Practical-7

Calculation of Seed Requirement for Important Vegetable Crops

Exercise 7.1: Calculation of quantity of seed required for sowing French bean, okra and turnip in 1000 m^2 area

OBJECTIVE:

- To calculate the quantity of seed required for sowing a unit area for different vegetable crops.

Delivery schedule: 01 period.

Student's expectations/learning objective:

- To illustrate the method to work out the quantity of seed for an unit area.

Handouts/material /equipment's required: Paper sheet and pen to note down the steps *etc.*

Pre-learning required: Recommended spacing to raise a particular vegetable crop, germination percentage, seed purity and test weight.

Introduction:

Seed is the most important component of vegetable production. Quality seed determines the success of cultivating a healthy and economic crop. Good quality seed should have following characteristics:

Genetic purity: The seed should be genetically pure and true to the type. Therefore, always procure seed from a reliable source as it is the most costly input.

Physical purity: The seed should be free from the mixture of other crops, weed seeds, chaff, stones, soil particle *etc.* The inert material affects the seed quality by influencing the seed requirement and germination percentage.

Uniformity in seed shape, size and colour: These characters like seed size and shape affect the viability and germination percentage of the crop. In general, undersized seeds are either immature or diseased and further on sowing give weak plants.

Seed maturity: Always harvest seed from fully mature crop as seeds from premature crop are poor in quality.

Seed boldness: Many aspects are taken into consideration with respect to seed boldness. The seed should not be damaged by insects or during threshing. Dull spots on the seed surface indicate disease or insect infestation. Ruptured or broken seeds are easily attacked by soil borne diseases.

Age of seed: Seed should be fresh and not very old as the old seed lose their viability and germination ability. Old seeds are comparatively dull than fresh seeds.

Germination ability: This is the most important characteristic with regard to the seed quality. The seed rate is decided on the basis of its germination percentage. The seed with high seed germination percentage are better for sowing.

Seed viability: It is essential to know about the seed viability as the seed may loose viability on exposure to high temperature and humidity in storage or due to some disease or insect attack. If embryo is damaged then the viability of the seed is lost.

Steps to be taken into consideration for calculating the quantity of seed required for sowing a unit area

The following information is given on the seed pack of any crop and its variety

1. Germination percentage.
2. Seed purity in percentage.
3. Test weight: It is the weight of 1000 seeds in grams.
4. Date of seed packing: It is very important to see this information as older the seed, lesser is the seed viability.

It is essential to test the germination percentage along with seed purity and test weight to work out the quantity of seed.

Calculating physical purity of seed

$$\text{Purity percentage} = \frac{(\text{Weight of pure seeds only})}{(\text{Total weight of seed sample})} \times 100$$

e.g. If total weight of sample = 100g

Weight of seeds of the crop = 95 g

Weight of weed seeds = 2 g

Weight of straw/chaff = 2 g

Weight of other material = 1 g

Then, its purity percentage = 95 %

To work out germination percentage of a seed sample: Take a petri dish and fix filter paper at the base of it. Moist it with water in a way that water does not stand on a filter paper. Put 10-20 seeds depending on the size of seeds on the filter paper in the petri-plate. Cover the petri plate with its lid and keep it in the seed germinator at 20-25°C. Always keep the filter paper in the petri plate moist by adding little of water as and when required. After one week, take out the petri dish and observe the seed germination. Calculate the seed germination percentage by using following formula;

$$\text{Germination percentage} = \frac{(\text{Number of seeds with normal germination})}{(\text{Number of seeds kept for germination})} \times 100$$

Seed viability test: Soak the seed in water. After 2-3 days of soaking, make a cut on the seed with a sharp blade. Put the cut seed in tetrazolium chloride solution. The embryo will turn pink if seed is viable.

$$\text{Seed viability percentage} = \frac{(\text{Number of seeds showing pink colour of embryo})}{(\text{Number of seeds taken for test})} \times 100$$

Exercise 7.1: Calculate the quantity of French bean seed for sowing one hectare area from the particulars given below:

Spacing = 45 cm × 20 cm

Germination percentage of seed = 70

Purity percentage of seed = 90

Test weight of seed sample = 250 g

Solution:

$$\text{Seed required} = \frac{(\text{Area} \times \text{test weight})}{(\text{Spacing} \times \text{Germination \%} \times \text{Purity \%})}$$

Area = 1 ha = 10,000 m^2

$$\text{Test weight} = \frac{(250\ g)}{(1000\ \text{seed})} = \frac{(0.250\ kg)}{(1000\ \text{seed})}$$

Germination (%) = 70 = 0.70

Purity (%) = 90 = 0.90

Spacing = 45 cm × 20 cm = 0.45 m × 0.20 m

Using formula

$$\text{Seed quantity (kg/ha)} = \frac{(10000 \times 0.250/1000)}{(0.45 \times 0.20) \times (0.70) \times 0.90)}$$

= 44.1 kg/ha = 45 kg/ha (Approx.)

Quantity of seed required for 1000 m^2 area = 4.5 kg

Exercise 7.2: Calculate the total okra seed requirement for sowing 1000 m^2 area, if the recommended seed rate is 20 kg/ha. The test showed that seed has 95% purity and 80 % germination. Seed required for gap filling is 5% by weight of seed required for sowing.

Solution:

$$\text{Seed quantity required (kg/ha)} = \frac{\text{(Recommended seed rate)}}{\text{(Germination \% } \times \text{ Purity \%)}}$$

$$= \frac{20}{(0.80 \times 0.95)} = 26.3 \text{ kg/ha}$$

Quantity of seed required for 1000 m^2 area = 2.63 kg

Seed requirement for gap filling = 5% by weight of seed required for sowing

$$= \frac{5}{100} \times 2.63 = 0.131 \text{ kg}$$

Total seed requirement of okra for 1000 m^2 area = 2.63 + 0.13 = 2.76 kg

Do yourself

Exercise 7.3: On the basis of following information, work out the seed requirement of turnip for 1000 m^2 area:

Spacing = 30 cm ×5 cm

Germination (%) of seed = 90

Purity (%) of seed = 95

Test weight = 20 g

Number of seeds damaged by birds has to be replaced by resowing = 10 seeds/m^2