

# Session 4.4 – Pulse Milling

- Pulses are defined as dried edible seeds of cultivated legumes. They serve as major sources of dietary protein and energy.
- Bengal gram/Chick pea (chana), pigeon pea (tur/arhar), cow pea (lobia), black gram (urad), green gram (moong), lentils (masur), peas (matar) are some of the major pulses grown in India.
- Pulses are consumed in its dehusked and split form which is termed as dal.

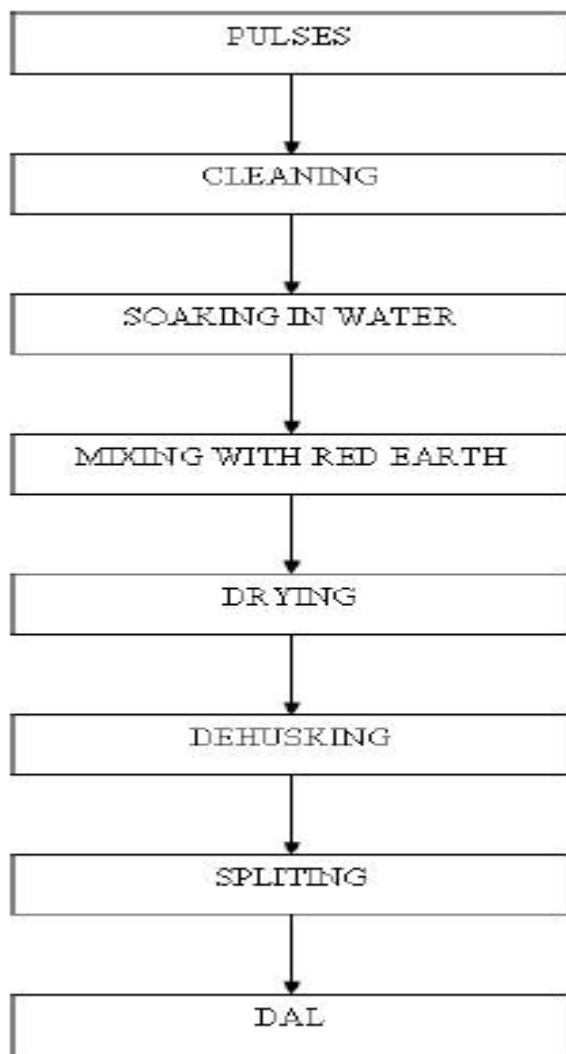
# Pulse Milling

- Pulse milling (dal milling) is accomplished in **three major steps namely: loosening of husk, dehusking and splitting of pulses.**
- Processing of pulses involves two basic steps – (i) seed coat/husk loosening and its removal and (ii) conversion of seed grain into splits and grinding into flour depending upon its end-use.
- Various methods are employed for pulse/dal milling. Pulses undergo some basic unit operations during pulse milling such as cleaning and grading, drying, loosening of husk, dehusking, splitting and polishing.

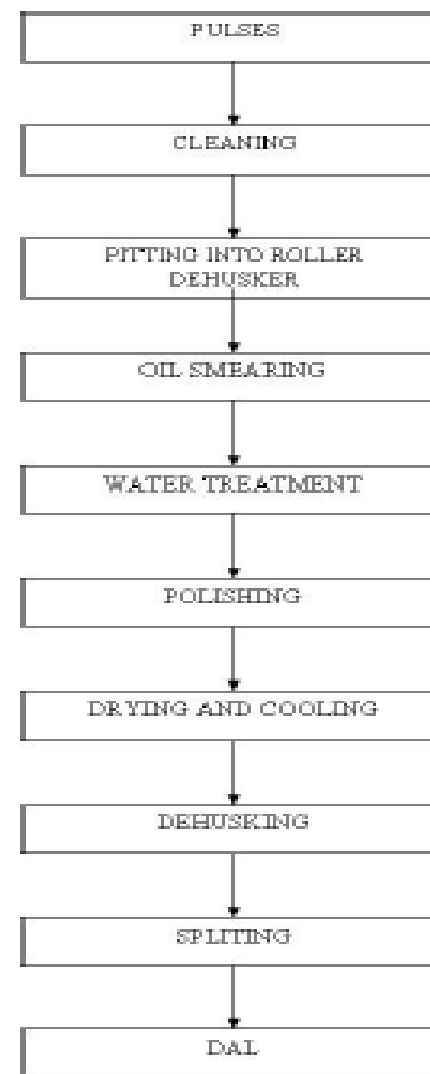
# Methods of Pulse Milling

- Wet milling of pulses
  - Wet method of pulse processing involves cleaning to remove dust, dirt, chaff, stone pieces, immature grains and other seeds.
  - The easy to dehusk pulses are then soaked into water for a period of 2 – 8 hrs whereas difficult to dehusk type of pulses (pigeonpea, black gram, green gram) are often treated with red earth.
  - The pulses are subsequently dried and then subjected to dehusking and splitting to obtain Dal.

- Dry method of pulse milling
  - In case of dry method of pulse milling, the pulses after cleaning are fed into roller de-husker where a scratch, dent and crack is formed on the outer seed coat.
  - Pitted pulses are then stored for ½ day to 3 days after applying oil on the surface. Generally 150 – 250 gm oil per 100 kg pulses is applied. The oil diffuses between husk and cotyledon and thus facilitates loosening of the husk.
  - Water treatment (2.5 – 3.5 kg water/100 kg pulses for overnight period) helps in further loosening of the husk.
  - Then the pulses are subjected to drying and cooling. Now, the dried pulses are dehusked and split to obtain dal.



**Fig. 15.1 Wet milling of pulses**



**Fig. 15.2 Dry milling of pulses**

# Pulse milling units

- **Home scale milling**
  - This involves pounding of grains for dehusking by using a mortar and pestle after mixing with small quantity of water and drying in the sun for a few hours.
  - Sun-drying after water application helps to loosen the husk from the cotyledons.
  - In mortars, dehusking is achieved due to shearing action between pestle and grains, and abrasive effect between the grains
  - Winnowing separates husk and split cotyledons are separated from the whole dehusked and unhusked grains by manual sieving
  - The whole grains are again pounded for further dehusking and splitting.
  - This technique of dehusking is generally adopted when small quantity i.e., up to 5 kg of pulses is to be dehusked
  - Dal yield by this process is quite low (50-60%) due to breakage and chipping of the edges of cotyledons.

# Cottage scale milling

- Traditionally, villagers use the hand operated wooden or stone chakki/ sheller when comparatively large quantities of pulses are to be dehusked. The technique is similar to those of the home-scale methods.
- The preconditioning of grains before milling is done either by prolonged sun drying until the hulls are loosened or through application of water followed by several hours of sun drying and tempering.
- The heating of the grains in pan with or without sand along with vigorous stirring is also in practice
- There are no standard dehusking techniques at the cottage level. Different combinations of methods, depending upon the experience and available facilities, are followed.
- Of late, mechanized shellers and plate mills are used for custom milling of preconditioned pulses.
- At cottage level milling, often the husk is not completely removed and breakage is also quite high. This reduces the consumer appeal and value of the product.
- The yield of head dal obtained from these techniques may vary in the range of 55-70% depending upon the variety of pulse and pre-treatment used.



# Commercial scale milling

- Commercial scale milling involves processing large quantities of pulses in plants of bigger capacities
- Two methods for large scale processing of pulses are in practice. **Traditional method**, most commonly followed by dal millers, is almost similar to cottage level treatment in principles. **A modern method of milling has been developed at CFTRI** which is independent of weather conditions.