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Research Paper :

Effect of moisture content on selected physical properties of pulses

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ABSTRACT

The physical properties *viz.*, true density, bulk density, porosity per cent and angle of repose were estimated at different moisture levels [10, 15, 20, 25 and 30 per cent (w.b.)] with an accuracy of ± 0.5 per cent in each level, with standard procedures. From the study it is concluded that the true density and bulk density decreases and the porosity per cent and angle of repose increases with increase in the moisture levels. The true density was observed highest in the Bengal gram (1415.09 kg/m^3) at 10 ± 0.5 per cent (w.b.) moisture level and lowest in Green gram (1229.52 kg/m^3) at 30 ± 0.5 moisture level. The bulk density was found highest in Pigeon pea (875.00 kg/m^3) at 10 ± 0.5 per cent (w.b.) and lowest in Black gram (669.00 kg/m^3) at 30 ± 0.5 per cent (w.b.) moisture content. The highest porosity per cent (47.59 per cent) was observed in Black gram at 30 ± 0.5 per cent (w.b.) and lowest in Pigeon pea (35.91 per cent) at 10 ± 0.5 per cent (w.b.) moisture levels. The angle of repose increased with increase in moisture levels. The highest angle of repose (41.98^0) was found in Bengal gram at 30 ± 0.5 per cent (w.b.) and lowest in Pigeon pea (30.11^0) at 10 ± 0.5 per cent (w.b.) moisture contents.

Key words : Pulses, Physical properties, Moisture content

Pulses are grown and used for food in nearly all the temperate and tropical areas of the world. Pulses are important crops both economically and nutritionally. Their importance is increasing day by day due to high nutritive value. Therefore, pluses and their products become important constituents in the human diet. Also they provide substantial quantities of minerals and vitamins to the diet. In addition pulses supply significant amount of energy through carbohydrates, fibers, lipids, minerals and vitamins including reasonable levels of thiamine, riboflavin and niacin.

Pulses such as chickpea, pigeonpea, black gram, green gram, etc. have been used as a source of protein in the diets of people in many regions of the world, especially where animal proteins are scare or expensive as food ingredient, it is desirable to improve their functional properties. Considering the importance of pluses in processing resources, efforts have been directed to improve grain yield, nutritional quality, digestibility, storage and processing technology of grains. Among the engineering properties, the physical properties of pluses are more important in the Agricultural Process Engineering for the post harvest operations. The angle of repose, porosity per cent, bulk density and true density are needed in the analysis of various operations in respect of separation, drying, handling and conveying of pulses (Oke *et. al.*, 1985). These properties are used in the design and construction of silos, storage bins, handling equipments and hoppers. These properties vary with moisture content of pulses and such information is highly useful for the designers as the grain undergoes various post harvest operations at different moisture contents (Dev *et al.*, 1982).

The objectives of the present study was to study the effect of moisture content on angle of repose, porosity per cent, bulk density and true density for some selected pluses.

METHODOLOGY

The pulses and their variety used in the experiment were as follows:

1. Pigeonpea (*Caganus Cajan*) var. 'BDN-2'
2. Bengal gram (*Cicer arietnum*) var. 'Chaffa'
3. Green gram (*Phaseolus aureus*) var. 'S-8'
4. Black gram (*Phaseolus mungo*) var. I-9'

The physical properties *viz.*, true density, bulk density, porosity per cent and angle of repose were estimated at different moisture levels [10, 15, 20, 25 and 30 per cent (w.b.)] with an accuracy of 0 ± 0.5 per cent in each level (Adhoo *et al.*, 1976). The moisture contents of the samples were obtained by standard air oven method. The higher moisture contents of the samples were obtained by rewetting. (Brusewit, 1975).

The angle of repose was determined by using the experimental set-up. The grain filled in the grain holder was allowed to fall on a circular plate of known diameter and a natural heap was noted. (Verma and Prasad, 2000). From the known diameter and height of heap, the angle