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| SOP No: SOP-PHYS-005 | SOP Description: Bulk Density |
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| Author: Sarah Lanning | Replaces Version: |
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SOP-PHYS-005: Bulk Density

Scope:

This procedure measures the bulk density of a rice sample. It may be applied to rough, brown, milled or head rice. It is used as a gross measure of particle size, compaction, and/or dispersion, which may reflect processing parameters such as flow consistency and package fill.

Principle:

Bulk density is the weight per unit volume of a sample. In this procedure, samples are systematically placed into a vessel of known volume and weighed. The bulk density is calculated as the weight (ex. kg) per unit volume (ex. m³).

Equipment:

Funnel bulk density apparatus, Seedburo Equipment Co., Chicago, Illinois

Procedure:

1. Record the weight of an empty cup of known volume and place it under the hopper (funnel) of the bulk density apparatus, inside the collection pan. (The black Pint Cup is generally used for research purposes.)
2. Make sure that the hopper valve is closed. Load a rice sample into the hopper.
3. Release the valve and allow the sample to drop into the cup to overflowing. Move the hopper to the side, without jarring the apparatus.
4. Gently level the sample to the top of the cup by moving a wooden strike-off stick in a zig-zag motion.
5. Weigh the sample and record. Drop and weigh each sample three times.
*Note: bulk density is partially determined by the rate at which the valve is released. The trainee should try to match and maintain the trainer's speed and technique.
6. Average the three weights and calculate the weight of the rice sample in the cup divided by the volume of the container, expressed as g/cm³ or kg/m³, per the following equation:

$$\text{Bulk Density} = \frac{((\text{wt of sample+cup})-(\text{cup wt}))}{\text{cup volume}}$$

** Use the following volume constants for collection cups:

Black pint cup: 568.28 cm³

White cup: 166.64 cm³

Silver cup: 70.8 cm³

Small glass: 17.9 cm³