

# **SEED PROCESSING AND SEED CLEANING**

# SEED PROCESSING

- Seed processing is necessary in order to dry the seeds to safe moisture level;
- remove or reduce to the extent possible the various undesirable material, weed seeds, other crop seeds, deteriorated or damaged seeds;
- uniform size grading and seed treatment to upgrade the over all seed quality.
- Seed processing refers to all the steps necessary for preparation of harvested seed for marketing, namely, handling, drying, shelling, preconditioning cleaning, size grading, treating and packaging

## **Factors to be considered in planning and designing a seed processing plant**

1. Kinds of crop seeds to be handled
2. Size of operation
3. Whether drying facilities should be required;
4. Selection of suitable equipment;
5. Location of the plant;
6. Source of power for running machinery;
7. System of seed delivery to processing plant; and
8. Availability of labour

# Type of Layouts

- a) **Multistorey:** In this system, seed is carried by elevators to the top floor and emptied into large bins. Cleaning machines are then arranged in a vertical series on the lower floors.
- b) **Single level:** In the single storey plant, seed is moved from one machine to the next by elevators placed between the machines.
- c) **Combined designs:** A compromise between the single and multistorey system could also be adapted.

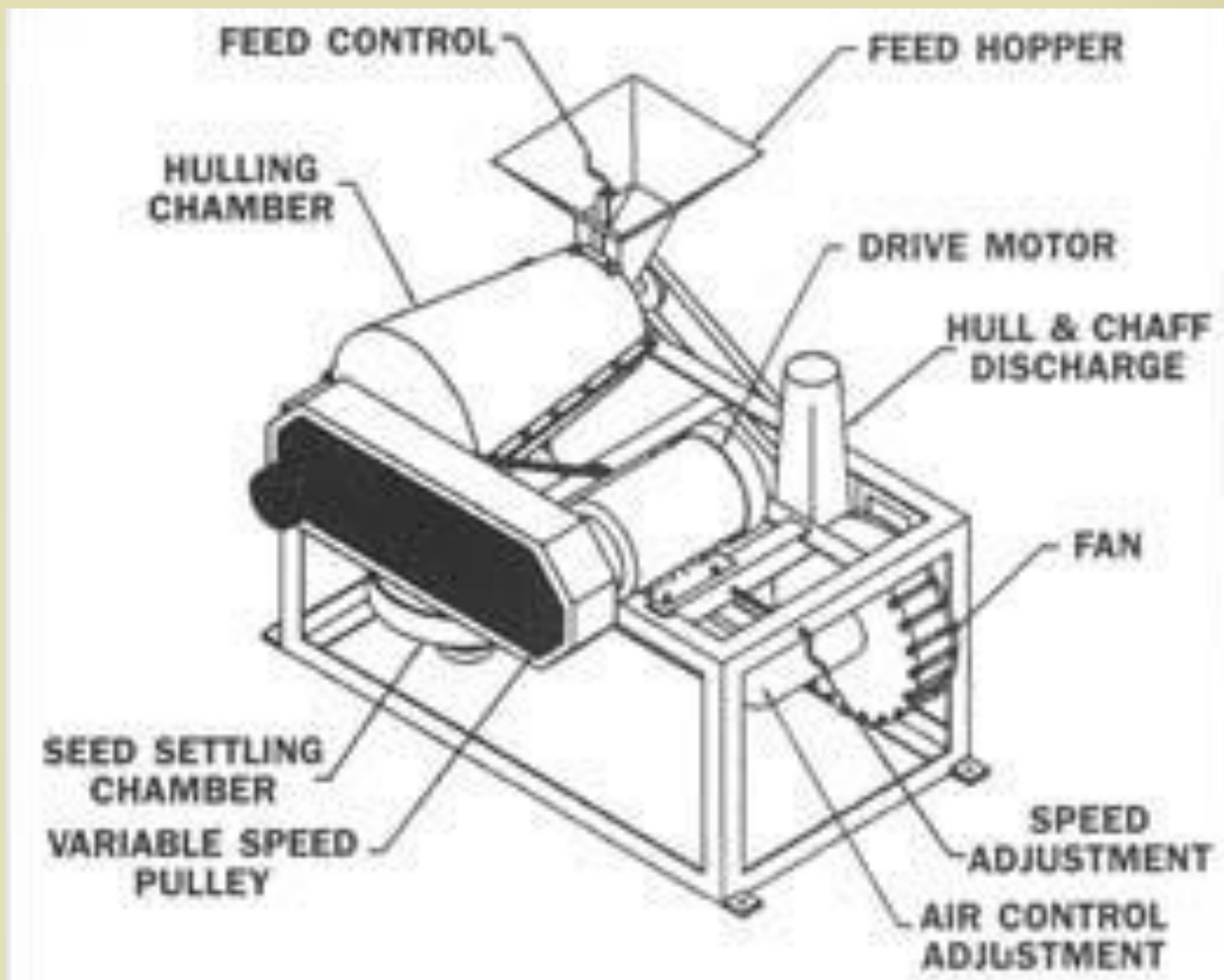
# SEED CLEANING

- **Pre-cleaning & Pre-conditioning:** It refers to the operations such as shelling, debearding etc. that prepares the seed lots for basic cleaning and also for the removal of particles such as trash, stones, clods etc. larger than crop seed.
  1. Scalper or Rough Cleaner
  2. Huller Scarifier
  3. Debearder
  4. Maize Sheller

# SEED CLEANING

1. **Scalper or Rough Cleaner:** The single sieve pre-cleaners are called as scalpers and the multiple sieve units are referred as rough cleaners
2. **Huller Scarifier:** Hulling (removal of an outer coat or husk) and scarification (scratching of the seed coat) can be done separately or jointly with a huller scarifier
3. **Debearder:** Debearder removes the hair like structures present on the seeds
4. **Maize Sheller**

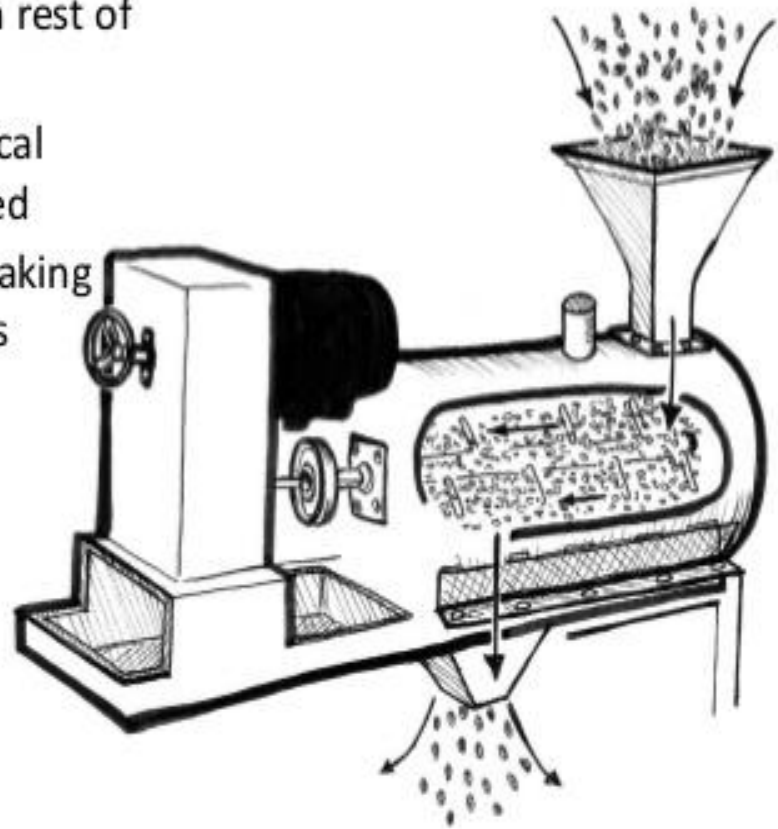




# HULLER/ SCARIFIER



- De Bearding/de awner
  - Before air screen cleaner
  - Optional, it can be bypassed
  - Seed flows much better in rest of cleaning process
  - Important when mechanical planting machines are used
  - May be important for breaking dormancy in some species



