University of Idaho Extension

CIS 788

Northern Idaho Fertilizer Guide

Bluegrass Seed

Robert L. Mahler

SEED OF KENTUCKY BLUEGRASS (*Poa pratensis L.*) is grown on approximately 60,000 acres in Kootenai, Benewah, Latah, Lewis, Nez Perce, and Clearwater counties. In addition there are about 1,000 acres under irrigated production in south-central and southeastern Idaho. Idaho ranks first nationally and accounts for 50 percent of U.S. Kentucky bluegrass seed production. Over the past 20 years an annual average of 38,000,000 pounds of seed valued at $50 million have been harvested in Idaho.

These fertilizer guidelines have been developed by the University of Idaho based on relationships between soil tests and crop yield responses to applied fertilizer. The fertilizer rates suggested are based on research results and are designed to produce above-average yields if other factors are not limiting production. Thus, the fertilizer guide assumes the use of good management practices.

The suggested fertilizer rates will be accurate for your field provided (1) your soil sample was taken properly and is representative of the area to be fertilized, and (2) the crop and fertilizer history you supply is complete and accurate. For help in obtaining a proper soil sample, confer with the extension agricultural educator in your county.

Nitrogen fertilizer recommendations for orchard-grass, crested wheatgrass, creeping red fescue, and bromegrass will be similar to those for bluegrass. Recommendations for other essential nutrients will be the same as those for bluegrass.

Nitrogen

Nitrogen (N) is the most important nutrient in bluegrass seed production, and large amounts are needed for established stands. The amount of N fertilizer required on any field depends on the following factors:

1. The bluegrass variety and its yield potential in your location. Newer varieties with a high yield potential generally need less N than older, lower-yielding varieties.
2. Total annual precipitation and other climatic factors.
3. The age of the bluegrass stand.
4. The amount of usable N in the soil profile, including predicted mineralizable N (released from decomposing organic matter during the growing season) and inorganic soil test N in the forms of nitrate (NO_3) and ammonium (NH_4).

Total N need based on variety and climate—Estimating the amount of N fertilizer needed to produce a crop of seed requires knowing the seed variety, the stand age, and the field's potential yield. The potential yield in northern Idaho is very much related to annual precipitation (Table 1). The ranges of N application rates for a given precipitation range and stand age reflect variety differences. For example, for a 3-year-old stand in an annual precipitation range of 21 inches, N application rates range from 165 to 175 pounds per acre. In general, lower-yielding bluegrass seed varieties would require close to 175 pounds of N, while higher-yielding varieties require closer to 165 pounds of N.

Table 1. Estimated total nitrogen needed by a bluegrass seed crop based on stand age and annual precipitation.

	Annual precipitation (inches)				
Age of stand	<19	20	21	22 to 24	> 24
(years)	----------(lb/acre)----------				
2 to 3	155 to 165	160 to 170	165 to 175	175 to 185	185 to 200
3 to 4	160 to 170	165 to 175	170 to 180	180 to 190	190 to 210
5 to 6	165 to 175	170 to 180	175 to 185	185 to 195	195 to 215
more than 6	170 to 180	175 to 185	180 to 190	190 to 200	200 to 220

Once the total amount of N needed to produce a bluegrass seed crop is known, a simple equation can be used to determine the amount of fertilizer N that will meet this need:

$$\text{Fertilizer N needed} = \text{Total N need based on potential yield (Table 1)} - \left(\text{Mineralizable N (Table 2)} + \text{Soil test N (Table 3)}\right)$$

Mineralizable nitrogen—Soils vary in their capacity to release N from organic matter during the growing season. The rate or amount of N released depends on factors such as amount of soil organic matter, soil erosion, available soil moisture, and soil temperature during the growing season. Northern Idaho soils release mineralizable N at four different levels based on their organic matter contents (Table 2).

Soil test nitrogen—The amount of inorganic N (NO_3 and NH_4) in the soil can be evaluated most effectively with a soil test. Soil samples should represent the rooting depth of the crop since nitrate-nitrogen (NO_3-N) is mobile in the soil. Bluegrass grown for seed is capable of removing N to a depth of 2 feet or more.

Soil test values include both NO_3-N and ammonium-nitrogen (NH_4-N). To determine plant-available nitrogen add the ammonium value in the top foot of the soil profile together with the nitrate values in the first and second feet of the soil profile, and then multiply by 3.5 (Table 3).

