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## EC71-135 Pure Live Seed...A Basis for Calculating Seed Requirements for Planting Grasses and Legumes

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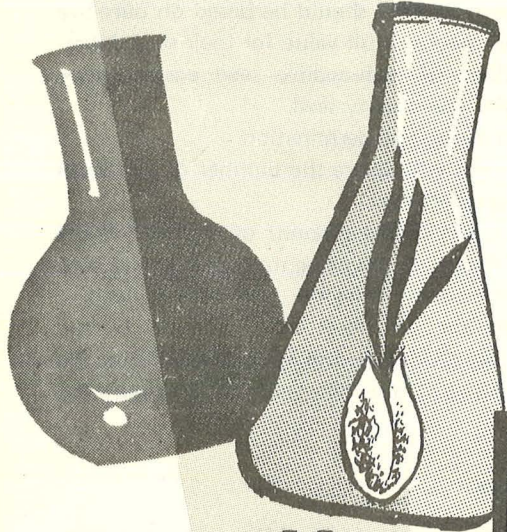
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A BASIS FOR CALCULATING  
SEED REQUIREMENTS  
FOR PLANTING GRASSES AND LEGUMES



Extension Service, University of Nebraska College of Agriculture Cooperating with the  
U.S. Department of Agriculture and the College of Home Economics  
E. F. Frolik, Dean J. L. Adams, Director

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## A BASIS FOR CALCULATING SEED REQUIREMENTS FOR PLANTING GRASSES AND LEGUMES

D. F. Burzlaff and W. J. Moline <sup>1/</sup>

Grass seed lots may vary widely in quality and price. Seed lots of grasses with light or chaffy seeds may by their nature contain unusually large amounts of inert material. Since only live seeds of the desired crop are of value, the businesslike way to buy, sell and plant grass seed should be based on pure live seed. Pure live seed assures farmers and ranchers full value for their seed dollar. It also protects producers and handlers of high-quality seed against price penalties experienced in competition with low-quality seed.

Avoid seed priced without regard to purity and germination.

Planting rates based on pure live seed will assure the number of live seeds needed per acre to produce acceptable grass stands.

The term "pure live seed" (PLS) refers to the amount of live seed of the desired crop present in any lot of seed material. The percentage of pure live seed present is calculated by multiplying the purity times the germination. Seed, if properly labeled, will have information attached to show the purity, germination, weed seeds, hard seeds, other crop seed, and inert matter. Thus, the seed tag supplies the information needed to plan seeding mixtures on a pure live seed basis.

### Calculating Mixtures on a PLS Basis

Calculating mixtures for grass seedings need not be difficult or confusing. Actually, this is not too different from determining the amount of crude protein in a 100-pound bag of 40% protein supplement. Similar calculations are performed each time you decide how many pounds of a 45% fertilizer are needed to apply 100 pounds of the needed element. This circular has been prepared to acquaint you with the procedure for making grass-seeding calculations on the basis of pure live seed content.

Table 1 shows the approximate number of pounds of PLS of each grass required to plant at least 20 live seeds per square foot in pure stands. This information is used in determining a minimum amount of seed to be planted in pure stand or for calculation of amounts to be included in specific mixtures.

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Table 1. Pounds of Pure Live Seed required per acre to plant the minimum rate of approximately 20 PLS per square foot for important grasses and legumes.

Warm-season grasses	
Big bluestem	6.0
Sand bluestem	8.0
Little bluestem	3.5
Indiangrass	5.0
Sand lovegrass	1.0
Side-oats grama	4.5
Switchgrass	3.0
Bluegrama	1.5
Prairie sandreed	3.5
Cool-season grasses	
Smooth bromegrass	6.5
Reed canarygrass	2.9
Orchardgrass	2.0
Intermediate wheatgrass	10.0
Tall fescue	4.0
Tall wheatgrass	11.0
Crested wheatgrass	5.0
Russian wildrye	5.0
Western wheatgrass	8.0
Legumes	
Alfalfa	4.0
Sweet clover	3.5
Red clover	3.5
Birdsfoot trefoil	2.5
Hairy vetch	24.0 <sup>a/</sup>
Lespedeza	4.0

<sup>a/</sup> Provides approximately 10 pure live seeds per square foot.

The following grass mixture represents a recommendation which could be made for York County.

