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CROP PRODUCTION TECHNOLOGY

UNIT II – Crop Selection And Establishment

Advantages of dormancy

- When seeds are matured and if there is a flood, the seeds would germinate which would result in loss of the quality in seeds.
- Dormancy results in protecting the seeds from unfavourable conditions.

Disadvantages

- Seeds cannot be used immediately after harvest due to dormancy, i.e. fresh seeds can't be used for sowing if the seeds have definite dormancy period.

Importance of good quality seed

- Plants reproduce sexually by seeds or asexually by vegetative parts
- Grains which are used for multiplication are called seeds while those used for human consumption are called grains.
- The seed/ planting material largely determines the quality and quantity of produce
- A good seed/plant material is genetically satisfactory and true to type fully developed and free from contamination, diseases and pests can also be used as seeds but grains are largely used for consumption and hence generally are not used as seeds.
- In case of banana, sugarcane, etc. vegetable parts are used as seeds.
- When compared to seeds, seed materials for banana and sugarcane are required in large quantities.

Characteristics of Good quality Seed

- Seed must be true to its type. That is it should be genetically pure , free from admixtures, and belong to the proper variety
- Seed should be pure, viable vigorous and high yielding ability. Only a particular variety should be present, e.g., if ADT 36 is taken, it should contain only the same variety
- The selected seeds much be free from weeds, seed borne diseases, insects and pests
- It should be in uniform in size and weight
- It should have optimum moisture content(8to12%)
- They should have high germination capacity or ability – more than 80% or 90%
- The seeds should be matured and should be bold without any shrinkage; should be uniform in size and shape

Advantages of using good quality seed

- Reduced cost of cleaning, standardization and disinfection
- Uniform germination thus avoiding replanting and gap filling
- Vigorous seedling growth which reduces weed and disease damage
- Uniform growth stages, maturity and products
- Reduced cost of seeds

Germination

- Germination is a protrusion of radicle or seedling emergence.
- Germination results in the rupture of the seed coat and emergence of seedling from embryonic axis

Factors Affecting seed Germination

1. **Soil** – Soil type, texture, structure and microorganisms greatly influence the seed germination
2. **Moisture** – When the seeds do not get the actual requirement of moisture in the soil the viability is lost. When the moisture is excessafter germination, it will lead to rotting of the sprouts.
3. **Temperature** – When it is above and below the optimum temperature, the germination rate will be affected
4. **Light** – the most effective wavelength for promoting germination is red 662 nm and 730 nm inhibits germination
5. **Soil Condition**

a) **Tilth**

i) Small seeds–fine tilth

ii) Moderate–medium tilth

iii) Large–coarse tilth

b) **Depth of sowing**

i) The seeds should be placed at optimum depth. When the seeds are placed at deeper layers they have to spend more energy for germination. When it is placed on soil surface, it will be taken away by birds/worked away.

ii) The thumb rule is to sow seeds to a depth of approximately 3 to 4 times diameter of the seed.The optimum depth of sowing for most of the field crops ranges between 3 to 5 cm depth

iii) The seeds sown should be protected from rodents or birds before germination by employing labourers to scare the birds at least for three days after sowing.

SELECTION OF SEEDS AND PRACTISING SEED TREATME NT

It is a process of selecting good, viable, more vigorous, true to type of the species from inferiors. It is the also to treating the seeds with chemical or botanical to augment the germination, growth promoters to invigorate the seeds, to make it free of pest and diseases, to harden the seeds to withstand drought, prolong the shelf life of seed etc.

Objectives of Seed Treatment:

The seeds are treated to

- Protect the seeds from the pest and diseases
- Protect from or repel birds and rodents
- Supply plant nutrients
- Soften the hard seed coat
- Facilitate the easy handling of seeds
- Induce drought tolerance

Methods of Seed Treatment

1. Dry Seed Treatment

In this method seeds are treated with powder form of pesticides especially during storage.

Examples: Seeds treated with Thiram @ four grams per kg of seed, Vasambu, Turmeric powder (1:100)and mixing red earth with red gram.

2. Wet Treatment:

Seeds are soaked in nutrient/chemical/pesticide solution.

