{\text{no. of natural seedlings at the } 1^{st} \text{ counting}}{\text{no. of days until } 1^{st} \text{ counting}} + \frac{\text{no. of natural seedlings at the } 2^{nd} \text{counting}}{\text{no. of days until } 2^{nd} \text{ counting}} + ---- + \frac{\text{no. of seedlings at final counting after fixing}}{\text{no. of days until fixing}} = ?\ \text{(seedling/day)}$$

3- Plumule elongation speed $= \dfrac{\text{average of shoot length}}{\text{no. of days}}$ (Cm./day)

4- Radicle elongation speed $= \dfrac{\text{average of root length}}{\text{no. of days}}$ (Cm./day)

5-Seed value:

Deals the real value of germination for pure seed sample:

$$\text{Seed value} = \frac{\%\ \text{purity} \times \%\text{germination}}{100}$$

Exercise:

The following data was obtained from 100 seed germination in Library:

a- The seed purity = 80%
b- The germinated seeds = 77 seeds
c- The first counting after 1 day = 0 seedlings
d- The second counting after 2 days = 0 seedlings
e- 0/3 , 8/4, 25/5, 36/6, 77/7, 77/8
f- The final counting after 8 days = 77 seedlings

Calculate:

1. Germination percentage?
2. Germination speed?
3. Seed value?

Calculation:

1- $G\% = \frac{77}{100} \times 100 = 77\%$

2- $G.S = \frac{0}{1} + \frac{0}{2} + \frac{0}{3} + \frac{8}{4} + \frac{25}{5} + \frac{36}{6} + \frac{77}{7} + \frac{77}{8}$

$= 32.5$ seedling/ day

3- $\text{Seed value} = \frac{80 \times 77}{100} = 61.6\%$