

TECHNICAL

U. S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NOTES

IOWA STATE OFFICE
DES MOINES, IOWA

Agronomy #8

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Subject: CALIBRATION OF SEEDING EQUIPMENT

When planting forage species, adjustment of the equipment to attain the desired seeding rate is important. Most equipment has setting predetermined and furnished with the machine for at least some plant species. Many times, these settings are not correct, have been lost, are not available, or have not been developed for the species being planted.

The following procedures may be used to calibrate equipment to approximate desired seeding rates.

SEED DISTRIBUTION

Most all seeding rates are listed in pounds of seed per acre. Each species has an approximate number of seeds per pound. The surest method of determining the amount of seed being distributed by the seeding equipment is to count the number of seeds per foot of drill row or per square foot while the machine is in operation.

TABLE 1

Species	wt. bu.	Seeds/lb.	Seeds/ft @ 1 lb/Ac PLS	Seeding Rate lb/Ac	Seeds per Row Foot With Row Spacing at:			
					6"	8"	10"	*12"
<u>1. Cool Season Grasses</u>								
Tall Fescue	21	206,840	4.7	10	23	32	40	48
Orchardgrass	14	429,600	9.9	6	30	39	49	59
Smooth Bromegrass	14	142,900	3.3	12	20	27	33	40
Reed Canarygrass	48	506,000	11.6	5	29	38	48	58
Timothy	45	1,125,000	25.8	2	26	34	43	52
Kentucky Bluegrass	14	2,177,000	50.0	2	50	67	83	100
Meadow Foxtail	14	545,000	12.5	3	18	24	31	37
Red Top		4,990,000	114.5	1	57	76	95	114
Perennial Ryegrass		227,000	5.2	8	20	27	34	41
Crested Wheatgrass (fairway)		323,900	7.4	5	18	25	31	37
Crested Wheatgrass (standard)		192,800	4.4	9	20	27	33	40
Western Wheatgrass		106,600	2.5	14	17	23	29	35

(continued on page 2)

TABLE 1 (continued)

Species	wt. bu.	Seeds/lb.	Seeds/ft @ 1 lb/Ac PLS	Seeding Rate lb/Ac	Seeds per Row Foot With Row Spacing at:			
					6"	8"	10"	12"
2. Warm Season								
Sudan Grass	28	54,000	1.2	25	18	25	31	37
Mountain Brome		64,000	1.4					
Russian Wildrye		175,000	4.0					
Meadow Brome		71,000	1.6					
Purpletop		465,000	10.6	4	21	28	35	42
Meadow Fescue		230,000	5.2	10	26	34	43	52
Eastern Gamagrass		7,280		28				
Bermuda Grass		1,787,000	41.0	1	20	27	34	41
Switchgrass		389,000	8.9	5	22	29	36	44
Indiangrass		175,000	4.0	10	20	27	33	40
Big Bluestem		165,000	3.7	10	20	27	33	37
Little Bluestem		255,000	5.8	7	20	27	34	41
Side-Oats Grama		191,000	4.3	5	20	26	32	39
Blue Grama		898,000	20.6	2	20	27	34	41
Sand Bluestem		106,000	2.4	10	12	16	20	24
Caucasian Bluestem		860,000	19.7	2	20	26	32	39
3. Legumes								
Alfalfa	60	226,800	4.6	10	23	30	38	46
Alsike Clover	60	680,400	15.6	3	23	30	38	46
Birdsfoot Trefoil	60	375,000	8.6	5	21	28	36	43
Cicer Milkvetch	60	130,000	3.0	5	8	10	12	15
Crownvetch	55	138,600	3.2	5	8	11	13	16
Hairyvetch	60	17,000	0.4	40	8	11	13	16
Purplevetch	60	10,000	0.2	50	5	7	8	10
Korean Lespedezo	40	236,000	5.4	15	41	54	68	81
Sericea Lespedezo	60	372,000	8.5	6	25	34	42	51
Crimson Clover	60	149,700	3.4	12	20	27	34	41
Ladino Clover	60	871,650	20.0	2	20	27	33	40
Red Clover	60	275,000	6.3	7	22	29	36	44
Strawberry Clover	60	288,000	6.6	7	23	30	38	46
Sweetclover	60	258,500	5.0	7	20	27	34	41
White Clover	60	856,000	19.6	2	20	26	32	39
Varia Crownvetch	55	119,000	2.7	15	20	27	33	40
Sainfoin	28	181,000	.4	20	4	5	7	8
4. Cereal Grain								
Barley	48	13,500	0.3	70	11	14	18	22
Oats	32	19,500	0.4	64	14	19	23	28
Rye	56	18,000	0.4	70	14	19	24	29
Wheat	60	12,000	0.3	90	12	16	21	25

*Seeds per row – 12" space is equal to square foot for broadcast seedings.

