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Calibrating a Seed Drill for Conservation Planting

Plant Materials Technical Note

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Introduction

Many species of grasses, forbs and legumes are planted to help solve resource problems. Some examples include seeding highly erodible cropland to permanent vegetative cover, seeding forages for hay or pasture, establishing permanent perennial vegetation on rangeland, and planting critical areas such as roadsides or grassed waterways. To achieve a successful seeding, an important step is the calibration of the seeding equipment so that the recommended amount of seed is uniformly planted.

Seeding rate recommendations are often given in pounds of Pure Live Seed (PLS) per acre. PLS seeding rates must be converted to bulk pounds per acre in order to calibrate planting equipment. Planting equipment varies considerably among cooperators so it is important to become familiar with the equipment being used.

General rules of thumb are used in setting PLS seeding rates. Seed mixtures commonly have both large and small seeded species. The following rules are used to establish those rates:

Large seed <500,000 seeds /lb calibrate at 20 seeds/sq. ft.

Small seed >500,000 seeds /lb calibrate at 40 seeds/sq. ft.

Critical area plantings use 2 times the drill seeding rates shown above.

The following are several different methods for calibrating a drill:

- Determine the seeds per foot of row.
- Run the drill a given distance, weigh the seed dropped, then convert to pounds per acre.
- Determine the drive wheel circumference, turn it a given number of times, weigh the seed dropped, then convert to pounds per acre.
- Fill the drill with a weighed amount of seed, seed a measured area, reweigh what is left in the drill, then calculate the pounds per acre.
- Consult the seed chart on the inside of the drill cover.

Most people try to use the handy chart on the inside cover of the drill because it lists some species along with their seeding rates and drill settings. The charts work well for crops like wheat and sorghum. However, the charts DO NOT work well for conservation mixtures. These mixtures have different sized seeds which flow differently and also tend to stratify. This requires combining species of similar size in each seed box as well as adding a carrier such as rice hulls, sand, or kitty litter in order for the drill to operate properly.

Preliminary Steps Before Calibration

Become familiar with the drill being used. Perform necessary maintenance and check to ensure the drill is in proper operating condition. You can expect to find rusty openers as well as overzealous greasing and oiling that will interfere with seed flow or the tubes may be clogged with nesting materials from field mice. Check drill gates or flaps to ensure they are in the proper position for the size and kind of seed being planted. Start calibration from an open position before closing down to the desired position.

Determine the bulk seeding rate per acre. PLS information (purity and viability) will be on the seed tag or seed analysis report. Based on the PLS seeding recommendation from the Texas Field Office Technical Guide, determine the PLS seeding rates for the mixture.
To calculate bulk seeding rate use the following formula:

PLS pounds per acre divided by percent PLS = Bulk seeding rate per acre

Example:
A seeding recommendation for a switchgrass/purple prairie clover mix is set at 2 pounds PLS/ac switchgrass and 2.5 pounds PLS/ac purple prairie clover. Percent PLS for switchgrass as determined from the seed tag is 85% and for purple prairie clover it is 90%.

Switchgrass:
2 pounds PLS per acre divided by 85% PLS = 2.4 bulk pounds per acre

Purple prairie clover:
2.5 pounds PLS per acre divided by 90% PLS = 2.8 bulk pounds per acre.

Calibration Methods

SEED WEIGHT-DISTANCE

First compute the area of a 100 foot test run based on the width of the drill to be used for the seeding.

$$\frac{\text{Drill width (ft)} \times 100 \text{ foot test run}}{43{,}560 \text{ sq.ft./ac}} = \text{acreage of test run}$$

Example:

$$\frac{10 \text{ feet drill} \times 100 \text{ foot test run}}{43{,}560 \text{ sq. ft./ac}} = 0.02 \text{ ac}$$

Next calculate the amount of seed mixture required for test run

Purple prairie clover	2.8 bulk pounds per acre
Switchgrass	2.4
Total	5.2 bulk pounds per acre

5.2 x .02 ac = 0.1 pounds of seed mix for test run

Then

$$\frac{\text{Pounds of mix for test run}}{\text{Number of tubes on drill}} = \text{pounds of mix per tube}$$

$$\frac{0.1 \text{ pounds of seed mix for test run}}{10 \text{ tubes on drill}} = 0.01 \text{ pounds of mix per tube}$$

Since a small amount of seed is being weighed, it is desirable to convert the amount into grams (0.01 pounds x 454 grams/pound = 4.54 grams per tube for a 100 foot test run).