Grass	% of Mixture	Lbs. PLS Per Acre
Little bluestem	40	1.4
Side-oats grama	30	1.4
Switchgrass	30	<u>  .9</u>
		3.7

The percentage figures indicate the desired amount of each kind of seed in the mixture. The amount of each to be included depends upon what

composition is desired in the forage to be produced. When legumes are included, they usually do not represent more than 20 percent of a seed mixture. To obtain the PLS pounds required per acre, multiply the percentage of each grass to be included in the mixture by the pounds of pure live seed required per acre to plant the minimum rate of approximately 20 PLS per square foot from Table 1.

In the preceding example:

Little bluestem	$40\% \times 3.5 = 1.4$ lbs. PLS per acre
Side-oats grama	$30\% \times 4.5 = 1.35$ or $1.4\frac{2}{10}$ lbs. PLS per acre
Switchgrass	$30\% \times 3.0 = .90$ lbs. per acre

### Plan for Seedings on a PLS Basis

When planning a grass seeding, first consider the purpose of the seeding and the site on which it is to be planted. Then select a mixture that meets your forage needs from the list of grass seeding mixtures developed for your county.

Let us assume, for example, that you want to make a seeding on 40 acres of sandy land in Holt County. After considering a few alternative mixtures, select the following basic mixture:

Grass	Percent of Each Grass in Mixture	Pounds PLS Per Acre
Big bluestem	50%	3.0
Indiangrass	30%	1.5
Switchgrass	20%	<u>.6</u>
		5.1

To determine the amount of PLS required for your seeding, multiply the number of acres to be seeded times the pounds of PLS needed per acre for each grass. This will give you the following information:

Grasses	Lbs. PLS/acre	Acres to be seeded	Pounds PLS to be purchased
Big bluestem	3.0	40	120
Indiangrass	1.5	40	60
Switchgrass	.6	40	24

<sup>2/</sup> When computing seeding rates, always remember to increase any fractional value to the next highest tenth of a pound.

Take this information to the seed dealer to determine the amount of bulk seed you will need to get the required amount of pure live seed for planting. The amount of seed needed is determined by using the information on the seed tag.

For the example, assume the following seed quality:

Grasses	Purity	Germination
Big bluestem	70%	75%
Indiangrass	80%	60%
Switchgrass	95%	70%

To decide how much bluestem to purchase from bulk seed of the above quality, find "70" in the column headed "purity" on Table 2. Follow horizontally along this line to the column for the germination percentage of 75. At this point of intersection is found the number 2.0. This means for every pound of PLS desired, 2.0 pounds of material must be purchased. In our example it would require  $2.0 \times 120$  or 240 pounds of bulk seed of big bluestem.

This procedure is repeated for each grass in the mixture, using their respective purity and germination values. The bulk seed requirements for making your 40 acre grass seeding would be:

Big bluestem — 240 pounds  
 Indiangrass — 126 pounds  
 Switchgrass — 39 pounds  
 405 pounds total

### PLS of Harvested Mixtures

Assume that you have harvested a mixture of grass seed. The laboratory has processed your seed mixture and reported the following analysis:

	Purity	Germination	PLS
Little bluestem	26.6%	52%	13.8%
Big bluestem	5.2%	51%	2.5%
Side-oats grama	5.1%	60%	3.1%
Indiangrass	9.0%	60%	5.4%
Inert and foreign matter	54.1%	-----	-----

This analysis tells you that in each 100 lb. bag of this mixture there are 13.8 pounds of little bluestem, 2.5 pounds of big bluestem, 3.1 pounds of side-oats grama and 5.4 pounds of indiangrass. The rest is inert material.

Table 2. Pounds of Grass Seed Material Required to Yield One Pound of Pure Live Seed