Table 2. Annual mineralizable nitrogen release rates for northern Idaho soils.

Organic matter content	N release rate
(%)	(lb N/acre/year)
< 2.0	32
2.0	34
2.1	36
2.2	37
2.3	39
2.4	41
2.5	43
2.6	44
2.7	46
2.8	48
2.9	49
3.0 +	51

Table 3. Example of calculation to convert N soil test results (ppm) to pounds N per acre.

	Soil test results					
Depth	NO_3-N	NH_4-N[1]	Total N	Factor		Total N[2]
(inches)	(ppm)	(ppm)	(ppm)			(lb/acre)
0 to 12	5	1	6	x 3.5	=	21
12 to 24	4	_	4	x 3.5	=	14
Total	9	1	10	x 3.5	=	35

[1]Ammonium (NH_4-N) is usually low and is often not included in the soil test analysis.
[2]ppm x 3.5 = lb/acre.

Fertilizer N—Calculation for N fertilizer needed is:

Total N needed (lb/acre) (Table 1)		_____
Minus mineralizable N (lb/acre) (Table 2)	–	_____
Minus soil test N (lb/acre) (Table 3)	–	_____
Equals N fertilizer required (lb/acre)	=	_____

Example: With a newer, higher-yielding variety in a 3-year-old stand, 2.3 inches of annual precipitation, 2.5 percent soil organic matter, and soil test values from the example in Table 3, 97 pounds N per acre are needed:

Total N needed (Table 1)		175
Minus mineralizable N (Table 2)	–	43
Minus soil test N (Table 3)	–	35
Equals N fertilizer required	=	97

Phosphorus

Phosphorus (P) is important for root development and seed production. Plants use phosphorus most efficiently when it is incorporated into the seedbed before seeding because P is not mobile in soils. For established stands, P can be surface applied in fall. Phosphorus needs of established grass and of seedbeds before seeding can be determined with a soil test (Table 4).

Table 4. Phosphorus fertilizer needed for a bluegrass seed crop based on a soil test.

Soil test P (0 to 12 inches)[1]		Application rate[2]	
NaOAc	Bray I	P_2O_5	P
(ppm)	(ppm)	(lb/acre)	(lb/acre)
0 to 2	0 to 20	80	35
2 to 3	20 to 30	60	26
3 to 4	30 to 40	40	18
4 to 6	40 to 60	20	9
over 6	more than 60	0	0

[1]Soil test P can be determined by two procedures: sodium acetate extractable (NaOAc) and the Bray I method. Use the column indicated by your soil test report.
[2]P_2O_5 x 0.44 = P, or P x 2.29 = P_2O_5.

Because fertilizer P is most effective when placed in the soil near plant roots, it is difficult to effectively apply P after stand establishment. Consequently, a large amount of P should be applied to soils prior to stand establishment and worked into the surface 4 to 6 inches of the soil profile. When P is needed after bluegrass establishment, the P may be surface applied; however, it will take many months for the P to move into the soil and be available for plant roots.

Potassium

Because potassium (K) is relatively immobile in the soil, it should be applied at seeding and incorporated into the soil. For established stands, apply K as a topdress treatment in the fall. Most soils in northern Idaho contain sufficient amounts of K for maximum seed yields. However, the soil should be tested for K every 3 years. Potassium recommendations for established stands and for seedbeds before seeding can be determined by a soil test (Table 5).

Table 5. Potassium fertilizer needed for a bluegrass seed crop based on a soil test.

	Application rate[2]	
Soil test K (0 to 12 inches)[1]	K_2O	K
(ppm)	(lb/acre)	(lb/acre)
0 to 50	80	68
50 to 70	60	50
70 to 85	40	33
over 85	0	0

[1]Sodium acetate extractable K.
[2]K_2O x 0.83 = K, or K x 1.20 = K_2O.

Sulfur

Without adequate sulfur (S), bluegrass appears light green to yellowish-green, resembling plants with a N shortage. Plants require S to use N efficiently. Since S is mobile in soil, it is subject to leaching. Consequently, you need to test soil for S every year. Sulfur needs based on soil test results are shown in Table 6. Sulfur application rates should never exceed 25 pounds S (as sulfate-S) per acre.

Table 6. Sulfur fertilizer needed for a bluegrass seed crop based on a soil test.