3. Slurry Treatment:

Seeds or seedlings are dipped or mixed with slurry which is prepared by adding a binding material like rice gruel to the biofertilizers or bio-agents

4. Pelleting:

It is the coating of solid materials in sufficient quantities to make the seeds larger, heavier and to appear uniform in size for sowing with seed drills. Seeds are pelleted with pesticides as a protect against soil pests and as a repellant against birds and rodents.

5. Scarification:

It is the process of making the seed coat permeable for the developing embryo. This is done by scarifying the seeds with hard seed coat in a pestle and mortar.

6. Hot Water Treatment:

Water is boiled in a container which is 4 to 5 times of the volume of the seeds. The container is taken out of the burner or stove and kept on the wooden square. The seeds will be added to the container with hot water and allowed to cool down. After cooling the water is drained and seeds are dried under shade. The seeds are to be sown at the earliest possible.

7. Acid Treatment:

This is done for the cotton seeds. One kg of cotton seed is taken in a plastic bucket and 100 ml of conc. H_2SO_4 is carefully added and the seeds are stirred fast with a wooden stick for about three minutes and repeatedly washed with water. The seeds are then shade dried.

8. Leaching:

The seeds are soaked in running water or by frequently changing the water for 12 – 24 hrs.

This is done to remove any germination inhibitor.

9. Seed hardening:

It is the process of soaking seeds in water or chemical solution and drying back to original moisture content to induce drought tolerance in emerging seedlings.

10. Hormonal Treatment

GA_3 500 ppm solution is used for soaking the seeds for 12 hrs to break the dormancy. Cytokinins and ethylene can also be used.

Seed Rate

It is normally referred as the quantity of the seeds of the crop in reference needed to take up sowing or planting for a unit area *viz.* per hectare. The seed rate depends upon many factors; they are:

a) **Number of plants need to be established per unit area**

Usually the plant population varies due(referpreviousse ction2.4)

i. To variety,
ii. Method of stand establishment,
iii. Purpose of cultivation,
iv. Season and locality etc

b) **Allowance factor to ensure the plant population.**

a.To establish rice in one hectare

i. Werequire6,66,666plants(other wise called hills)if the variety is shorter in duration (15 x 10 cm)

ii. It will be 5,00,000 plants formed ium duration(20x10cm)
iii. And it is only 3,33,333 if the variety is longer in duration(20 x 15)

c) **Weight of the seed**: Seed rate is in general referred as weight per unit area, then,to establish the same number of seedlings, the seed rate varies due to varying seed size. For example
   i. Variety *White Ponni* has 66,666 number of seeds per kg whereas
   ii. Hence seed rate in weight varies due to individual grain weight.

METHODS OF SOWING (PLANTING)

Sowing **is the process of planting seeds.** An area or object that has had seeds planted will be described as being **sowed**.

There are different methods of sowing such as Broadcasting, Dibbling, Drilling, Seed dropping behind the plough, Transplanting, Hill dropping and Check row planting.

i) Broadcasting

- Broadcasting is the process of random scattering of seed on the surface of seedbeds.
- It can be done manually or mechanically both.
- When broadcasting is done manually, uniformity of seed depends upon skill of the man.
- Usually higher seed rate is obtained in this system.
- Mechanical broadcasters are used for large-scalework.
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ii) Dibbling

- Dibbling is the process of placing seeds in holes made in seedbed and covering them. In this method, seeds are placed in holes made at definite depth at fixed spacing.
- The equipment used for dibbling is called dibbler.

iii) Drilling

Drilling consists of dropping the seeds in furrow lines in a continuous flow and covering them with soil. spacing and proper amount of seed to be sown in the field. Drilling can be done by (1)Sowing behind the plough(2)Bullock drawn seed drills

(3)Tractor drawn seed drills.

- Seed metering may be done mechanically.
- The number of rows planted may be one or more.
- This method is very helpful in achieving proper depth, proper

(4)Seed dropping behind the plough

It is very common method used in villages. It is used for seed like maize, gram, peas, wheat and barley.

- A man drops seeds in the furrow behind the plough. Sowing behind the plough can be done by a device known as malobansa. It consists of a bamboo tube pro shaped mouth.

iv) Transplanting

- Transplanting consists of preparing seedlings in nursery and then planting these seedlings in the prepared field.
- It is commonly done for vegetable and flowers. It is very time consuming operation. Equipment for placing plants in the soil is called transplanter.

SEED DRILL