Drill Calibration Worksheet

Calibration Methods for Native Grass Drills

Description:
When planting native warm season grasses and forbs with the use of a no-till drill it is critical to the success of the planting to correctly calibrate your drill before planting. Seeds planted at incorrect rates and depths will not provide maximum wildlife benefit.

Benefits:

- Increases wildlife habitat value
- Increases plant diversity
- Promote proper seed germination
- Promotes diversity of wildlife species
- Promotes success of planting

Method 1:

Step 1: Determine bulk pounds of seed needed to plant the desired pounds of Pure Live Seed (PLS) seeding rate.

Calculation Method:

1. % Purity x Total % Germ = **% PLS** (%PLS is usually on the seed batch tag. You DO NOT need to calculate %PLS if it is already on the tag)

2. **1/% PLS** = Bulk pounds needed to plant 1 pound PLS

3. Bulk pounds needed to plant 1 pound PLS **x recommended rate** of pounds of PLS/acre = **bulk pounds needed/acre**

(Note – There may be two percentages in each "batch" of seed: germination (germ) and purity. Germ is the percentage of seeds that are alive. Purity is the amount of material that is actual seed versus "trash". Trash is stems, hulls, husks, etc. Each batch of seed will have a different amount of bulk pounds required. **This is why you MUST calibrate every time you plant a new batch of seed**. Because most landowners will probably order their own batch, it is essential that the drill is calibrated each time. It is conceivable for those proactive soil conservation

districts to figure out how many pounds of PLS they will need for each "mix" in their county and order that all in one batch. The landowners could pay the districts for their amount of the seed if you had the seed company bag each landowner's seed separately. In this scenario, you could conceivably calibrate the drill one time to this "batch" to determine what setting to plant on. Of course the boxes and hoses would need to be cleaned out for each use to ensure no clogs. IMPORTANT: Each mix and batch **MUST** be calibrated separately (i.e.- pollinator vs. short mix vs. tall mix vs. forage mix vs. others…).

Step 2: Drill setup (**REQUIRED for ALL plantings regardless of calibration!**)

1. Ensure seed is flowing and there are no clogs in all box openings, hoses, and coulters by hand.
2. Then take the back panel off of the drill (different drills may vary on this ability) and have the landowner pull the drill ~100 yards (approx.) or once around the field (if there is a small field). This gets seed flowing through the drill. You can see seed drop where the panel was. Don't worry if your drill model doesn't allow for this. You will probably see some seed on top of the ground. This is expected.
3. While the landowner is pulling the drill, walk behind it to make sure seed is flowing. Check for seed in the dirt of each drill row.
4. Also check the seed depth of the seed. It should be 1/8" – 1/4" deep. The most common mistake is for it to be planted TOO deep. When in doubt, put a depth spacer on to make it plant shallower.

Step 3: Calibration

Note – Useful conversion factors

- 43,560 ft^2 = 1 acre
- 16 oz. = 1 pound
- 1 oz. = 28.3 grams (shouldn't be necessary)

1. Measure linear course with a measuring wheel and mark the finish line with flag
    a. for a **10-foot wide drill: 435'** long course (for 1/10 acre worth), or
    b. for a **7-foot wide drill: 311'** long course (x 2 to get 1/10 acre worth), or
    c. for a **5.5-foot wide drill: 396'** long course (x 2 to get 1/10 acre worth)
2. Tie-on ziploc bags to 3 tubes (from different parts of the box; on a 10' haybuster). You may need to adjust this number by drill model.
3. Have the landowner drill the course. Make sure he/she raises/drops the drill at the proper place.
4. Weigh a calibration cup containing 3 empty grocery bags in ounces on a digital scale. Then put all of the bags of seed from the course into a calibration cup and weigh it.
    - Weight **(oz.)**
5. Convert ounces to pounds
    - Weight (oz.)**/ 16** = Weight **(lbs.)**
6. Convert to account for total of 18 tubes (adjust this calculation as necessary for your drill model)

- Weight (lbs.) **x 6** = **Total Weight (lbs.)**

7. Convert weight **for course length/~ 1 acre worth of drilling**:
    - Note – the weights for the 7-foot and 5.5-foot drill calibrations are multiplied by 2 to make the course length a reasonable distance
    - α = Total Weight (lbs.) adjusted by course length/~ 1 acre worth of drilling
    - **10-foot drill:**
      α = (Total Weight (lbs.) **x 10)**/acre, or
    - **7-foot drill:**
      α = (Total Weight (lbs.) **x 10 x 2**)/acre, or
    - **5.5-foot drill:**
      α = (Total Weight (lbs.) **x 10 x 2**)/acre
8. Adjust opening or gear of drill and repeat until you get the recommended rate or within **1 lb./ac under** the recommended rate.

Method 2:

CALIBRATION BY BULK WEIGHT OF SEED

Weigh the seed metered out for a fraction of an acre and then calculate the rate per acre. The following procedure is based on 1 /50th of an acre.

