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Selecting Screens for Southern Crops

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SELECTING SCREENS FOR SOUTHERN CROPS

(The following is an edited condensed transcript of a talk given by Mr. James Henderson at the 1955 Short Course at Mississippi State College)

Before discussing reasons for selecting screens for Southern crops, the numbering system used to designate different types of screens in seed cleaners must be reviewed:

Round-hole perforated metal screens are identified by the diameter of the perforation. Those larger than 5½/64 in diameter are measured in 64ths of 1 inch. For example: The size commonly called 64 is 64/64 of 1 inch or 1 full inch in diameter. Round-hole screens smaller than 5½/64 are numbered in fractions of 1 inch. These are the sizes 1/12 through 1/25.

Oblong slotted screens have two measurements, the width of the slot and the length of the slot. The width of the slot is measured using the same system as for round-hole screens - 5½/64x3/4 and larger measured in 64ths of 1 inch and 1/12x1/2 or smaller measured in fractions of 1 inch. Three exceptions to the rule are the sizes 5/64x3/4, 4-7/8x3/4 and 3/64x5/16. The last number given in all cases is the length of the slot. Slotted screens commonly used in cleaning seed may have slots 1/4-inch, 5/16-inch, 1/2-inch or 3/4-inch long with some special longer slots available for large seed such as peanuts.

Wire mesh screens have either rectangular or square openings. The number given a wire mesh screen shows the number of openings per inch horizontally and vertically. The square 10x10 wire mesh screen size has ten openings per inch across and ten openings per inch down the screen. The rectangular 6x22 wire mesh screen has six openings per inch down and twenty-two openings per inch across the screen. Square wire mesh screens range in size from the 3x3 with nine openings per square inch to the 60x60 with 3,600 openings per square inch. Rectangular wire mesh screens are available in sizes ranging between the 2x8 and 6x60 meshes.

The size of triangular screen is given as the length of one side of the equilateral triangle measured in 64ths of 1 inch. For example: The size 9 triangle has sides measuring 9/64 of 1 inch in length. Some perforators measure the size of a triangle as the diameter of the largest circle that can be inscribed in the triangle.

A photograph of Kobe lespedeza seed lying on a 1/18x1/4 slotted screen illustrates clearly the importance of selecting a top screen with slots long enough to permit the seed to engage the openings easily and drop through. The Kobe lespedeza seed are almost 1/4-inch long and so must be fitted exactly into the short openings of the 1/18x1/4 screen before they will pass through. However, the seed engage the longer slot of the 1/18x3/4 size easily and pass much more rapidly through this slot that has the same width of opening as the shorter 1/18x1/4. With the same width of opening the same weed seed are separated, but the capacity is greatly increased when the longer slot is used. For the same reason a flat, wide seed like Kobe lespedeza can be sifted through a wire mesh top screen having a longer opening faster than a wire mesh screen having a shorter opening, and the size 3x14 has more capacity than the size 6x14.

The other top screen for Kobe lespedeza will usually be a round-hole screen to scalp off stems and trash. The sizes 9, 8½ and 8 can be used. Here the operator must choose the smallest that will drop the lespedeza seed freely.

The bottom screen generally used for Kobe lespedeza is a 1/14. If the Kobe has a small percentage of Korean mixed in it, then a 1/12 may be used to drop the Korean. Either of these round-hole screens will drop the weeds dodder, dock, buckhorn and bracted plantain, but neither of them will separate the horsenettle. When Kobe contains horsenettle, use the 6x21 wire mesh as one of the bottom screens; then most of the horsenettle will be sifted through. The flat, thin horsenettle seed turn on edge and go through the opening that will not drop Kobe lespedeza.

We are frequently asked for screens to completely separate sumpweed, lady's-thumb and rough buttonweed (pojo) from Kobe lespedeza. Unfortunately, there is no screen that will make a complete separation. If Kobe lespedeza seed is so badly contaminated with one of these weeds that normal cleaning screens will not clean it to salable purity, hull the Kobe lespedeza seed and then separate the weed seed while the hulled Kobe seed is recleaned.

