

DAL MILL

Machineries used in pulses processing

- Cleaning and grading
- Dehusking
- Oil/water applications
- Drying
- Splitting
- Grading
- Polishing
- Powder and husk separation

CLEANING AND GRADING

- Raw pulses need to be cleaned before milling.
- Normally rotary or reciprocating screen cleaners are used.
- Rotary screen graders are common in northern part of the country, whereas in the southern part, reciprocating screen graders are used.
- These graders separate the grains into different fractions based on size.
- Light impurities are removed with the help of blower or suction fans.
- Rotary screen cleaner/grader mainly consists of four compartments fitted with screens in sequence of increasing opening size.

- Smallest grains falls at the first compartment, whereas the largest one falls in the last column.
- Slope is given towards the direction of grain flow for ease of grain movement.
- Low RPM around 18–30, is maintained to ensure proper grading.
- Mild steel or wooden body is used to house these compartments.
- Reciprocating flat screen grader usually consists of three screens to separate the grain fractions.
- Stroke length of 4-5 cm is provided for the reciprocating unit.
- Blower is provided to remove dust, dirt and other fine impurities.

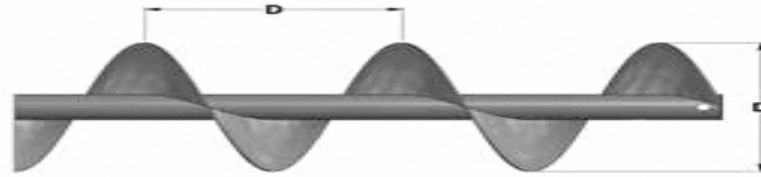
DEHUSKING

- Typically Emery coated rollers are used for dehusking of different pulses.
- Cylindrical or taper rollers are used for the purpose.
- The foundation of taper rolls is kept horizontal whereas cylindrical rolls are mounted with inclination to the horizontal. This system facilitates ease of grain movement inside the drum.
- Normally, a slope of 15 cm for entire length of machine is recommended.
- Body of the roller is made of wood or steel on which mixture of emery, chemical cement and salts are applied in layer of uniform thickness.
- The granule size of emery varies for crop to crop and type of operation to be performed on the grain.



OIL/WATER APPLICATIONS

- This machine is used for mixing of oil/water to the pitted pulses. Screw conveyors with full flight or cut screw are used.



- The screw slowly moves the grain forward, with the oil/water application at the entry of the conveyor.
- The grain gets thoroughly mixed with oil/water while traveling the mixer length.
- Cut screw flights, commonly used in southern India, also serve the purpose of agitator and increases retention time for better mixing.

DRYING

- Generally, sun drying on rooftop or in open drying yard is practiced.
- Sun drying is a weather dependent process, the operation of the mill stops during rainy and cloudy seasons.
- To make conventional milling plants operational round the year, artificial or mechanical drying is essential.

SPLITTING

- To split the dehusked pulses and pulse seeds, roller mills, under runner disk are used.
- Under disk runner machine consists of two horizontal disks with 1.25 cm emery coating.
- One of the disks is fixed whereas other one rotates. This rubbing action causes splitting of dehusked whole.
- Sometimes dehusked splits are dropped from a height of about 3-5 m on a hard surface to obtain splits

