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SEED CLEANING - THE BASICS

L. S. Beckham ^{1/}

The problem of cleaning seed should be handled in a systematic fashion just as any other problem. First, define your objective - produce a product that can be sold. Second, define your problem - what are the weed seeds, other crops, inert matter, etc. that must be removed? Third, redefine your objective - should you aim for 99% pure seed with no crop and no weeds or something less. Finally, solve the problem with available resources.

The subject of this paper has to do primarily with solving the problem with an air-screen cleaner. But before solving the problem, we must determine the problem and whether or not it can be overcome. A set of hand screens is almost indispensable for this purpose. The hand screens will allow you to determine what the problems are and what screens will solve the problem. You will also be able to determine if the unwanted material in a seed lot can be removed, completely or partially. Only then can you make the decision whether or not to clean that seed lot.

Suppose that the decision is made to clean a lot. What are the basic tools available, and how do we use them?

No foreign matter may be removed from a seed lot unless one or more of its physical properties differ from those of the good seed. These physical properties are size, length, width, thickness, shape, density, surface texture, color, affinity for liquids and conductivity. In the basic seed cleaning operations the first six properties may be exploited. The last four are reserved for the finishing operations.

The machine used in basic seed cleaning operations is the air-screen machine. The air-screen machines use three cleaning elements: aspiration, scalping and grading. Air is used for aspiration and screens for the other two elements. Air screen machines come in many sizes with capacities up to 60,000 pounds of seed per hour. The machines vary from two screens to 8 screens per machine. The number of air separations vary from one to four.

Screens are used to perform two operations, scalping and grading. During scalping operations, the good seed fall through the screen perforations and larger materials pass over the screen. Grading is the opposite, good seed pass over the screen while undersize materials fall through. A two screen machine will have one scalping and one grading screen. A four screen machine normally has two of each type. A three screen machine may be set up with one scalping and two grading

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screens or vice versa.

In selecting screens, lists in books such as "Seed Processing and Handling" from the Mississippi State Seed Technology Lab. are excellent for establishing guides. However, these should be used only as guides because each lot of seed is different and may require a different set of screens.

Screens are constructed of both perforated sheet metal and wire mesh. Openings in sheet metal screens may be round, triangular, or oblong. Wire screen openings are either square or rectangular. Normally, wire screens are used for cleaning small seeds such as grasses, small seeded legumes, etc.

For most seeds, other than the small legumes, a combination of round scalping and oblong grading screens is used. Generally, the long axis of the oblong perforations is parallel to the flow of the seed. Having the long axis perpendicular to the flow of seed, cross slot screens, is ideal for removing splits from seeds such as beans and soybeans. A diagonal slot can also be used for making similar separations. Often the last grading screen has triangular openings when wild buckwheat, bindweed or dock seed occur as contaminants.

Air adjustments are often neglected in an air-screen machine. This is unfortunate since 30% or more of the cleaning is accomplished with air. Aspirating the seed with air blasts separates seed which differ in density. All air-screen cleaners have a bottom air blast while most commercial capacity machines have both top and bottom air. The top air removes light chaff and dust before the seed mass reaches the first screen. Bottom air removes light seed and trash as the seed comes off the final grading screen.

Top and bottom air should be at equal static pressures of about 1-1/2 inches of mercury. This is especially important when the exhausts from both fans are vented into one cyclone. The bottom blast will blow out an occasional good seed when properly adjusted. Good seed falling into the bottom fan housing is an indication that the bottom air is too strong.

Care should be taken to assure that air exhaust ducts do not restrict air flow. Restrictions of any kind will reduce the efficiency of aspiration. The radius of any bend in the exhaust ducts should not be less than twice the diameter of the duct.

The following are some tips gained from my experience in operating an air-screen machine:

1. Screen knockers on older machines should be removed. The damage that they cause to screens exceeds their usefulness.
2. Screen pitch adjustments can compensate to a degree for not having exactly the correct size screens. When the opening is

slightly too large or the seed remain on the screen too long, steepen the pitch. When the openings are too small or the seed are not staying on the screen long enough for complete grading, flatten the pitch.

3. For most conditions nylon brushes are excellent, however, with wire screens, fiber bristle brushes should be used. The flexible nylon brushes often cause wire screens to blind.
4. The major cause of failure of sealed bearings is over greasing. They should receive a maximum of one pump per 6 months of use. Needle bearings require frequent lubrication.
5. Replace the rollers on the brush carriers frequently. When the rollers wear out, the brushes do not contact the screens properly permitting the screens to blind.
6. Screen dams can overcome a screen having too steep a pitch and will increase seed mass turbulence. A yardstick nailed flat above a screen cross-brace will do an ideal job.
7. Some mill-wrights place rubber belting between the skids of an air-screen machine and its foundation. This practice should be avoided with solid wood cleaners.
8. If the bottom fan housing has seed in it, reduce the fan speed. The problem is caused by too much pressure causing the seed mass to bubble.

Finally, the most basic seed cleaning operation is a two step procedure. First, buy pure Foundation seed. Secondly, rogue your fields and keep them weed free. When contaminants are eliminated in the field, seed cleaning problems are minimized.