

Study on the Moisture Determination of Seed

Mirza Hasanuzzaman, PhD
Professor
 Department of Agronomy
 Sher-e-Bangla Agricultural University

Concept

Seed moisture content is one of the most important factor influencing seed quality and storability, Therefore, its estimation during seed quality determination is important. The seed moisture content (Mc) is the amount of water in the seed. It is usually expressed as a percentage or weight basis in seed-testing laboratory.

Importance

The seed moisture content is the most vital parameter which influence the seed quality and storage life of the seed. Viability decrease more rapidly at high moisture content because of mould growth, heating damage, ageing and increased insect image. Seed moisture content is also closely associated with several aspect of physiological seed quality. For example, it is related to seed maturity, optimum harvest time, mechanical damage, economics of artificial seed drying, seed longevity and pathogen infestation.

Objective

To determine the moisture content of seed by methods suitable for routine use.

Definition

- The moisture content of a sample is the loss in weight when it is dried in accordance with ISTA rules.
- It is expressed as a percentage of the weight of the original sample.

Methods of moisture determination in seed

Moisture meter method:

- Estimation as quick and convenient
- Estimation is approximate (not precise)
- Estimation is generally based on electric conductivity
- Meter(s) to be calibrated for each species
- Only to be used if, the results are comparable with an oven method

Air oven method:

- Standard reference method
- Estimation is precise
- Seed moisture is removed by drying (under a specified temperature for a specific duration)
- Approved by ISTA

Weight of submitted sample

- 100 g for species that have to be ground
- 50 g for all other species
- Be submitted in polythene bags



Equipment

- Moisture meter(s) of different types
- Constant temperature oven
- Containers/bottles of glass or stainless steel
- Desiccators with silica gel
- An adjustable mill/seed grinder
- A small spoon
- Sieves set of 0.5, 1.0 and 4.0 mm mesh and receptacle
- Analytical balance
- Heat resistant hand glove
- A brush and steel brush

Working sample

- Determination in two replicates, i.e. two independently drawn sample
- Sample size depends on the diameter of the containers;
if the diameter is ≤ 8 mm: 4-5 g and if the diameter is ≥ 8 mm: 10 g
- Sample be thoroughly mixed
- Stir the sample with a spoon or pour the sample back and forth between two similar containers
- Exposure of sample to laboratory atmosphere be minimum i.e. ≤ 30 sec.

Grinding

- Grind the large seed, unless difficult, due to high oil content. e.g. linum
- Be done on sub-sample
- Fine grinding - in cereals and cotton seeds (90% material should pass through 0.5 mm sieve)
- Coarse grinding - in leguminous seed (50% material should pass through 4.0 mm sieve)
- Sieve: 0.5 mm (90% fine), 1.0 mm (10% fine), 4.0 mm (50% coarse)

Constant temperature oven method

1. The low constant temperature methods

- At temperature: 103°C for 17 ± 1 h
- At the end of the prescribed period, cover the container, place in desiccators to cool for 30 to 45 min
- The %RH of laboratory be $\leq 70\%$ during moisture determination

2. The high constant temperature oven method

- Temperature: $130-133^{\circ}\text{C}$
Drying period:
4 h for maize
2 h for other cereals
1 h for other species
- No special requirements to laboratory relative humidity during moisture determination.

Procedures

- Be carried out in duplicate on two independently drawn working samples
- Weight with an accuracy of 1 mg
- Weight the empty container with its cover (M_1)
- Mix thoroughly the submitted sample using spoon
- Two small portions of seed samples are weighted directly into the containers (M_2)
- Seed materials to be evenly distributed on bottom of the containers
- After weighting, remove the cover or lid of container



- Place the container in the oven, already heated to desired temperature
- At the end of drying period, container be closed with its lid or cover, transfer to the desiccators, to cool down for 30-45 min
- Weight again (M₃)
- Calculate the moisture content

Calculation of result

The moisture content (Mc) are calculated as percentage (%) by weight (up to one decimal place), using the following formula:

$$\% \text{ Mc} = \frac{M_2 - M_3}{M_2 - M_1} \times 100$$

Where,

M₁ = weight of the container with cover (g)

M₂ = weight of the container with its cover and seed materials before drying (g)

M₃ = weight of the container with its cover and seed materials after drying (g)

M₂–M₃ = Moisture loss

M₂–M₁= Fresh weight of sample

