SEED MOISTURE CONTENT DETERMINATION

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Moisture content of the seed is one of the most important factors influencing the seed germination, viability, vigour and seed health and seed storability. Moisture content of the seed affects many processes such as harvesting, threshing, processing, storage and marketing of the seed. It is, therefore, imperative that the moisture content determination should be made accurately in accordance with the Rules of Seed Testing.

Objective: To determine moisture content of the seed lot at the time of its sampling.

Equipments:

- Weighing bottles: Weighing bottles made of non-corrosive metal or Pyrex glass of approximately 0.5 mm thickness with an air-tight lid to minimize gain or loss of moisture.
- Desiccator: Desiccator fitted with a thick porcelain plate to promote rapid cooling of the weighing bottles. Silica gel is used as desiccant.
- Grinding mill: Electric grinding mill is required to grind the seed to particular mesh size. A Willey mill or house-hold grinder may be used for grinding the seeds before moisture estimation.
- Analytical balance: Electric analytical balance which can weight up to four decimal places is desirable for correct weighing in the minimum possible time. The efficiency and accuracy in moisture determination may be considerably enhanced by the used of such balances and other equipments.

Procedure: There are two methods for moisture determination namely Air Oven Drying Method and Moisture Meter Method.

A. Air Oven Drying Method: In this method seed moisture is removed by drying for a specified period and temperature. The steps are as follows:

- Submitted sample: The samples for moisture determination weighing approximately 50-100 g should be packed separately in moisture-proof containers, such as sealed tins or thick polyethylene bags.
- Working Sample: The moisture determination must be made in two replicates weighing 4-5 g each. The working sample is obtained by spoon method. Mechanical dividers should not be used for this purpose. While drawing the working sample for moisture determination, sample should not be exposed to the humidity; otherwise the seed will gain or lose moisture before the actual determinations.
- Grinding: Some seeds are needed to be ground finely before the moisture content determination, some other seeds are coarsely ground (Legumes) whereas some seeds which are of very large size may be cut with knife.
- Pre-drying: When the seed belongs to the species for which grinding is necessary and the moisture content is more than 17 per cent, pre-drying before grinding is necessary. Keep two replications of
50 g in open tray at 130°C for 5-10 min and then in a closed desiccators for cooling, weigh each replication for moisture loss. 20 g from each replication is ground for final drying.

**Drying:** Pre-set the oven at the prescribed temperature. The desired temperature for moisture determination varies with the kind of seed. The seeds may be dried at 130°C-133°C temperature for 1-4 hours. The cereals and millets seed must be dried for 2 hours, Maize for 4 hours and other species for 1 hour while using high temperature drying method.

Weigh the empty bottles along with their lids. Place 4-5 g seed material and weigh it up to three decimal places. Transfer the weighing bottles without lid with seed material in oven maintained at desired temperature.

After the drying is over, the lids must be placed on the respective weighing bottles which are then transferred to the desiccator. Allow the weighing bottle to get cool in the desiccator at least for one hour. Weigh the weighing bottle along with its lid.

**Calculation and Reporting of Results:** The moisture content as a percentage by weight is calculated as follows:

\[
\text{m} \quad = \quad \frac{\text{Loss in weight}}{\text{Initial weight of seed}} \times 100
\]

\(m\): seed moisture per cent

**Species for which grinding is obligatory**

- *Arachis hyupogaea*  
- *Avena spp.*  
- *Cicer arietinum*  
- *Citrus lanatus*  
- *Fagopyrum esculentum*  
- *Fagus spp.*  
- *Glycine max*  
- *Gossypium spp.*

**Air Oven dry method recommendations for different crops**

<table>
<thead>
<tr>
<th>Crops</th>
<th>Temperature requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice, wheat, pearl millet, maize, sorghum, chick pea, lathyrus, pea, pigeon pea</td>
<td>High constant temperature (130 ±2°C)</td>
</tr>
<tr>
<td>Ground nut, rapeseed and mustard, soybean, sesame, linseed, castor and cotton</td>
<td>Low constant temperature (103 ±2°C)</td>
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</tbody>
</table>

**B. Quick Method (Moisture Meter):** It is convenient and rapid method to determine moisture per cent of the seed. This is suitable for the approximate determination of the moisture content. The apparatus has been designed on the following principles:
- The seed is weighed by an inbuilt balance which is heated directly by an infra red lamp or an electric heating element.
- The moisture content is determined by the conductivity of the seed, since the moisture content is directly proportional to the resistance and the dielectric constant of the sample.

**Procedure:** A representative sample of prescribed weight is placed in the sample cup. It is then fixed in the lower house of the compression. Moisture meter is calibrated by pressing the button “cal” using calibration knob provided with the meter. The sample is compressed as per requirement using compression knob and scale. The meter dial (M) is read at required compression by pressing the knob “Read” and “bell”. Temperature (T) is observed by thermometer fixed in between meter dial and compression chamber. The reading M and T are intercepted on the dial of moisture meter turning temperature dial. After adjusting both the reading marks of arrow on outer reading of temperature dial indicates the moisture per cent.

   For more reliability these apparatus must be calibrated each time for each species.

**Precautions**
- ISTA rules for moisture determination in different crops must be followed.
- The sample must be handled in such away that its initial moisture content is retained.
- The grinding must be done in crops where required.
- Pre drying should be done in case of wet samples.
- The moisture analysis should be done quickly without wastage of time and water loss.
- The duplicate results should not differ by more than 0.2 per cent.