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T. W. Still

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## THE ROLL (DODDER) MILL

T. Wayne Still <sup>1/</sup>

No seed processing machinery manufacturer has yet claimed to have developed a machine that will remove all objectionable weed seeds and foreign material from a lot of seed. The application of the principles of seed cleaning in which components of a mixture differing in dimensional characteristics may be separated by screens, indented cylinders or discs and those differing in weight and specific gravity by aspirators or gravity tables, are well known through the trade. Unfortunately, not all lots of seed may be cleaned satisfactorily on the basis of size, shape, and weight. Additional or special purpose machines must be added to the processing line to take care of such lots.

The roll mill uses a difference in surface texture of the seed to make a separation. In some instances seeds of different shapes can also be separated on the roll mill.

The roll mill is always, and I emphasize always, used after the basic cleaning machines in the processing line. It is used to finish lots of seed with smooth seed coats that contain seeds with rough seed coats such as dodder, seeds irregular in shape or with sharp angles, as well as flat or immature seed and inert matter that passed the previous machines.

A roll (dodder) mill consists of two units, the feeding unit and the separating unit.

### THE FEEDING UNIT

As the name implies, the feeding unit feeds the seed to be cleaned into the separating units. The feed unit consists of a hopper, a vertical shaft, and individual feed spouts. The hopper receives the seed yet to be cleaned from the elevator or some other means. From the hopper the seed flows into the vertical shaft. From the shaft the seeds flow into the individual feed spouts that lead directly to each pair of rolls. On most machines, the hopper and related feeding components are cleaned easily and rapidly by means of fast clean-out pull slides.

### THE SEPARATING UNIT

The separating unit consists of two rolls covered with a velvet-like material. The rolls are always used in pairs and each pair is a separate cleaning unit. A baffle (roll shield) is placed directly over each

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<sup>1/</sup> Mr. Still is Assistant Agronomist, State Seed Testing Laboratory, State College, Mississippi.

pair of rolls. A roll (dodder) mill may contain as few as one pair of rolls and baffles or a large machine may contain as many as ten pairs, depending upon the capacity desired.

The length of rolls may vary with different machines, as a certain length is not absolutely necessary for maximum cleaning. The number of rolls may also vary from machine to machine. An increase in the number of rolls does not increase the efficiency but merely increases the capacity.

#### PRINCIPLES OF OPERATION

The rough seed are separated from the smooth seed by the action of the rolls. A pair of rolls covered with a velvet-like material are placed side by side close enough to touch lightly. The rolls are mounted in an inclined position and turn in opposite directions, outwardly when viewed from the top. By the action of the rolls, the rough seed are lifted out of the smooth seed and discharged separately.

The seed mixture is fed onto the rolls from the feed hopper at the high end of the machine. As the seed travel downhill between the revolving, inclined rolls the rough seed are caught by the velvet-like material on the rolls and thrown against the baffles (roll shields). The rough seed continue to ricochet between the rolls and the baffles until they are thrown out. The smooth seed continue rolling and spinning downhill between the rolls and are discharged at the lower end of the machine. The seeds thrown over the sides are caught in graduated grade hoppers underneath the machine. The grades of seed from these hoppers vary from a high percentage of rough seed from the hopper nearest the feed (high) end of the machine, to a very low percentage of rough seed from the hopper nearest the discharge (low) end of the machine. The intermediate grades may be re-run to recover smooth seed that were thrown out with the rough seed.

#### ADJUSTMENTS

A few years ago I heard a man make a statement to the effect that a machine is 25 percent of seed cleaning and the operator the other 75 percent. There is a lot of truth in this statement. Regardless of how good the machine is it must be properly adjusted if it is to make the separations of which it is capable. All adjustments are important and none should be overlooked.

Once a roll (dodder) mill is properly adjusted it requires little attention on the part of the operator. There are however, a number of adjustments to make and these should be made very carefully.

Rate of Feed - The rate of feed is rather critical on the roll (dodder) mill. It is adjusted and controlled for two reasons. First, the effectiveness of the separation may be controlled by the rate of feed. If the rate of feed is too great,

many of the seed will not come in contact with the rolls and a separation will not be effected. Second, the capacity may be increased or decreased by adjusting the rate of feed. We all want to clean seed as fast and as effectively as possible.

The rate of feed adjustment is made by opening or closing the feed slide in the vertical shaft underneath the feed hopper. This increases or decreases the size of the opening in the shaft, through which the seeds flow into the individual feed spouts.

Speed of the Rolls - The most important adjustment is the speed of the rolls which is controlled by the hand wheel at the end of the motor base. In general, the faster the rolls revolve, the cleaner the seed. However, too fast a speed is not recommended, as it results in unnecessary throwover of good seed. The recommended procedure for adjusting the speed is to start with a minimum speed and the desired rate of feed, then increase the speed of the rolls until the seed is clean. If rough-coated seed are found in the smooth-coated seed discharge, the speed is too slow or the rate of feed is too fast. If there are too many smooth-coated seed thrown out with the rough seed, the rolls are running too fast.

Variable Tilt Mechanism - The tilt mechanism is located at the bottom of the feed end of the machine. On some machines it is a large hand wheel screw; whereas on other machines it is a combination lever-screw device. This variable tilt mechanism permits quick, easy adjustment of pitch for various types of seeds. A continuous incline range from 7 to 13 degrees may be obtained. It is generally agreed that an incline of 13 degrees gives best results for most kinds of seed. Slight adjustments in angle affect the capacity and efficiency of the machine. Increasing the tilt has the effect of shortening the rolls and also reduces the amount of throwover. This adjustment is used less by most operators once a desirable tilt has been established.

Height of Baffles - The baffles are roll shields that conform fairly close to the shape of the rolls as viewed from the top and are positioned directly over each pair of rolls. The baffle adjustment is used primarily to widen the range of separations possible. The clearance between the rolls and the baffles should be adjusted so that seed can turn freely and cannot touch both roll and baffle at the same time, but close enough so that rough-coated seed will be repeatedly thrown against the baffle as the seed comes in contact with the rolls with the result that the rough-coated seed are removed rapidly from the smooth-coated seed which are not lifted.

The baffles are independently adjustable at either end of the machine. All the baffles are adjusted at one end at the same time and have the same spacing. For most cleaning problems, a 1/4 inch spacing between the rolls and baffles seems to be best. It may be to your advantage, however, to check the clearance.

In adjusting a roll (dodder) mill, as well as other machines, make only one adjustment at a time. Run the machine several minutes, then observe the results. If changes in adjustment are warranted, make them, and once again observe the results. Changes in adjustment should be gradual, unless of course, the results indicate that a drastic change is needed.

The roll (dodder) mill is a very economical machine because the cost of operation and maintenance is extremely low. The minimum attention needed to operate the roll mill, once it is adjusted, is also a point to remember when considering this machine. Most manufacturers of roll mills offer an exchange service on rolls that need resurfacing.

Below are listed a few rough-coated seeds and objects which are removed by the roll (dodder) mill.

Dodder	Catchfly	Wild Winter Peas
Mustard	Cockle	Wild Carrot
Foxtail	Timothy	Pieces of Clay or Stones

These rough-coated seeds or objects may be removed from clovers, alfalfa, hulled lespedeza, hairy vetch and other smooth-coated seeds. Because of its triangular shape and sharp corners, dock is commonly and easily removed from the clovers.

The removal of buckhorn can be accomplished with this machine if prior treatment has been given the seed lot containing buckhorn. This prior treatment involves adding a foreign material such as wood dust to the buckhorn which creates a rough surface. Separation is then an easy matter.