1. Determine the row spacing of the seeder.
2. Determine the circumference of the wheel (distance traveled per revolution) that drives the metering mechanism on the seeder.
3. Jack the drill up so this wheel clears the ground and turns freely.
4. Place a quantity of seed over a number of seed cups in the drill box; turn the drive wheel until the seed is flowing uniformly from the cups covered with seed.
5. Randomly select six drill runs metering seed and set up containers or bags to collect the seed metered by these runs.
6. Calculate the number of drive wheel revolutions necessary to calibrate the drill according to Table 4.
7. Rotate the drive wheel the required number of revolutions as determined in step 6; collect the seed metered out in the containers as set up in step 5.
8. Weigh the total amount of seed (in ounces) collected in the containers set up in step 5.
9. Calculate the seeding rate using the following formula:
   weight of seed collected (in ounces) X 50 /16= pounds per acre
10. Adjust seeding rate and repeat steps 7 to 9 until the desired rate is achieved.

TABLE 4 Distance To Travel and Revolutions of Drive Wheel to Seed 1/50th Acre with Six Rows at Various Spacings

Drill Row spacing in inches	Distance to seed 1/50th acre(ft) with six rows	÷	Circumference of Drive Wheel (feet)	=	Revolutions of Drive Wheel to seed 1/50th acre
6	290'	÷	C	=	X
7	249'	÷	C	=	X
8	218'	÷	C	=	X
9	194'	÷	C	=	X

EXAMPLE

You are using a seeder with 7inch row spacing. The circumference of the meter drive wheel is 9.5 feet. By using Table 4 you determine that the number of drive-wheel revolutions required to calibrate a drill with 7 inch row spacing (249 divided by 9.5) is 26. Rotate the drive wheel 26 sums. Weight of the seed collected from the six runs is 3 ounces. The seeding rate is

3 X 50/ 16 = 9.40 lbs/acre bulk

Example #2 (This is the method that I use.)

Same as above except that you can calibrate by engaging drill and pulling the required distance.

You are using a seeder with 7inch row spacing. By using Table 4 you determine that the distance required is to calibrate a drill with 7 inch row spacing is 249 ft. Engage the drill and pull the distance of 249 feet. Weight of the seed collected from the six runs is 3 ounces. The seeding rate is

3 X 50/ 16 = 9.40 lbs/acre bulk

Square Foot Method:

Determine a distance to calibrate drill.

Determine the planting width of the drill.

Determine the factor of acreage covered.

Pull ½ of the tubes off drill; set up containers or bags to collect the seed metered by these runs.

Weight of seed collected from tubes doubled x _____square foot % = _____ ounces per acre

Ounces per acre divide by 16 = lbs bulk per acre.

Example:

Distance to test = 100 feet

Planting width of drill = 8 feet

100 ft x 8 ft = 800 square feet

43560 square foot / (_____)sq. ft planted = _____ square foot factor

43560 square feet divided by 800 square feet = 54.45 square foot factor

Pull ½ of tubes to collect seed. (We collect 1.5 ounces combined from half the tubes)

Weight of seed collected from tubes x 2 (1.5 ounces collected times 2 = 3 oz)

(3 oz) x 54.45 square foot factor = 163.4 ounces per acre.

163.4 ounces per acre divided by 16 ounces = 10.2 lbs bulk per acre.

Use of a No-Till Drill:

1) **Evaluate the drill**:

- Tubes clear- very common for tubes to be plugged
- Use a vacuum to clean out seed box if dirty before putting in new seed
- Tubes connected, undamaged, and properly aligned
- Check seed slot opening to be sure it is not plugged with soil or trash
- Coulters running straight,
    - bearings good
    - clear of caked-on soil or debris
    - on level ground, adjust each coulter to the same depth
    -

2) **Planting (best to plant native grass in late spring or it can be planted during dormant season or late winter)**

- Soil test a month or more prior to seeding.
- Control competition with burn down herbicide if less than 30% of the surface is visible (follow label)
- If heavy residue or thatch is present, scarify ground lightly with disc to avoid getting residue pinned into seed slot and interfering with seedling germination and emergence. Graze close before planting if no-tilling into sod.
- Most common mistake is planting too deep. Small seed should not be planted deeper than a ½ inch, a ¼ inch is better; some seed on top of the ground is good. (plant seed at a depth of 8 x the width of the seed)
- Another common mistake is traveling too fast (particularly a problem with fluffy seed)
- Check tubes after seeding one acre to make sure seed are flowing and not building up in tube.
- Traveling too fast can throw soil out of the planting slot
- Seed should be firmed by rollers. A deep, open planting slot can silt in or erode out seed. In drier weather an open slot may cause seed to germinate and then dry out and die in some spots causing uneven stands.
- Clean drill of all seed and caked-on soil before unhooking from tractor (germinating seed, and insects and rodents seeking food contribute to problems).

Note: These recommendations are help with the proper establishment of native vegetation, specifically the establishment of native warm season grasses and associated forbs.

For further information and specifications please see U.T. Extension Publication PB1752, "Native Warm-Season Grasses: Identification, Establishment and Management for Wildlife and Forage Production in the Mid-South" and U.T. Extension Publication SP731-B, "Establishing Native Warm-season Grasses for Livestock Forage in the Mid-South".