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Thermo – chemical pretreatment for dehulling of pigeon pea grain

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ABSTRACT

Although, pulse processing is an old practice, the milling industry and the farmer in particular are suffering to a great extent from the loss in terms of brokens, powder and low product recovery. This recoverable loss can be reduced by using an appropriate technology of thermo-chemical pretreatment to pigeonpea grain. Use of edible oil for pigeonpea treatment can be replaced by using thermo – chemical pretreatment to pigeonpea grain. For this purpose after scarification of grains 8 per cent urea solution was applied in the grain-to-solution ratio of 1:25 and left for 5h. The levels of temperature and heating of urea treated grain before milling were found to be 64^0C and 5 min, 64^0C and 30 sec for oven and sand medium, respectively. Urea treatment and thermo-chemical pretreatment to pigeonpea grain improved the dehulling index by 25.28 per cent and reducing dehulling time by 51.51 per cent.

Key words : Pigeonpea, Scarification, Thermo-chemical pretreatment, Dehulling.

Pulses are important constituent of diet for large number of Indian people. Where majority of population is vegetarian meets their proteins requirement. Most of the pulse grains are consumed in the form of splits. In the process of conversion of grain into splits (dal), it is dehulled resulting in a mixture of pearled (dehulled) grain and whole (dehulled) grain. Out of the total production 15 millions tonnns (FAO, 1996), about 10% is used for seed, 7.5-10% is lost in handling and storage and 10-15% as milling losses, the total loss amounting to about 30% of from production to consumption. Thus, considering the nutritive value, increasing demand and higher milling losses, the pulse must be paid special attention with respect to their production and processing. Pigeonpea grain has to pass through four abrasive rollers or four times through a roller to obtain finished products. Pearled grain at second and third rollers have to unnecessarily pass through the forward stages of dehulling, resulting in more broken kernels and scouring out the protein-rich outer scirt of pearled grain. Moreover, these mills use edible oil treatment consuming oil to the tune of 19000 t costing about Rs. 78 crores per annum. This calls for shifting to some other type of pretreatment for pigeon pea in particular and other pulses in general.

The major production of pulses is that of bengal gram and pigeopea occupies the second position. The pigeon pea is mostly consumed in the form of dehulled splits (dal) as dehulling improves its appearance, texture, cooking quality, palatability and digestibility. However, pigeon pea is considered to be the most difficult grain to mill.

Literature reveled that applying urea solution to scarified pigeonpa grain and dehulling in hot condition is an effective pretreatment considerably increasing the dehulling efficiency and decreasing dehulling time (Phirke and Bhole, 1999). It is, therefore, necessary to study the various operational parameters of thermo-chemical pretreatment to pigeon pea grain before dehulling and to evaluate the optimum input conditions for efficient dehulling.

METHODOLOGY

Pigeonpea grain (var. C11) was selected as raw material. The moisture content was held constant at 8.20 $\pm$ 0.10% w.b. through out the tests over a saturated solution of magnesium chloride at 30^0C and 50 per cent relative humidity for 24 h (Oomah *et al.*, 1981). It was graded by passing through the sieve 5.96 mm diameter and retained on 4.76 mm sieve.

Grain properties: Physical properties:

Grain dimensions:

Sample of 10 grains randomly picked up and their major (a) and minor (c) axes were measured.

Grain surface area:

The surface area of the grain was calculated by using the mathematical expression (Mohsenin, 1986) as below

$$S = \pi c^2 + (ac/2e)\sin^{-1}e$$

where a and c are, respectively the major and minor axes of the ellips of rotation and e is the eccentricity given by

$$e = \left[1 - (c/a)^2\right]^{0.5}$$