Long slots are ideal for thin, flat Kobe lespedeza seed. Shorter Korean lespedeza seed can be cleaned better using shorter slots. Korean lespedeza seed passes freely through the 1/18x1/4 screen that rejects or scalps Kobe lespedeza seed. The 6x15 wire mesh makes a slightly closer separation of ragweed, spiny sida and pojo seed. In some years Korean lespedeza seed are unusually small, and the ragweed is also smaller than normal. When this is true, the size 3x16 Special may be used instead of the 1/18x1/4 or 6x15 screen to make a very close and accurate separation at good capacities.

Korean lespedeza, like Kobe, should be cleaned first through a round-hole screen, generally a size 6. When the seed are small or when there is a portion of Kobe lespedeza to be separated, the smaller size 5½ or 1/12 may be used.

Round-hole bottom screens 1/16 and 1/15 are generally used to separate dodder from Korean lespedeza seed. These screens will not separate bracted plantain, buckhorn or horsenettle seed from Korean lespedeza, so when confronted by any of these weeds use a 6x22 wire mesh bottom screen. If the Korean is unusually plump, it is better to use a 6x21, but in normal years the 6x21 loses some good seed.

Normal screens will generally clean enough lady's-thumb and rough buttonweed (pojo) seed from Korean. Some lots are so badly contaminated, however, that they should be cleaned through a 12x12 square wire mesh screen for a thorough separation. The capacity of this screen is low, but it is effective.

Some seedsmen prefer the square 16x16 wire mesh bottom screen for Korean. This is a good screen when there is no dodder as it sifts out the small foreign material without losing hulled Korean lespedeza seed. However, when the Korean contains dodder, a round-hole bottom screen will make a better separation.

Sericea lespedeza seed should be cleaned before hulling and recleaned again after hulling. Hulling reduces the size of the seed. If the seed are properly cleaned before hulling, a round-hole bottom screen size 1/16 or 1/15 will remove the dodder, buckhorn, bracted plantain and curled dock seed from the Sericea. After the seed have been hulled, they can be passed through a 1/16 top screen which will screen out any horsenettle seed. If the seed are properly pre-cleaned before hulling and again properly recleaned after hulling, many lots can be made weed-free without putting them through any special-purpose machines. The small residue of seed that were hulled by the combine drops through the 1/15 bottom screen used in the pre-cleaner.

Since this percentage will contain dodder, dock and buckhorn seed, it may be necessary to put this smaller portion through every special-purpose machine in the seed plant to make it weed-free. It is always advisable to finish the major portion of the seed with the cleaners alone than to be forced to run the entire lot through the slow special processing machines.

The final top screens for fescue seed should be a 1/24x1/2 slotted screen and a 6 round-hole screen. When the seed are brought in from the combine, however, they commonly contain so much trash and weed seed that much good seed will flood over these very close openings along with the trash. If the seed are properly pre-scalped with a 3/64x5/16 screen, enough of the cheat, green weed seed, freshly killed insects and other foreign material is removed so that the fescue seed are in full contact with the finishing top screens and can contact and go through the perforations. The 1/24x1/2 makes a very close separation of cheat, dock, onion and other such large or plump weed seed. The 6 round screen makes an especially good separation of hulled cheat and small, irregularly shaped wild onion bulblets that connot be made with any other screen or machine.

The same top screens will generally be used for rye grass and orchard grass grown in the Southeastern states, though orchard grass may more often be cleaned with the 1/22x1/2 diagonal screen instead of the 1/24x1/2 straight slot, and orchard grass being slightly shorter can be passed through a 5½ round instead of the 6 round.

The bottom screens for fescue, rye grass and orchard grass are a 6x32, 6x30 or 6x28 rectangular wire mesh size and sometimes the size 5 triangle. The rectangular wire mesh screens drop fine inert matter, and the larger openings are used to sift out oxeye daisy seed. The 5 triangle is especially good for separating sorrel and small, misshapen dock seed. The 5 triangle does its work quickly, so in most instances one-half of a section of bottom screen covered with this perforation will make the maximum separation with the least loss of good seed.