# BASIC SEED CLEANING

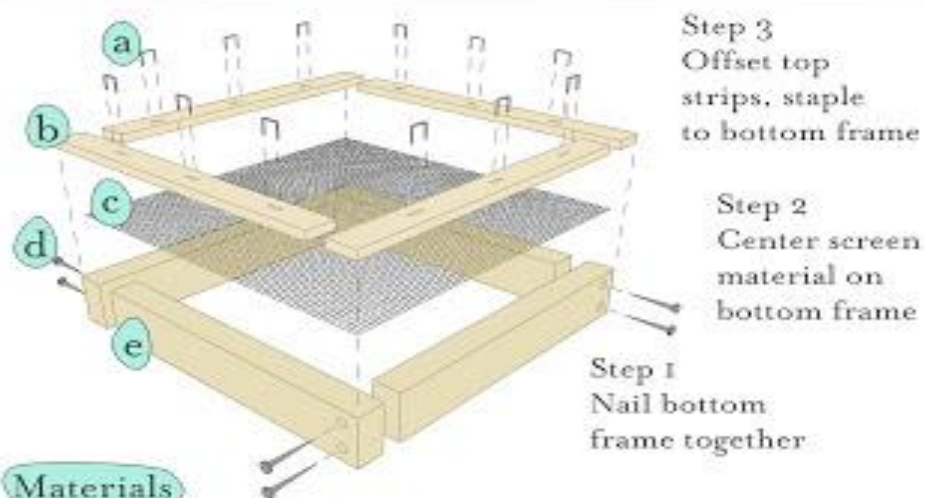
- It refers to actual cleaning and grading of seeds and is essential process in seed cleaning operation.
  - The basic seed cleaning is done over an air screen machine commonly referred to as an air screen cleaner
1. **Aspiration:** the light seed and chaffy material is removed from the seed mass through aspiration.
  2. **Scalping:** Good seed are dropped through screen openings but large material (trash, clods etc.) are scalped off over the screen into a separate spout.
  3. **Grading:** The good seed ride over the screen openings, while smaller particles (undersized, weed seeds, shriveled) drop through the screen perforations.

# PARTS OF AIR SCREEN CLEANER

1. Feed hopper
2. Screens
3. Clay crushing rolls
4. Brushes
5. Tappers or screen knockers
6. Shoes
7. Eccentrics
8. Fans
9. Air Chest

# Build Your Own Seed Screen

Dick Jensen, Jim Edrington and Grant Olson



## Materials

- a. staples
- b.  $\frac{1}{4}$ " x  $\frac{3}{4}$ " x  $8\frac{1}{4}$ " pine
- c.  $8\frac{3}{4}$ " x  $8\frac{3}{4}$ " screen material
- d.  $1\frac{1}{2}$ " ringshank nail
- e.  $\frac{3}{4}$ " x  $1\frac{1}{2}$ " x  $8\frac{1}{4}$ " pine