Purity %	Percent Germination																		
	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10
100	1.0	1.1	1.2	1.2	1.3	1.4	1.5	1.6	1.7	1.9	2.0	2.3	2.5	2.9	3.4	4.0	5.0	6.7	10.0
95	1.1	1.2	1.2	1.3	1.4	1.5	1.6	1.7	1.8	2.0	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	2.0	2.2	2.4	2.7	3.0	3.4	4.0	4.8	5.9	7.9	11.8
80	1.3	1.4	1.4	1.5	1.6	1.7	1.8	2.0	2.1	2.3	2.5	2.8	3.2	3.6	4.2	5.0	6.3	8.4	12.5
75	1.4	1.5	1.5	1.6	1.7	1.8	2.0	2.1	2.3	2.5	2.7	3.0	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	2.0	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	2.0	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	2.0	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	2.0	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	2.0	2.2	2.3	2.4	2.5	2.7	2.9	3.1	3.4	3.7	4.0	4.5	5.0	5.8	6.7	8.0	10.0	13.4	20.0
45	2.3	2.4	2.5	2.7	2.8	3.0	3.2	3.5	3.8	4.1	4.5	5.0	5.6	6.4	7.5	8.9	11.2	14.9	22.3
40	2.5	2.7	2.8	3.0	3.2	3.4	3.6	3.9	4.2	4.6	5.0	5.6	6.3	7.2	8.4	10.0	12.5	16.7	25.0
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	4.0	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	4.0	4.3	4.5	4.8	5.0	5.4	5.8	6.2	6.7	7.3	8.0	8.9	10.0	11.5	13.4	16.0	20.0	26.7	40.0
20	5.0	5.3	5.6	5.9	6.3	6.7	7.2	7.7	8.4	9.1	10.0	11.2	12.5	14.3	16.7	20.0	25.0	33.4	50.0
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	10.0	10.6	11.2	11.8	12.5	13.4	14.3	15.4	16.7	18.2	20.0	22.3	25.0	28.6	33.4	40.0	50.0	66.7	100.0

The information in Table 2 is in 5% gradations. Seed analyses seldom come out as a whole number ending in "0" or "5". It is sufficiently accurate to use the nearest whole number. For example: 37.50% to 42.49% would be considered as 40%.  
42.50% to 47.49% would be considered as 45%.

You have harvested 2000 pounds of the above mixture and plan to seed 200 acres with the following mixture:

	PLS lbs/acre
Little bluestem	1.8
Big bluestem	1.2
Indiangrass	1.0
Side-oats grama	<u>.5</u>
	4.5 Total

The additional seed you'll need to purchase for the seeding can be calculated as follows:

Pounds of PLS available from local harvest		
2000 x 13.8%	=	276 pounds of little bluestem
2000 x 2.5%	=	50 pounds of big bluestem
2000 x 5.4%	=	108 pounds of indiangrass
2000 x 3.1%	=	62 pounds of side-oats grama

Pounds of PLS required to make the seeding		
200 x 1.8	=	360 pounds of little bluestem
200 x 1.2	=	240 pounds of big bluestem
200 x 1.0	=	200 pounds of indiangrass
200 x .5	=	100 pounds of side-oats grama

Pounds of PLS to be purchased	
Little bluestem	84
Big bluestem	190
Indiangrass	92
Side-oats grama	38

### What Is the Cost of Pure Live Seed?

Traditionally, grass seed prices were quoted on the bulk seed basis. However, because of widespread interest in the pure live seed method many dealers are now quoting seed cost on a PLS basis.

The cost of pure live seed in any bulk seed lot can be determined by



multiplying the purity times the germination and dividing the result into the bulk seed price. Here is the formula:

$$\frac{\text{Bulk Seed Price}}{\text{Purity} \times \text{Germination}} = \text{Cost of Pure Live Seed}$$

Example:

Step 1 -- Substitute appropriate figures in the formula:

$$\frac{\text{Bulk Seed Price } \$0.75/\text{lb.}}{50\% (\text{Purity}) \times 60\% (\text{Germination})} = \text{Cost of PLS}$$

Step 2 -- Do arithmetic to find your cost of PLS:

$$\frac{\$0.75}{.50 \times .60} = \frac{\$0.75}{.3000} = \$2.50 \text{ for each pound of Pure Live Seed}$$

This formula provides a means of comparing the "actual" or "real" value among different lots of seed. The price per pound of pure live seed and not the bulk seed price determines which seed lot is the better buy for you. Again, it takes pure live seed to establish productive stands of grass.

Farmers who buy grass seed on a pure live seed basis for the first time may be concerned because the price per pound of pure live seed is greater than that of bulk seed. As the formula shows, the cost of seed that will grow is no greater, and in many cases may be less, than that offered at a low bulk seed price. Remember that Pure Live Seed planting rates are based on the amount of live seed needed to give the desired stand.