Lens-shaped seed, like elongated seed, should be passed through a slotted top screen; however, the first separation that should be made in cleaning any type of seed is to remove the straw and stems, and this can generally be done best with a round-hole top screen. The seed of crotalaria spectabilis are generally lens-shaped and if passed through a slotted top screen and over a round-hole bottom screen the plumper, rounder coffeeweed seed can be easily separated.

Commercial seed processors should have a cleaner that has at least four screens so that their seed can be passed through two top screens and over two bottom screens. Seed that are normal in shape, like sudan grass or clover seed, should be cleaned through a round-hole top screen and a slotted top screen. They should be cleaned over a slotted bottom screen and either a round-hole or square wire mesh bottom screen. The square wire mesh bottom screens are used when the seed being cleaned are so small that they will pass through the smallest round-hole screen size 1/25 or when there is some weed seed that can be more accurately separated with the greater number of openings and rougher-surfaced square wire mesh screen. For example, the square wire mesh screen 24x24 separates hop clover from white clover. Another separation that can be made better with a square wire mesh screen is the separation of hulled Johnson grass from hubam clover seed. The size 15x15 square wire mesh top screen drops the hubam clover seed but holds up most of the hulled Johnson grass seed. Unfortunately, there is no method that gives a complete separation of Johnson grass seed without loss of good clover seed, but the amount of Johnson grass seed in hubam clover can be sharply reduced with this square wire mesh screen.

The separations that can be made with round-hole, rectangular, oblong and triangular screens are well known and have been widely publicized. Little study has been given to the use of square wire mesh screens. Seedsmen who will try square wire mesh screens when confronted with a difficult separation frequently are rewarded with the solution of a cleaning problem.

Perfectly round seed like yellow soybeans can be easily and perfectly cleaned with only two screens, a round-hole top screen and a slotted bottom screen. Commercial seed processors who have seed cleaners with two bottom screens should first pass their soybeans over a round-hole bottom screen to drop the weed seed and then over a slotted bottom screen to drop the splits free of weed seed. Such splits that have been pre-cleaned have a higher value than splits full of weed seed. When flat, colored hay beans are cleaned, they should be run through a slotted top screen of a size that will screen out any round yellow soybeans in the seed. If the flat hay beans are small enough to pass through an 8/64x3/4 slotted top screen, this screen will also remove some of the larger morning glories so that a round-hole bottom screen can then be used to drop the small morning glories and completely clean the seed. When the flat soybeans are too large to be passed through the 8/64x3/4 slotted top screen and too small to be passed over a 12 round-hole bottom screen, screens will not separate all of the morning glories. In this case the seed may have to be put through a dodder mill to make a final separation.

When a round-hole bottom screen is being used to make a very close separation of a weed seed from a crop seed; example, a 1/16 round-hole screen to separate dodder from Korean lespedeza, screen dams placed on that screen to interrupt the smooth flow of the seed down the screen will increase the efficiency of the separation and permit greater capacity. Screen dams may be formed with pieces of wood lath fastened across the screen to retard the smooth movement of the seed down the screen and cause them to be held back, shaken back and forth and thoroughly sifted. Screen dams may be used on any type of bottom screen where more thorough sifting is needed than can be had with the screen alone. Dams will not cause seed to pass through an opening that is too small for them, but they will cause seed to engage a small opening and, if they are small enough, to pass through.

Oil cloth can be draped over a top screen to hold long stems, straw and pods flat on a round-hole perforation so that they will not turn on end and drop through with the good crop seed. Likewise, top screens with their lower section blanked off make better separations because the pieces of straw and stems that pass over the first few inches of open perforations ride onto the blanked-off section and have no opportunity to drop through and contaminate the good seed. Lots of Kobe lespedeza have been cleaned to 1-percent higher purity simply by blanking off the lower section of the top screen.

In all, there are 210 sizes of screens available. These range in size from $1\frac{1}{2}$-inch round-hole perforations to the 60x60 with 3,600 holes per square inch. A careful, well-chosen selection of screens for seed cleaning will yield a finished article from the cleaner and make further processing unnecessary.