## Screen Sizes

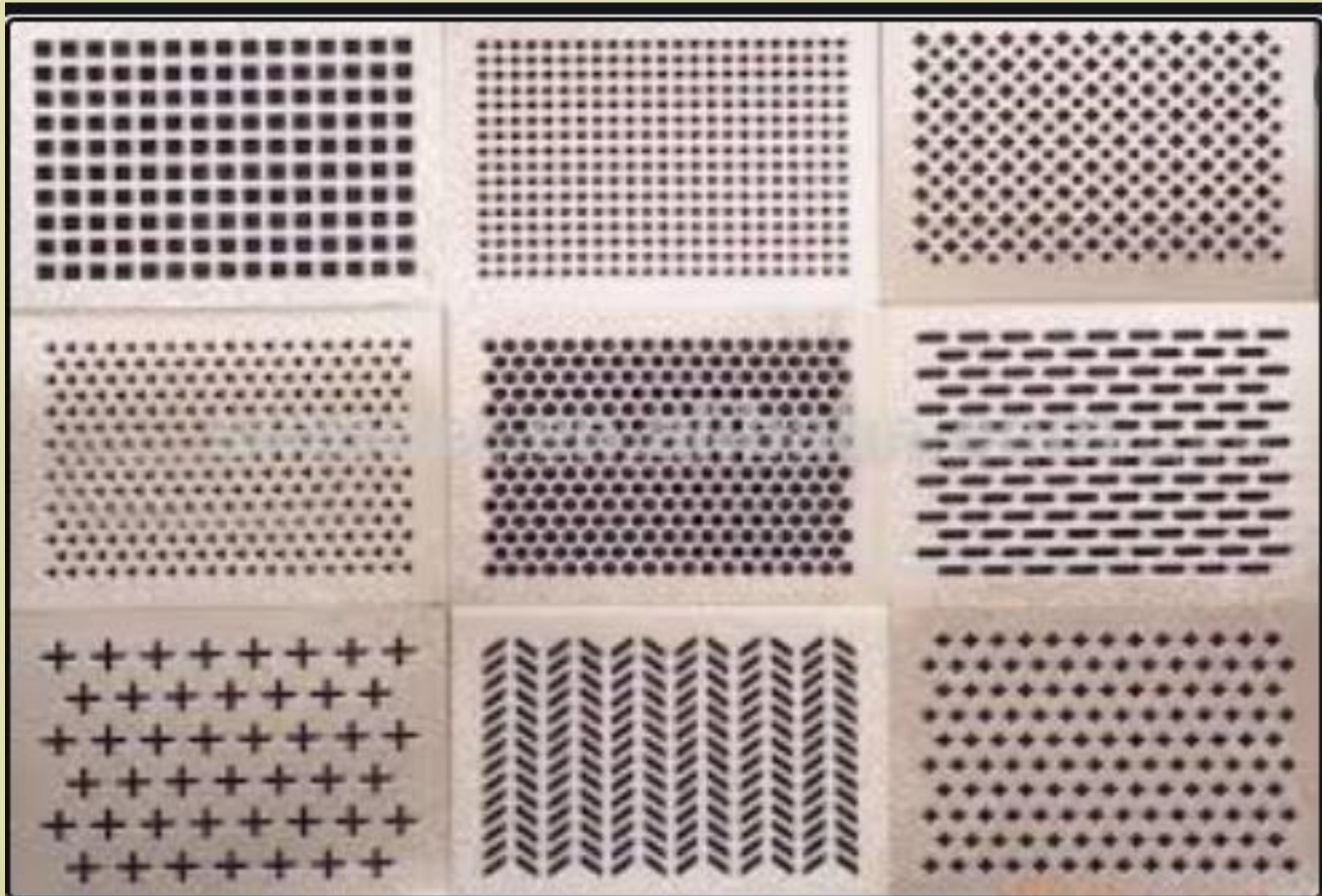
	scalper	sieve
Alliums	$\frac{7}{64}$ "	$\frac{1}{64}$ "
Celery	$\frac{1}{16}$ "	$\frac{1}{25}$ "
Brassicas	$\frac{5}{64}$ "	$\frac{3}{64}$ "
Carrots	$\frac{5}{64}$ "	$\frac{3}{64}$ "
Lettuce	$\frac{5}{64}$ "	$\frac{3}{64}$ "

scalper screens are used to catch large debris while allowing the seed to fall through

sieve screens retain the seeds while allowing dust and smaller particulates to fall through



# DIFFERENT SCREENS/ SIEVES



# DIFFERENT SCREENS/ SIEVES



# Principle of Operation of air screen machine

1. The air blast removes lightweight seed and chaffy seed.
2. Scalping screen removes material larger than the crop seed.
3. Grading screen drop out material smaller than crop seed.
4. Eccentrics do the shaking motions of the screens.
5. The two shoes in 4 screen cleaner move in opposite direction to balance each other also to reduce machine vibrations to minimum.

