

Natural Resources Conservation Service

## How to Calculate the Bulk Seed Planting Rate of Native Warm Season Grasses Planted on a PLS Basis

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Plant Materials Technical Note - No. 11906 July 2015

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### **Background**

Native warm season grasses (NWSG) are gaining popularity in Arkansas for livestock grazing and hay production. Unlike some common warm season grasses such as bermudagrass and bahiagrass, which are planted on a bulk lb/acre basis, NWSG are planted on pure live seed (PLS) lb/acre basis. For example, the seeding rate for switchgrass in the Arkansas Agronomy Technical Note 1 is 5 PLS lb/acre for Forage and Biomass Plantings (Practice Standard 512). Is planting 5 PLS lb/acre the same as planting 5 bulk lb/acre? The answer is NO. So the question is, how do you calculate the amount of bulk seed lb/acre to achieve the recommended PLS lb/acre seeding rate?

### **Purpose**

This technical note was developed to guide conservationists, landowners and others on how to calculate the bulk seed planting rate when the desired grasses are planted on a PLS lb/acre basis using information from the seed label or tag.

## Common terms

Becoming familiar with the following terms and their definitions will make seed rate calculations much less difficult:

- Pure Seed - seeds of each kind and/or cultivar, or kind(s) and variety, under consideration, which are present in excess of 5% of the whole.
- Weed Seed – Seeds, florets, bulblets, tubers or sporocaps of plants recognized as weeds by law, official regulation or by general usages.
- Germination – The maximum plant producing potential of a seed lot (i.e. the capability to germinate and produce a normal seedling under favorable conditions.)
- Dormant Seed – Viable seeds which fail to germinate when provided the specified germination conditions for the kind of seed in question. Dormant seeds have imbibed water and are swollen in size but have not germinated by the end of the test period. Many grasses and native species are known to have varying types and amounts of dormancy.
- Hard Seed – Seeds that remain hard at the end of the prescribed test period because they have not absorbed water due to an impermeable seed coat. Legumes are best known for hard seeds.
- Variety – A taxonomic subdivision of a species consisting of naturally occurring or selectively bred populations or individuals that differ from the remainder of the species in certain minor characteristics.

## Bulk seed vs Pure Live Seed (PLS)

When seed is bagged by the grower, there will be living seed, nonliving seed, weed seed, and inert materials (stems, and other plant parts). This is the “Bulk Seed”. The Arkansas State Plant Board is responsible for assuring no seed is sold in the state without a seed label (see example below) on each bag sold. This label includes the common name, cultivar name (if stated) of the plant, along with test results. The test results include: % hard seed; % pure seed, % inert material; % other crop; % weed seed; % germination; and a seed testing date. Pure live seed is defined as the % seed that will germinate.

## Sample seed tag

Kind: Switchgrass	<b>Purity: 95%</b>	Weed Seed: 0.00%
Lot: SSG 1-14	Other Crop: 0.01%	Bulk Wt.: 50lbs
Test Date: 12/2014	Inert: 0.04%	<b>Germination: 88.00%</b>
Origin: Native grass USA	Noxious Weed Seed: 0	Hard Seed: 5.00%
Net Wet. 44 (lbs. PLS)	Dormant Seed: 0.00%	

Example: A landowner wants to establish switchgrass for livestock grazing and hay production in northwestern, Arkansas. The NRCS planting rate in the Agronomy Technical Note 1 is 5

PLS lb/acre. To determine the amount of bulk pounds to plant/acre to provide 5 PLS lb/acre use the calculations below:

### Calculating PLS

Using factors from the seed test tag above, the following calculation will be made to determine the PLS of the seed lot: (this calculation will only be valid when the test date on the tag is < 12 months old.)

$$\% \text{ PLS} = (\% \text{ Germination} + \% \text{ Hard Seed (if applicable)}) \times (\% \text{ Purity}) / 100 = 88\%$$

germination + 5% hard seed multiplied by 95% purity divided by 100 = 88.35%  
Based on the information on the tag, this seed lot contains approximately 88% Pure Live Seed.

### Calculate bulk seed to be planted to have 5 PLS pounds per acre.

To determine the amount of bulk seed to supply 5 PLS lb/acre planting rate:

$$5 \text{ PLS lb/acre planting rate} / 88\% \text{ PLS of the seed} = 5.7 \text{ lb/acre or about 6 (bulk seed)}$$

Use the reference chart below for a quick method to determine the number of bulk pounds to plant in order to plant 1 PLS lb. To use this chart, simply cross reference the **% Germination** down to the corresponding **% Purity**). Using the sample seed tag from the previous page (93% germination and 95% purity) the amount of bulk pounds required for 1 PLS lb is 1.2 lbs. Using the example above, multiply 5 PLS/acre by 1.2 to determine the amount of bulk seed to plant per acre to provide the desired PLS lb/acre planting rate.

