

TECHNICAL NOTE

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CALIBRATING A SEED DRILL FOR COVER CROP MIXTURES

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This Technical Note provides clear, step-by-step instructions on how to calibrate a seeding drill for planting a multiple-species cover crop seed mixture.

INTRODUCTION

Composition of cover crop mixes can be very diverse with seeds ranging in size from very small clovers (270,000 seeds/lb) to very large peas/beans (2,000 seeds/lb). Additionally, the makeup of each mix will vary depending on the site, planting window and resource concern being addressed. The final seed mixture could be comprised primarily of larger seeded species, smaller species or a blend of both (Figure 1). For more information on developing a mix see Regional Technical Note 2: Cover Crop Selection Tool. For species descriptions see Idaho Technical Note 67: Cover Crops for the Intermountain West.



Figure 1. Calibrating a seed drill for highly diverse mix can be intimidating, but by following a few simple steps it can be accomplished without much difficulty. Photo by IDPMC.

To achieve the desired outcome of a seeding practice, an important step is the calibration of the seeding equipment so that the recommended amount of seed is uniformly planted. While NRCS field office staff are well acquainted with diverse seed mixes, calibrating seeding equipment can pose a challenge for farmers who are used to planting single species.

Drills are calibrated by adjusting the sizes of the openings through which the seeds fall. Many drills have an adjustable lever and a seed chart for calibrating for single species (Figure 2). However, when seeding a multiple species mixture like a cover crop mix, it can be hard to know where to begin.

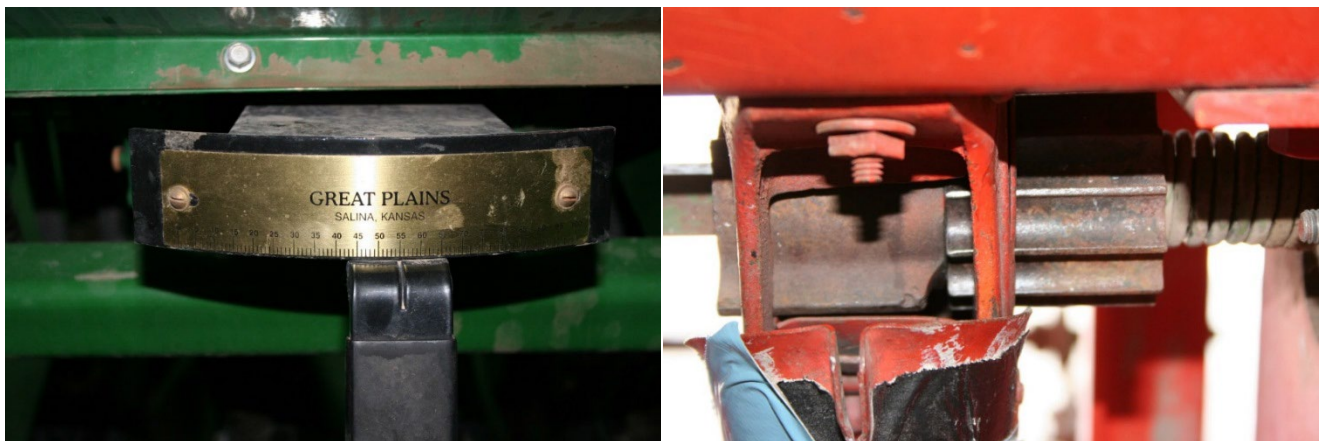


Figure 2. Most drills, like the Great Plains No-till drill (left) come equipped with a graduated lever for easy calibration, while older drills (right) may have to be adjusted manually by sliding the opener shaft one way or the other. Photos by IDPMC.

For this guide we will use the following mix as an example (Table 1); however, the steps will be the same regardless of the mix composition.

Table 1. An example 8 species cover crop seed mix with a desired seeding rate of 40.5 lb/ac.