Measure and stake 100 feet of linear distance. Run the drill for at least 6 feet before initiating the test run in order to "prime" the drop tubes. Remove the drill tubes from the double disk openers and place a baggy or whirlpack under the tube spout to collect seed. Drive at a

constant speed (the same speed that seeding will take place) during the test run. Measure a minimum of 2 tubes on each side of the drill. Stop and weigh seed from each tube and compare to calculated amount. Make necessary adjustments to the drill openings. Repeat the above procedure until seed weight coming from the tube is within 10 percent of the desired rate. Repeat the test run at least twice once calibration is set to desired setting.

A variation to this method, known as the catch-all method, involves removing all the tubes and collecting seed from all of the spouts during the calibration trial. The target rate would be the total pounds of seed mix for the test run as shown above (0.1 pounds).

WHEEL CIRCUMFERENCE

This method involves measuring the drill drive wheel circumference in feet and determining the number of revolutions the wheel must turn to cover a pre-determined length of run (usually 100 feet). This method only works on drills where the drive wheel can be turned by hand without pulling the drill. A variation of this method that also works quite well is to count the number of revolutions the drive wheel turns in 100 feet. It is extremely important that the air pressure in the tires on the drill be maintained at recommended levels during both the calibration and the actual seeding. If a consistent air pressure is not maintained, actual seeding rates can be different than the rate calibrated.

Determine the area covered in 100 feet:

$$\frac{\textbf{Drill width (ft) x a 100 foot test run}}{\textbf{43,560 sq.ft./ac}} = \textbf{acreage of test run}$$

Example:

$$\frac{\text{a 10 foot drill x 100 feet}}{\text{43,560 sq. ft./ac}} = 0.02 \text{ ac}$$

Once the distance of the test run is determined, you will need to measure the circumference (perimeter) of the drive wheel and determine the number of revolutions the drill drive wheel must turn to equal the distance of the test run. The calculation for determining the number of rotations is:

$$\frac{\textbf{Distance of test run (feet)}}{\textbf{Wheel circumference (feet)}} = \textbf{number of drive wheel rotations for test run}$$

Example:

$$\frac{\text{100 feet}}{\text{4.7 feet}} = 21.3 \text{ wheel rotations}$$

Note: measurements of test run length and wheel circumference should be to the nearest tenth of a foot to insure reasonable accuracy.

Remove tubes from the double disk openers and turn the drive wheel until all of the tubes are dropping seed uniformly in order to prime all the drop tubes. Place a baggy or whirlpack under the tube spouts to collect seed. Turn the drive wheel the number of rotations that were calculated. Remove baggies and weigh collected seed.

Calculate the amount of seed mixture required for test run

Purple prairie clover	2.8 bulk pounds per acre
Switchgrass	2.4
Total	5.2 bulk pounds per acre

5.2 x .02ac = 0.1 pounds of seed mix for test run

Determine the amount of seed that should be delivered through each tube during the test run.

$$\frac{\text{Pounds of mix for test run}}{\text{Number of tubes on drill}} = \text{pounds of mix per tube}$$

Example:

$$\frac{\text{0.1 pounds of seed mix for test run}}{\text{10 tubes on drill}} = \text{0.01 pounds of mix per tube}$$

Since a small amount of seed is being weighed, it is desirable to convert the amount into grams (0.01pounds x 454 grams/pound = 4.54 grams per tube for a 100 foot test run). Compare this amount to the amount collected and weighed during test run.

As with previous method, make adjustments to the drill and repeat the above procedure until seed weight is within 10 percent of the desired rate. Check results with two or more trials at the same setting. If during the calibration process one species appears to be consistently short, check to make sure the seed mixture is thoroughly mixed. Be sure to also record the drill settings for future reference.

For additional information please contact:

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