GRADING OF MAIZE GRAINS

Main Equipment and Tools

- Moisture Meter
  - Lab Scale: Range: 1g—3000g, Precision ≤ 0.1g
  - 4.5mm Round hole metal sieve

Sample Preparation

1. Maize of Other Colours
   - Example: For White maize, maize of other colours means all sound grain which has pink, red, yellow, etc. covering more than 50% of the grain surface.
   - Method
     1. Weigh 200 grams of the sample (Weight₁)
     2. Pick and weigh all maize of different colours (Weight₂)
     3. Express as a percentage

2. Moisture content determination
   - Method: Oven drying and/or a calibrated Moisture Meter

3. Organoleptic Test
   - Check the grain for foreign odour, noxious and toxic seeds, and moldiness.

4. Pest Damaged Grain
   - Grains partially eaten by weevils, grain borers or other crawling pests.
   - Method
     i. Select all grains which partially eaten (bored) by weevils, grain borers or other crawling pests.
     ii. Weigh all pest damaged grains (Weight₂)
   - Pest damaged grain = \[ \frac{\text{Weight}_2}{\text{Weight}_1} \times 100 \]

5. Rotten and Diseased Grain
   - Grains that appear decayed, moldy and decomposed without having to cut them to examine.
   - Method: Select all rotten diseased grain, weigh and express as a percentage same as 4 above.

6. Discoloured Grain
   - Kernels materially discoloured by excessive heat, grain respiration, and driers.
   - Method: Select all discoloured grain, weigh and express as a percentage using formula in 4 above.

7. Shriveled/Immature Grain
   - Under-developed, thin and papery kernels.
   - Method: Select all immature/shriveled grain, weigh and express as a percentage using the formula in 4 above.

8. Broken Grain
   - Grain or grain pieces that pass through a 4.5mm round hole sieve.
   - Method: Separate broken grains from foreign matter in the pan below the 4.5mm sieve and weigh (Weight₂).
   - Express as a percentage using the formula in 4 above.

9. Foreign Matter
   - Organic (leaves, cobs, chuff, stalks, husks, etc.) and inorganic matter (metal, plastic, glass, sand, soil, etc.)
   - Method: Select all foreign matter retained on top of the sieve and add it to that which passed through the sieve (Weight₂). Weigh and express as a percentage using the formula in 4 above.

10. Filth
    - These are impurities of animal origin, e.g. fur, droppings, insect parts, etc.
    - Method: Separate filth from both the grain retained on the sieve and that in the holding pan.
    - Weigh (Weight₁) and Express as a percentage using the formula in 4 above.

Grading Procedure

1. Obtain a representative sample 1000—1050g.
2. Use a divider or quartering method to subdivide the sample to a sub-sample of 200g.
3. Place the sub-sample on a 4.5mm round sieve and shake it horizontally for approx. 15 seconds.
4. Determine Foreign matter by weighing the portions of foreign matter passing through the screen, adding larger fragments of foreign matter retained on the sieve and express the weight as a percentage.
5. Determine broken grain by weighing the portion of maize grains which have passed through the 4.5mm round-hole sieve and express the weight as a percentage.
6. Determine pest damaged grains by hand picking and weighing such grains from the portion of the sub-sample retained by the 4.5mm round-hole sieve and express the weight as a percentage.
7. Determine shriveled grain by hand picking and weighing such grains from the portion of the sub-sample retained by the 4.5mm round-hole sieve and expressing the weight as a percentage.
8. Determine diseased grain by hand picking and weighing such grains from the portion of the sub-sample retained by the 4.5mm round-hole sieve and expressing the weight as a percentage.
9. Determine discoloured grains by hand picking and weighing such grains from the portion of the sub-sample retained by the 4.5mm round-hole sieve and expressing the weight as a percentage.
10. Determine the percentage of other defective grains e.g. germinated, stained, etc. by hand picking and weighing such grains from the portion of the sub-sample retained by the 4.5mm round-hole sieve and expressing the weight as a percentage.
11. Determine Total Defective Grain = \[ \text{Broken} + \text{Pest Damaged} + \text{Rotten & Diseased} + \text{Discoloured} + \text{Immature/Shriveled} + \text{Other defective grain} \] x 70%