Species	Seeding Rate (PLS) <i>lbs/ac</i>	% Composition
Cereal rye	15	37
Triticale	8	20
Phacelia	1	2.5
Radish	1	2.5
Hairy Vetch	6.5	16
Crimson Clover	1.5	4
Winter Pea	7	17
Turnip	.5	1
	40.5	100

Getting Started

There are two ways to choose a starting point for drill calibration. One possible starting point is to use the setting recommended for the most prominent species in the mix. For example, if the most prominent species is cereal rye, we would follow the recommendations for the drill setting located on the drill or in the operator’s manual for rye (Figure 3). If the dominant species in the mix doesn’t match anything listed in the manual, you can use the drill setting for a species of a similar bushel weight. For example, if the main species in your mix is cereal rye which has a bushel weight of approximately 57 lb/bu, but there is no rye setting on the drill, you could use the drill setting for peas or sorghum, which have bushel weights of 61 and 60 lb/bu respectively.

Figure 3. Sample from the Great Plains Seed Rate Chart showing drill settings for cereal rye. In our example, we would begin the drill calibration process with the seed rate handle set for cereal rye at 45 and expect to be close to seeding 40 lb/ac.

Rye (*Secale cereale*)

		Seed Rate Handle Setting																				
		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
Rows	Drive Type: 1	Seed Rate in Kilograms Per Hectare (based on 0.73 kg/litre)																				
19.1 cm		0	4.3	7.4	11	15	20	25	30	35	41	46	52	57	63	68	73	77	82	85	88	91
	Drive Type: 2	Seed Rate in Kilograms Per Hectare																				
19.1 cm		0	8.8	15	23	31	41	51	61	72	84	95	107	118	129	139	150	159	168	175	182	187
	Drive Type: 3	Seed Rate in Kilograms Per Hectare																				
19.1 cm		0	15	24	35	47	60	75	91	107	124	142	159	177	194	210	226	242	256	269	280	290
	Drive Type: 4	Seed Rate in Kilograms Per Hectare																				
19.1 cm		0	25	39	57	76	99	123	148	175	203	231	259	288	316	343	369	394	417	438	457	473

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The second possible starting point for calibration is to use the bushel weight of the seed mix. If the bushel weight of the mix is known, the drill can be set at the rate of a single species with a similar bushel weight and be very close to accurate. To find the bushel weight of a seed mix:

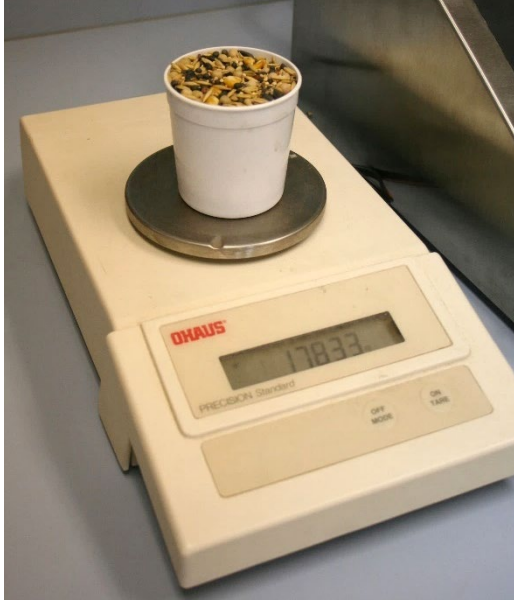


Figure 4. A gram scale can be used to calculate the bushel weight of the seed mix.

1. Pour seed into a 1 cup measure and level off. Do not pack the seed into the measuring cup (Figure 4).

2. Weigh the measured seed (in grams) and multiply the weight by 0.328.

Example: 1 cup of seed weighs 178 grams. $178 \text{ grams} \times 0.328 = 58 \text{ pounds per bushel}$.

We can thus set the drill for a species of a similar bushel weight at the desired pounds per acre. This should be a good starting point, though some fine tuning may be required.