DAL GRADING AND GOTA SEPARATION

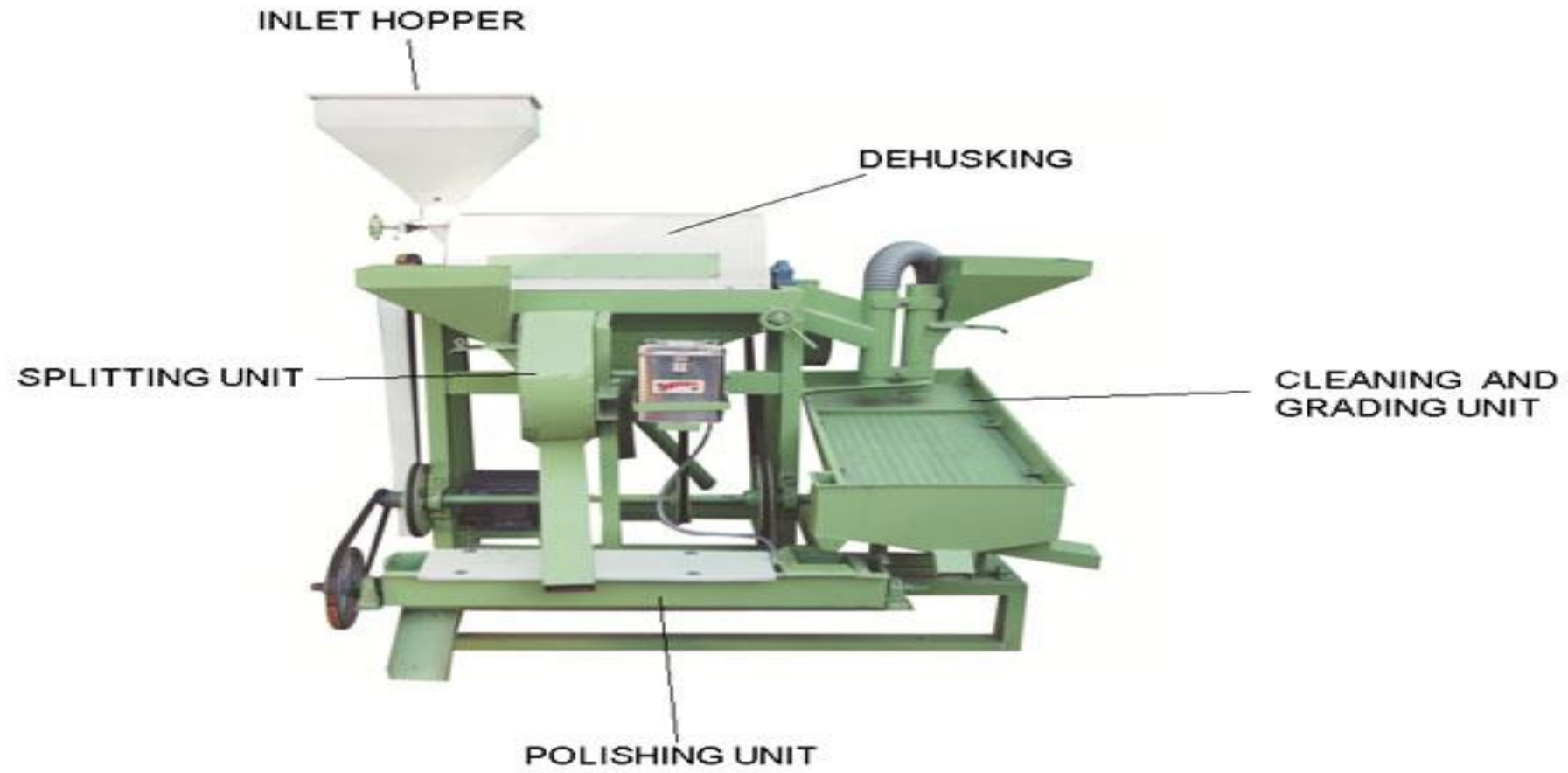
- Whenever the grain is passed through emery roll, some part of grain is converted into dehusked whole called "Gota".
- Combination of rotary and reciprocating screens are used in modern pulse milling plants to separate 'Gota'.
- This machine is used for separation of 'Gota' and whole grains, splits and broken.

POLISHING

- Dal polishing denotes to removal of powder from dehusked splits and application of oil and water to impart shine and luster to the finished dal.
- Cylindrical hard rubber roll, leather belts or emery cone polisher is used for the purpose.
- Rollers mounted with brushes can also be used to impart shining to the dal. Powder particles are removed by rubbing action

POWDER AND HUSK SEPARATION

- Husk and powder is separated from dehusked pulses, using suction fan or blower.
- This unit may end into a cyclone separator and collected in bags, in order to reduce environmental hazard of fine dust in the plant premises.





In a 100-gram amount, cooked (boiled) dal contains

- 9% protein,
- 70% water,
- 20% carbohydrates (includes 8% fiber), and
- 1% fat.

➤ Cooked dal (per 100 g) also supplies a rich content

- (20% or more of the Daily Value, DV) of B vitamin,
- Folate (45% DV) and
- Manganese (25% DV)
- Thiamine (11% DV) and
- Several dietary minerals, such as iron (19% DV) and phosphorus (18% DV).

Pulses	state	Area (lakh ha)	Production (lakh t)	Productivity (kg ha-1)
chickpea	Andhra Pradesh	6.30	9.12	1447.62
Pigeon pea	Andhra Pradesh	4.63	3.02	652.27
Green gram	Andhra Pradesh	4.40	2.17	493.18
Black gram	Andhra Pradesh	5.03	2.59	514.91
Lentil	Madhya Pradesh	5.64	2.87	508.87