Soil test S (0 to 12 inches)		Application rate
(ppm SO_4-S)	(ppm S)	(lb/acre)
0 to 10	0 to 4	20
over 10	over 4	0

Micronutrients

Grasses rarely respond to applications of micronutrients in northern Idaho. Recommendations for specific micronutrients follow.

Boron—Boron (B) should be applied only when soils test less than 0.3 ppm B. Needed B should be surface broadcast at a rate not exceeding 1½ pounds B per acre. For more information on B and specific fertilizer materials, refer to University of Idaho CIS 1085, *Essential Plant Micronutrients: Boron in Idaho*.

Zinc—Although zinc (Zn) deficiencies in northern Idaho are rare, applications should be considered when soil test levels are less than 0.6 ppm Zn in the surface 12 inches of the soil. Zinc fertilizer should be surface broadcast at the rate of 5 pounds Zn per acre. For more information on Zn, refer to University of Idaho ClS 1088, *Essential Plant Micronutrients: Zinc in Idaho*.

Other micronutrients—Bluegrass has never been shown to respond to applications of chlorine (Cl), copper (Cu), iron (Fe), manganese (Mn), molybdenum (Mo), or nickle (Ni). Therefore, application of these materials for grass seed production is not recommended.

Lime

Grass is more tolerant of low pH conditions than wheat, barley, peas, lentils, and alfalfa. Bluegrass seed yields fall only when soil pH is less than 5.0. When soil pH is less than 5.0 in the surface foot of the soil profile, consider lime applications of ½ to 1 ton per acre. Because lime must be incorporated into the soil to be effective, it must be applied before seeding. Topdress applications of lime on established sod will not effectively increase soil pH. For more information on lime applications and liming materials, refer to University of Idaho CIS 757, *Liming Materials*.

Agronomy/Water quality considerations

- Weeds, insects, diseases, and environmental stress can influence the effectiveness of a fertilizer program and reduce yields.
- All fertilizer sources of N, P, and K are equally satisfactory for grass seed production. Sulfate forms of S are recommended. Elemental S should not be considered because it becomes available to plants slowly and acidifies the soil.

- All fertilizer N should be applied in the fall. Research has shown that N applied in the spring often reduces bluegrass seed yields, especially when applied after April 15. Phosphorus, potassium, and sulfur should also be applied in the fall.
- Be sure to apply adequate amounts of P to soils at the time of bluegrass seedling establishment. The P should be incorporated into the soil at this time. This initial application of P is much more effective than subsequent P applications applied to the soil surface in the years following establishment.
- Grass stubble burning not only causes loss of N to the atmosphere but also results in S loss. Consequently, growers must be sure to monitor soil S levels.

Further Reading

These publications are available through the UI Extension publishing catalog: www.cals.uidaho.edu/edcomm/catalog.asp

BUL 704, *Soil Sampling*
CIS 787, *Liming Materials*
CIS 1085, *Essential Plant Micronutrients: Boron in Idaho*
CIS 1087, *Essential Plant and Animal Micronutrients: Molybdenum in Idaho*
CIS 1088, *Essential Plant Micronutrients: Zinc in Idaho*

Northern Idaho fertilizer guides

CIS 447, *Alfalfa*
CIS 453, *Winter Wheat*
CIS 785, *Winter Rapeseed*
CIS 788, *Bluegrass Seed*
CIS 815, *Blueberries, Raspberries, and Strawberries*
CIS 820, *Grass Seedings for Conservation Programs*
CIS 826, *Chickpeas*
CIS 851, *Legume and Legume-Grass Pastures*
CIS 853, *Grass Pastures*
CIS 911, *Northern Idaho Lawns*
CIS 920, *Spring Barley*
CIS 954, *Winter Barley*
CIS 1012, *Spring Canola*
CIS 1083, *Lentils*
CIS 1084, *Spring Peas*
CIS 1101, *Soft White Spring Wheat*
CIS 1135, *Oats*

About the Author

Robert L. Mahler is a soil scientist in the University of Idaho Department of Plant, Soil and Entomological Sciences, Moscow.

Issued in furtherance of cooperative extension work in agriculture and home economics, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Barbara Petty, Interim Director of University of Idaho Extension, University of Idaho, Moscow, Idaho 83844. The University of Idaho provides equal opportunity in education and employment on the basis of race, color, national origin, religion, sex, sexual orientation, age, disability, or status as a disabled veteran or Vietnam-era veteran, as required by state and federal laws.

Revised May 2005; September 2006; May 2015