Calculations

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

$$\frac{\text{Drill width (feet)} \times 100 \text{ foot test run}}{43,560 \text{ ft}^2/\text{ac}} = \text{acreage of test run}$$

Example:

$$\frac{10 \text{ foot drill} \times 100 \text{ foot test run}}{43,560 \text{ ft}^2/\text{ac}} = 0.023 \text{ ac}$$

2. Calculate the amount of seed mixture required for test run.

Example:

$$40.5 \text{ lb/ac} \times 0.02 \text{ ac} = 0.93 \text{ pounds of seed mix for test run}$$

3. Determine the amount of seed that will be delivered through each drill spout during the test run.

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

Example:

$$\frac{0.93 \text{ pounds of seed mix for test run}}{10 \text{ spouts on drill}} = 0.093 \text{ pounds mix per spout}$$

Since a small amount of seed is being weighed, it is desirable to convert the amount to grams (0.093 pounds x 454 grams/pound = 42.3 grams per spout for 100 foot test run).

Calibrating the drill

The 100 foot test run can be done either by driving the drill over the ground, or by jacking up the drill and turning the drive wheel while the drill is elevated to simulate travel. The second method involves measuring the drill drive wheel or coulter circumference (perimeter) and determining the number of revolutions the wheel must turn to cover the length of run (100 feet in this case). This method only works on drills where the drive wheel can be turned by hand without pulling the drill.

The calculation for determining the number of rotations is:

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

Example:

$$\frac{100 \text{ feet test run}}{4.7 \text{ feet circumference}} = 21.3 \text{ wheel rotations for test run}$$

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

Next, remove a spout from a disk opener on the left and right side of the drill and turn the drive wheel or coulter until all of the spouts are dropping seed uniformly to prime the drop tubes. Turn the drive wheel the number of rotations that were calculated or counted, while catching the seed in cans or other clean containers. Then weigh the collected seed.

Make adjustments to the drill openers and repeat the above procedure until seed weight is within ± 10 percent of the desired rate. Check results with one more trial at the same setting. Be sure to record the drill settings for future reference.

Idaho Plant Materials Technical Note 69a, Calculator for Calibrating a Cover Crop Mix with a Box-Type Drill, is an Excel worksheet that set up to do the above calibration calculations. Figure 5 is a screen shot showing example calculations. A live copy of Tech Note 69a is available at <https://www.nrcs.usda.gov/plant-materials/publications/search>

A video with example calibrations is available on the NRCS Idaho YouTube channel: [Calibrating a Seed Drill for Conservation Plantings \(youtube.com\)](#)

Conclusion

Following the above steps is a simple way to calibrate complex seed mixtures to achieve the desired seeding rate which is important for achieving the desired outcome of the planting and for maximizing cost efficiency.

Technical Note No. 69a, Calculator for Calibrating a Cover Crop Mix with a Box-Type Drill

See Idaho Plant Materials Technical Note No. 69 for details.

Enter information in **RED** boxes.

1) Bushel Weight of Cover Crop Seed Mix

NOTE: Use this bushel weight to find the closest rate setting on your drill.

Level 1-cup measure of mix = grams

Bushel weight of mix = **58 bushels**

2) 100-foot Test Run

Example: The circumference of the drive wheel is 96 inches (8 ft). To travel 100 feet, the wheel must rotate 12.5 times. Place a chalk line on the wheel, and rotate it 12.5 times.

100-foot Test Run

Drive wheel circumference = inches

Wheel rotations in 100 ft = **12.5 rotations**

NOTE: If it is not possible to lift and rotate the drive wheel, and there is no floating drive wheel, fasten baggies over the spouts and drive 100 ft.

3) Drill Calibration:

Example: You want to plant 40 lb/ac of a cover crop mix. Drill width is 15 feet; length of test run is 100 feet. Adjust the drill settings until you collect 26.1 grams of the cover crop mix per spout in 100 feet. At this point, you will be seeding your target rate.

Total mix/ac = lb/ac

Drill Calibration

Drill width = feet

Length of test run = feet

Number of spouts =

Grams of mix per spout = **26.1 grams**

NOTE: Make sure the drill is primed before starting collection (seed filling the fluted cogs). Using the number of wheel rotations from **2)** above, catch the seed from individual spouts (at least two) and weigh each catch with a gram scale. Adjust drill settings until you are within 10% of the desired weight.

Figure 5. Image of Tech Note 69a, Calculator for Calibrating a Cover Crop Mix with a Box-Type Drill. A live copy of Tech Note 69a can be found at <https://www.nrcs.usda.gov/plant-materials/publications/search>

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