

Seed Rate

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Definition

Seed rate is the quantity of seed of a crop that is required to sow a unit area of land for optimum crop production.

Importance of determining seed rate

- To maintain optimum plant population in the field for higher yield harvest.
- To prevent seed wastage from excess sowing such reduces the initial cost of production.
- To know the quantity of seed needed for sowing in advance.
- To ensure quality crop production.

Factors affecting seed rate

Direct plant population per unit area (DPP/UA)

It is the number of plants expected in a unit area of land for optimum crop production. It varies from crop to crop and depends upon some factors: growing season, soil productivity, sowing time and method of cultivation etc.

Number of seed per hill or pit (NS/H or NS/P)

In case of maize, cotton etc. 2-3 seeds are kept in a hill or pit and after the seedling germination only the healthy seedling is kept while others are discarded. In such case the seeds used in a hill affect directly on seed rate.

Purity percentage (PP)

It determines the percentage of pure seed present in a seed lot, which in turn determines the number of plants in a unit area. Seed rate increases or decreases with decreases or increases of purity percentage respectively.

Germination percentage (PG)

It is the number of normal seedlings out of 100 seeds, placed for germination test. Seed rate changes with the changes of germination percentage of a crop.

Percentage of safety allowance or field factor (PSA/FF)

It is the extra amount of seeds used during sowing, to ensure the desired plant population in the field against any seed loss that occurs after sowing. This loss may be happened due to moisture, status of soil, depth of sowing, intensive vertebrate attacks. The percentage of safety allowance varies with the changes of safety allowances.

Weight of thousand seeds (WTS)

It is weight of one thousand seed. It depends on the plumpness and moisture content of seed. The weight of seed (kg or lb) required for a unit area of land is determined on the basis of weight varies from crop to crop. Seed rate changes proportionally with the seed size/weight.



B. Indirect factors

Other than direct factors, the following factors are also responsible indirectly to determine seed rate of any crops.

Soil fertility and productivity: Poor/infertile soils require low seed rate because crops are widely spaced compared to fertile soils.

Growth characteristics of the crop: Tall/tillering/indeterminate varieties require low seed rate compared to short/less tillering/determinate varieties. e.g. for BARI maize varieties *Suvra*, *Mohor* and *Barnali*, the seed rate is 25-30 kg ha⁻¹ while the seed rate for *Khoi Vutta* is 15-20 kg ha⁻¹. For desi jute the seed rate for broadcasting system is 8-10 kg ha⁻¹ while the seed rate tossa jute is 6-8 kg ha⁻¹.

Spacing: High seed rate is required in closer spacing than wider spacing.

Number of seeds per hole: Two or more seeds per hole requires more seed rate than one seed per hole.

Intended use of the crop: e.g. fodder maize requires high seed rate than grain maize.

Growing season: Rainfed season requires more seed rate than irrigated season.

Method of planting: Broadcasting requires high seed rate than row planting. According to BARI recommendation, hand sown wheat seeds required a rate of 120 kg ha⁻¹, while BARI seeder and bed planter needs only 100 kg seeds ha⁻¹ (BARI 2015).

Pure/mixed stand: High seed rate for pure stand and low seed rate for mixed stand.

Planting time: Late planting requires more seeds.

Seed rates can be determined by the following formula:

$$A. \quad \text{Seed rate (kg ha}^{-1}\text{)} = \frac{10 \left(\text{DPP} + \frac{\text{DPP} \times \text{PSA}}{100} \right)}{\text{PP} \times \text{PG} \times 1000} \times \text{WTS (g)}$$

$$B. \quad \text{Seed rate (lb ac}^{-1}\text{)} = \frac{10 \left(\text{DPP} + \frac{\text{DPP} \times \text{PSA}}{100} \right)}{\text{PP} \times \text{PG} \times 453.6} \times \text{WTS (lb)}$$

The above formulae have many limitations and are seldom used.

$$C. \quad \text{SR (g ha}^{-1}\text{)} = \frac{\text{DPP/ha} \times \text{NS/H} \times \text{ISW} \times \text{MF}}{\text{PP} \times \text{PG} \times \text{FF}}$$

D. For dibbling and discontinuous line sowing of vegetative planting materials:

$$\text{SR}_{\text{ddp}} \text{ (g ha}^{-1}\text{)} = \frac{\text{DNH/ha} \times \text{NS/H} \times \text{ISW (g)}}{\text{PP}}$$

E. For transplanting system:

$$\text{SR}_t \text{ (g/ha)} = \frac{\text{DNH/ha} \times \text{NS/H} \times \text{ISW (g)}}{\text{PP} \times \text{PG} \times \text{FF}}$$

F. For broadcasting or continuous line sowing:

$$\text{SR}_{\text{bc}} \text{ (g/ha)} = \frac{\text{DPP/ha} \times \text{ISW (g)} \times \text{MF}}{\text{PP} \times \text{PG} \times \text{FF}}$$

Where,

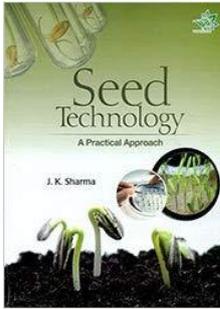
DPP = Desired plant population

PSA = Percentage of safety allowance

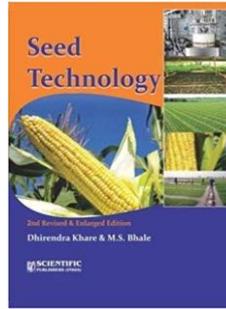


PP = Purity percentage
PG = Germination percentage
WTS = Weight of thousand seeds
ISW = Individual seed weight
DNH/ha = Desired number of hill/ha
NS/hill = Number of seedling/hill
MF = Method factor

Suggested reading:



Seed Technology: A Practical Approach
By J.K. Sharma
Westville Publishing House (2012)



Seed Technology
By D Khare
Scientific Publishers India (2014)

