

Introduction of Seed Processing

- Basic Concepts & Techniques in Seed Processing

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INTRODUCTION:

- Iowa US - Nairobi, Kenya



INTRODUCTION:

- Ames, Iowa



INTRODUCTION:

- Iowa State University (<http://www.iastate.edu>)



- Official established in 1858
- First US Land Grant university
- 8 colleges, Academic: 1709 Students: 28,682
- Nickname: *Cyclones*



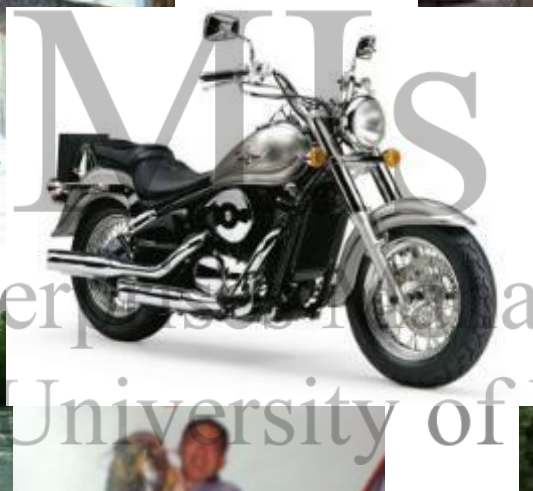
INTRODUCTION:

- Seed Science Center (<http://www.seeds.iastate.edu>)



- ISU seed research since 1890
- New Seed Science Building, 1978
- Largest public seed testing lab.
- Six programs (Director Dr. Misra):
 - **Seed Testing**
 - Seed Physiology
 - Seed Pathology
 - **Seed Conditioning**
 - **Global Seed Program**
 - **Computer & IT Management**

INTRODUCTION:



- ECOWAS/WASA
- SADC
- Nigeria, Niger, Senegal, Mali, Ghana
- Zambia, Malawi, etc.
- Kenya



Seed Processing – Why?

1. Complete separation:

- Removal of all contaminating or undesirable material from the seed and improve appearance/uniformity

2. Minimum seed loss:

- Keep good seed loss at a minimum

3. Upgrading quality:

- Removal of bad, injured, or low quality crop seed
- Add protective or remove moisture to maintain seed quality

4. Efficiency:

- Highest capacity with effectiveness of separation

5. Minimum labor requirement:

- Labor is direct operating cost and not recoverable

“Seed” vs “Grain”

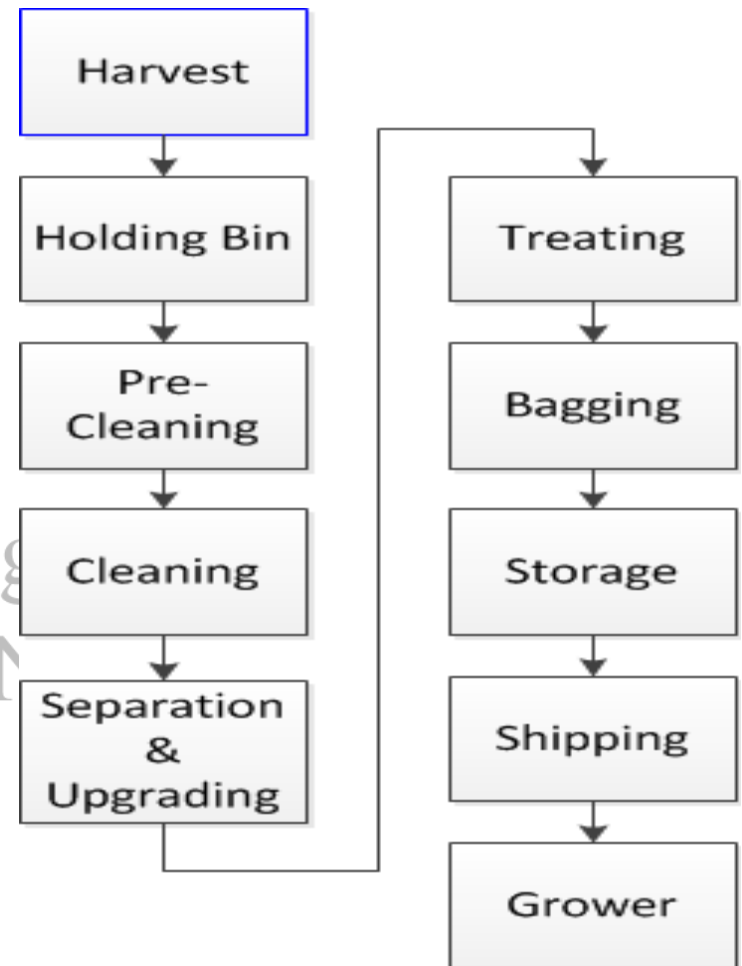
SEED	GRAIN
Planted and reproduce	Consumption & industry
Embryonic structure is critical	Dry matter, foreign material, MC%
Germination, purity, health, and vigor	POS (Protein, Oil, Starch), and fiber
Slow drying to minimize heat damage	Fast drying to save cost
Chemical treatment to maintain quality	Hardly any chemical treatment
Sold by bag, Kg, or Unit (80,000 seed corn)	Sold by truck or Tons
Seed Processing...	Food Processing...