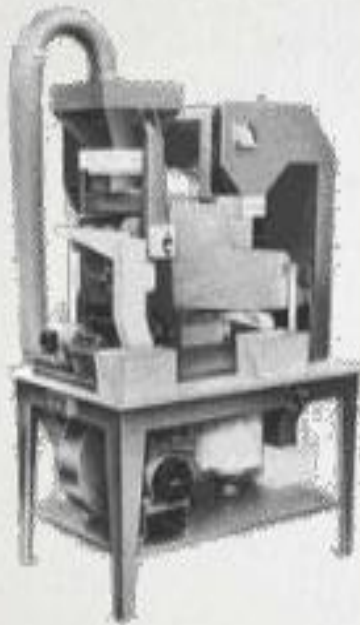
- ✓ First screen does scalping
- ✓ Second screen does grading
- ✓ Third screen does close scalping
- ✓ Fourth screen does close grading

# UPGRADING MACHINES

Name of the Separator	Property followed	Uses
Vibratory separator	Shape and surface texture	Removal of weed seeds
Spiral separator	Shape or the degree of its ability to roll	Separation of damaged/flat and wrinkled seeds from smooth seeds. Separation of mustard, rape, soybean and peas from wheat, flax, oats, etc., and round seeds from flat seeds.
Disk / Indented cylinder separator	Length	Dissimilar material like wheat, rye, mustard, barley from oats
Electrostatic separator	Electrical property	Johnson grass from sesame seed
Electronic colour sorters	Colour / brightness	Separation of off coloured seeds
Inclined draper	Shape and surface texture	Separation of smooth or round seeds from rough flat or elongated seeds
Magnetic separator	Surface texture and stickiness	Removal of contaminating weed seed from clovers, alfalfa seeds and iron metals
Roll mill	Shape and surface texture	Separation of smooth clover seed
Gravity separator or Destoner	Density or specific gravity	Removal of badly damaged, deteriorated, insect damaged crop seed and stones from good seeds.



## VIBRATORY AIR SCREEN CLEANER



Screening unit is composed of double or multiple screens.

Screens are tightened together and suspended in such a manner that these have horizontal oscillating and slightly vertical motion.

The slope of the screen is adjustable to control the rate of forward travel of the grain

To avoid clogging the screens are fitted with brush

Two screen m/c fitted with aspirator to suck the lighter materials

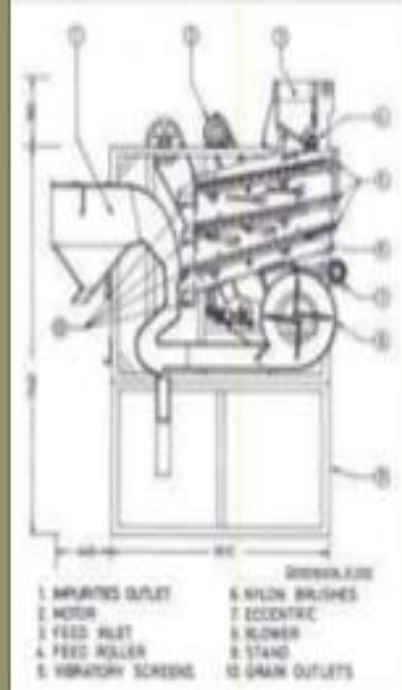
Coarse impurities are screened off by upper screen

Fine impurities are screened off by lower screen

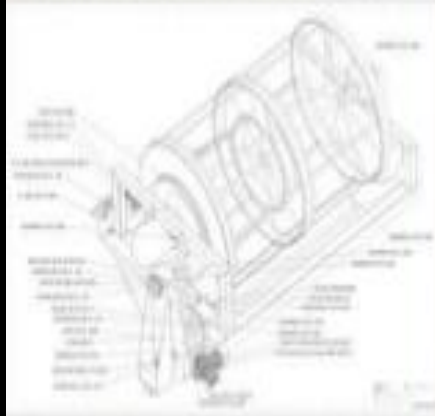
Grains are again cleaned by upward draft of air in the ascending separator

During this process, remaining lighter impurities and shriveled grains are sucked away

Lighter impurities are removed by Cyclone separator



# Rotary Air Screen Cleaner



- Has normally circular decks
- Motion is circular in horizontal plane
- Either single or double drum
- Consists of a rotary screen, aspirator and hopper
- Sound grains pass through the screen perforation into the center of the screen drum
- Oversized material is retained above and pass out through an outlet
- Sound grains come out at the center side of the drum rotating at low speed and fall onto the vibratory screen which remove the dirt particles
- Light impurities are sucked away by the aspirator
- Cleaned grains are discharged through the discharge chute



# SPECIFIC GRAVITY SEPERATOR



# ELECTRICAL COLOUR SORTER



# SPIRAL SEPERATOR