### Bulk lb/acre Reference Chart = 1 PLS Pound

% Purity	% Percent Germination																		
	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10
100	1	1.1	1.2	1.2	1.3	1.4	1.5	1.6	1.7	1.9	2	2.3	2.5	2.9	3.4	4	5	6.7	10
95	1.1	1.2	1.2	1.3	1.4	1.5	1.6	1.7	1.8	2	2.2	2.4	2.7	3.1	3.6	4.3	5.3	7.1	10.6
90	1.2	1.2	1.3	1.4	1.4	1.5	1.6	1.8	1.9	2.1	2.3	2.5	2.8	3.2	3.8	4.5	5.6	7.5	11.2
85	1.2	1.3	1.4	1.4	1.5	1.6	1.7	1.9	2	2.2	2.4	2.7	3	3.4	4	4.8	5.9	7.9	11.8
80	1.3	1.4	1.4	1.5	1.6	1.7	1.8	2	2.1	2.3	2.5	2.8	3.2	3.6	4.2	5	6.3	8.4	12.5
75	1.4	1.5	1.5	1.6	1.7	1.8	2	2.1	2.3	2.5	2.7	3	3.4	3.9	4.5	5.4	6.7	8.9	13.4
70	1.5	1.6	1.6	1.7	1.8	2	2.1	2.2	2.4	2.6	2.9	3.2	3.6	4.1	4.8	5.8	7.2	9.6	14.3
65	1.6	1.7	1.8	1.9	2	2.1	2.2	2.4	2.6	2.8	3.1	3.5	3.9	4.4	5.2	6.2	7.7	10.3	15.4
60	1.7	1.8	1.9	2	2.1	2.2	2.4	2.6	2.8	3.1	3.4	3.8	4.2	4.8	5.6	6.7	8.4	11.2	16.7
55	1.9	2	2.1	2.2	2.3	2.5	2.6	2.8	3.1	3.4	3.7	4.1	4.6	5.2	6.1	7.3	9.1	12.2	18.2
50	2	2.2	2.3	2.4	2.5	2.7	2.9	3.1	3.4	3.7	4	4.5	5	5.8	6.7	8	10	13.4	20
45	2.3	2.4	2.5	2.7	2.8	3	3.2	3.5	3.8	4.1	4.5	5	5.6	6.4	7.5	8.9	11.2	14.9	22.3
40	2.5	2.7	2.8	3	3.2	3.4	3.6	3.9	4.2	4.6	5	5.6	6.3	7.2	8.4	10	12.5	16.7	25
35	2.9	3.1	3.2	3.4	3.6	3.9	4.1	4.4	4.8	5.7	5.8	6.4	7.2	8.2	9.6	11.5	14.3	19.1	28.6
30	3.4	3.6	3.8	4	4.2	4.5	4.8	5.2	5.6	6.1	6.7	7.5	8.4	9.6	11.2	13.4	16.7	22.3	33.4
25	4	4.3	4.5	4.8	5	5.4	5.8	6.2	6.7	7.3	8	8.9	10	11.5	13.4	16	20	26.7	40
20	5	5.3	5.6	5.9	6.3	6.7	7.2	7.7	8.4	9.1	10	11.2	12.5	14.3	16.7	20	25	33.4	50
15	6.7	7.1	7.5	7.9	8.4	8.9	9.6	10.3	11.2	12.2	13.4	14.9	16.7	19.1	22.3	26.7	33.4	44.5	66.7
10	10	10.6	11.2	11.8	12.5	13.4	14.3	15.4	16.7	18.2	20	22.3	25	28.6	33.4	40	50	66.7	100

## Calculating Seed Mixtures

Some conservation plantings consist of multiple plant species rather than one single species. When developing a conservation planting mix, the total mixture should not exceed 100 percent. In calculating the mixture seeding rate, the full seeding rate per specie is multiplied by the percent of that specie is represented in the mix then multiplied by the number of acres to be planted.

**For example:**

<b><u>Plant Species</u></b>	<b><u>% Mix Planned</u></b>	<b><u>Seeding Rate Lb. PLS/Acre</u></b>	<b><u>Acres</u></b>	<b><u>Total PLS #</u></b>
Big bluestem	40	5	10	20
Little bluestem	40	5	10	20
Indiangrass	<u>20</u>	5	10	10
	100			

**For additional information please contact:**

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