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Flow Diagram for Seed Processing

- Limiting mechanical damage:
 - Reduce speed (RPM)!
 - Avoid at partial capacity
- Avoid varietal contamination
- Maintain quality in storage:
 - Limit incoming moisture
 - Limit FM or damaged seeds
 - Pre-clean seed before storage
 - Properly aerate
 - Careful drying to reach safe MC

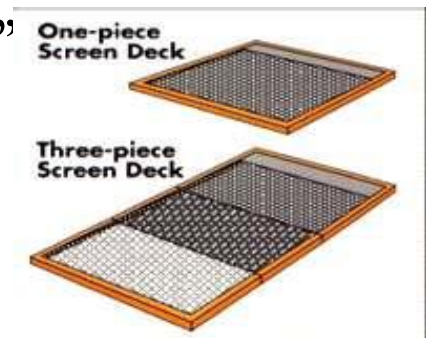
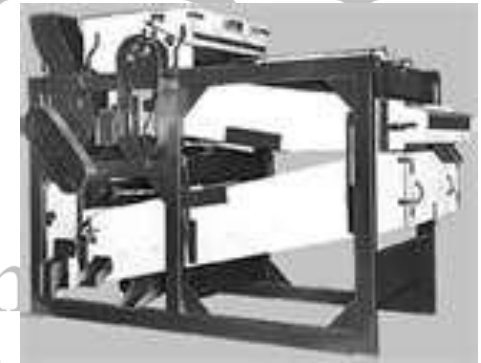


Basis of Separation:

- Seed processing is based on differences in physical properties between the desirable seed and the contaminating weed, other crop seeds or foreign material
- The “difference” can be in:
 - SIZE
 - LENGTH
 - WIDTH/THICKNESS
 - WEIGHT/SPECIFIC GRAVITY/TEST WEIGHT
 - SHAPE AND SURFACE TEXTURE
 - COLOR
 - OTHERS??

Basic of Separation - Size

- Size is the most common difference among seeds, and between seed and undesirable material
- The air-screen cleaner uses a series of perforated sheet metal or woven wire screens to separate seed of different sizes
- Seed size distribution and screen selection
- Two types of screen sizing are made:
 - SCALPING - Oversize material is removed
 - SIFTING – Undersize material is removed
- A series of scalping and sifting operations remove all material larger or smaller than the crop seed
- Factors effect “Screen efficiency” and “Capacity”
 - **Openings, feed rate, slope, and RPM**



Basic of Separation - Length

- Length differences are common among crop seed and weed seed, and are frequently used to upgrade and improve quality
- Both the indented cylinder (A) and the disc separator (B) make length separations.



A. Indented cylinder



B. Disc separator



Basic of Operation – Width/Thickness

- Width and thickness are special size dimensions used in operations such as sizing seed corn into specific widths and thickness for space-planting
- Thickness separations are made by turning the seed on edge or standing it on end to present its thickness dimension to perforations of specific size (A) cylinder
- Width separations are made by round-hole perforations at the cup-like depressions in cylinder (B)



A. Slot-hole cylinder



B. Round-hole cylinder



Basic of Separation - Weight

- Many seeds differ in weight, specific gravity, or test weight
- Weight or specific gravity is the effective separation principal in the air-blast separation in air-screen machines (**Terminal Velocity?**)
- Gravity separator, stoner, and the aspirator are all designed to make specific separations by differences in weight or specific gravity of seed (**Fluidization?** Specific Gravity of water=?)



Gravity Separator



Stoner



Aspirator

Basic of Separation – Shape & Texture

- Spiral separator is designed especially to separate round from flattened seed or round whole seed from the splits
 - A simple vertical series of spirals flights to allow seeds to roll or slide down by gravity. Round one will roll over the inclined edge of the inner flight of spirals
- Relative roughness or smoothness of the seed coat – surface texture – is a common difference between seeds.
 - The roll or dodder mill, the draper belt , the magnetic separator, the buckhorn machine and vibrator separator all effect separations of seeds differing in surface texture



Basic of Separation – Color

- Many seeds differ in color or reflectivity. Color separations are used more and more in processing, particularly with the larger crop seeds
- Electronic color sorters make color separations. These machines present each seed to electronic sensing devices which compare the seed with an electronic pattern or a given color background. If the seed is color hue or reflectivity is acceptable, it is allowed to continue to a discharge spout. Seeds not in the acceptable range of color hue or reflectivity are divided from the main stream by compressed air or other devices.



Basic of Separation:



SEEDS UoN
Seed Enterprises Management Institute
University of N

Questions?