The formula for calculating the above table is:

$$\frac{\text{Seeds per lb.} \times \text{seeding rate per acre}}{43,560 \text{ square feet/acre}} = \text{Seeds per square foot}$$

$$\frac{\text{Seeds per lb.} \times \text{seeding rate per acre}}{43,560 \times (\text{drill row spacing} \div 12)} = \text{Seeds per foot of row}$$

CALIBRATION OF DRILL

If a drill setting is available, fill drill with seed, make setting, and drive equipment over hard ground or canvas. Count the number of seeds dropped per foot of row and adjust according to Table 1.

If drill row spacing is different than Table 1 or different seeding rate is used, use formula to calculate the desired seeds per foot of drill row.

BROADCAST

Many seedings are made with broadcast seeders of various types. To calibrate, place canvas at several locations across the path of seed. Check canvas for proper seed count per square foot. Adjust for proper count according to Table 1.

NOTE: Several checks need to be made to determine width of strip seed being dispersed.

Another method of broadcasting seed is to mix seed with phosphate and/or potash fertilizer at a bulk fertilizer blending plant. Set the fertilizer buggy or easyflow type spreader for fertilizer rate to be applied. Check seed dispersal distance with canvas and adjust driving spacing accordingly.

NOTE: Seed should be mixed with fertilizer just prior to spreading to prevent seed damage from fertilizer. Blend fertilizer an extra amount of time to insure seed is well mixed with all fertilizer.

DEBEARDED SEED

Several warm season grass species have light seed with bothersome seed appendages. Big Bluestem, Indiangrass, Caucasian bluestem, and little bluestem are those most likely to be used. The seed appendages, awns on the tip of the seed, and hairs on the base of the seed, cause the seed to bridge severely in seeding equipment commonly used by Midwest farmers. This may limit acceptance of these species by many operators.

Seed of these species can be processed through a debearder to remove bothersome appendages. After debarding, the seed may be cleaned to a higher purity and seeded through various types of equipment, such as grain drills, billion seeders, etc.

Seeding debarded seed with specialized rangeland drills requires modification to reduce rate of seeding to recommended rates. Modification entails changing sprocket size and lengthening drive chains. This procedure is rather impractical if changing from debarded to nondebarded frequently.

Seeding with debarbed seed can be accomplished with a variety of grain drills. Calibration of the equipment in most cases may be time consuming. Roughness of the field, speed of equipment, and type of metering of the equipment may alter the flow rate of the seed. Relative humidity may affect the flow ability of the seed.

Most grain drills are not designed to accurately meter this type of seed. Additional care must be used to obtain proper calibration. The preferred check for seeding rate is to count seeds per foot or square foot while the equipment is operating under field conditions.

A drill setting for smooth bromegrass should serve as a starting point for big bluestem. A setting for tall fescue may serve as a starting point for debarbed indiagrass. Adjustments will need to be made as necessary.

Switchgrass may be seeded through the legume box on grain drills and a setting for alfalfa would be a starting point. This seed does not require debarbing.

A concern in using grain drills for grass seedings is a lack of positive depth control. This will be improved if the seedbed is rolled or cultipacked ahead of the drill. Reducing the spring tension on the furrow openers will reduce penetration and assist in placing the seed in the upper half-inch of the seedbed.

Seed metering mechanisms in grain drills are usually corrugated rollers, seed cup, or double seed cup type. The corrugated roller type with agitators will probably work more effectively with the light debarbed grass seeds. The seed cup without agitators will seed debarbed seed, but limited experience has shown accurate calibration may be difficult to obtain depending on the range of adjustments available on the specific equipment.

Calibration should be made well ahead of expected planting to allow adequate time for adjustments. The accuracy of seed distribution will depend on the care taken to set up and calibrate the specific equipment used.

Broadcasting debarbed seed by blending fertilizer with seed and spreading with a fertilizer truck or trailer has proven to be a very effective procedure. Fertilizer application rates should be adequate for equipment calibration.

Seeding in this way eliminates the difficulty of calibrating equipment. The fertilizer spreader application rate may be cut in half, drive at normal spacing, and then drive halfway between the original tracks of the second time over. This has demonstrated even seed distribution. Rolling the seedbed to firm the soil and cover seed completes the planting. This procedure is quite simple and effective when seeding on a quality prepared seedbed.

Driving heavy fertilizer equipment over the seedbed when it is wet will cause severe compaction and crusting in the wheel tracks preventing seedling emergence. The seedbed should be dry on the surface during seeding and rolling if at all possible.

Nonbearded seed will not broadcast as effectively through fertilizer trucks or trailers. With seed appendages intact, seed dispersion will be in very narrow bands. Nonbearded seed may be distributed with a gravity type fertilizer spreader, as this equipment drops the seed rather than attempting to throw it. Other procedures would be the same.

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