FERTILIZER guide
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Perennial Ryegrass Grown for Seed

(Western Oregon)

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Perennial ryegrass is grown for turf or forage seed on a broad range of soils in western Oregon. All perennial ryegrass varieties are similar in their nutrient requirements. Typical seed yield is between 1,400 and 1,800 lb/acre. Higher seed yields (up to 2,500 lb/acre) may be produced on better soils, but higher yields do not require additional nutrients. Plant growth regulators often are used to increase perennial ryegrass yields, but they do not increase the need for nitrogen, phosphorus, potassium, or sulfur fertilizer.

Appropriate management practices from seedbed preparation to harvest must be performed in a timely manner for optimum yield. Low soil pH, poor drainage, insects, diseases, and weeds all reduce seed yield. Increasing fertilizer rates when nutrients already are in adequate supply will not compensate for other limiting factors.

Soil testing is recommended to determine nutrient availability. Sample and analyze soil before planting to provide a basis for lime, phosphorus, potassium, calcium, and magnesium application. A single sample should represent a single soil type, or the same management practices in a field, and should not exceed 40 acres. Since perennial ryegrass seed fields typically are kept in production for fewer than 4 years, soil sampling after establishment usually is not necessary.

Local Oregon State University Extension offices can provide additional information, including the publications *Monitoring Soil Nutrients Using a Management Unit Approach, A List of Analytical Laboratories Serving Oregon,* and *Soil Test Interpretation Guide.* (See "For more information," page 3.)

This guide recommends supplying nutrients with topdress or band applications during the fall and late winter/early spring. Foliar fertilizer applications during heading may contribute to seed yield in some situations. Research shows that foliar fertilizer applications increase seed yield 100 to 200 lb/acre about 25 percent of the time. Late-season foliar fertilization should be used only on a trial basis and should not take the place of or reduce recommended spring nutrient inputs.

Nitrogen (N)

Nitrogen recommendations in this guide are in addition to the nitrogen supplied by the soil. Soil typically supplies 50 to 100 lb N/acre annually, depending on soil type and stand age. Soil nitrogen supply usually is highest after tillage, about 100 lb N/acre for the first 2 years of a stand, decreasing to about 50 lb N/acre in subsequent years.

Poorly drained soils with more than 5 percent organic matter supply more nitrogen than well-drained soils with lower organic matter. Use lower rates of nitrogen for poorly drained soils, as these soils have shown an erratic response to higher rates.

New seeding

Apply 20 to 40 lb N/acre at seeding. Application can be part of the charcoal slurry, in a subsurface band, or both. If nitrogen is banded at planting, at least 1 inch of soil should separate the seed from the fertilizer so the fertilizer does not delay crop emergence.

Established stand

Post-harvest residue management does not alter nitrogen fertilizer need. Regardless of whether the straw is removed, chopped back, propane burned, or open field burned, perennial ryegrass fields have a similar nitrogen requirement in typical 2- to 3-year rotations.

Fall application

Recent research has shown that fall nitrogen is important for optimum seed yield of tall fescue. Although similar studies have not been conducted in perennial ryegrass fields, application of 30 to 40 lb N/acre in early October is recommended.

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Spring application

Spring nitrogen application commonly produces a seed yield increase of 500 to 1,000 lb/acre compared to no spring N. Apply nitrogen at a rate of 120 to 160 lb N/acre as soil drains and spring growth begins, usually beginning in early March. Lower rates of nitrogen are suggested for the poorly drained and high-organic-matter soils of the Willamette Valley.

Occasionally, seed yield of turf-type perennial ryegrass increases as a result of slightly higher nitrogen fertilizer rates than those recommended here. In large-scale replicated tests, 180 lb N/acre produced optimum seed yield in only 25 percent of the situations tested. We do not recommend routine application of spring nitrogen above 160 lb N/acre, as the additional nitrogen is needed infrequently and adds to expenses by acidifying the soil and accelerating stand decline. (See "Lime" for additional explanation.)

Split nitrogen applications are recommended for uniformity and ease of management, to accommodate crop uptake, and to provide flexibility in avoiding unfavorable weather conditions. The final nitrogen application should occur before mid-April.

Do not apply nitrogen to fields with standing water. Nitrogen applied when soils are saturated and plants are yellow will not promote growth. These soils are oxygen-deficient, not lacking in nitrogen or other nutrients. You can delay nitrogen application until early April without decreasing seed yield.

Phosphorus (P)

Compare the results of a soil test that uses the Bray method for phosphorus to the values in Table 1 to determine the rate of P_2O_5 to apply for a new seeding or established stand.

When banding phosphorus at planting, at least 1 inch of soil should separate the seed from fertilizer. For established fields, phosphorus can be applied any time.

Table 1.—Phosphorus fertilizer application rates for perennial ryegrass based on a soil test using the Bray extractant for determination of plant-available P.

If soil test* for P is (ppm)	Apply this amount of P_2O_5: New seeding (lb/acre)	Established stand (lb/acre)
0–15	40–60	30–40
16–25	30–40	0
over 25	0	0

*Bray P1

Potassium (K)

Compare the results of a soil test that uses the ammonium acetate extraction for potassium to the values in Table 2 to determine the K_2O rate. When banding potassium at planting, at least 1 inch of soil should separate the seed from fertilizer. Do not exceed 30 to 40 lb K_2O/acre when banding potassium with seed at planting. A banded application of nitrogen plus potassium should not exceed 90 lb/acre total nutrients (not fertilizer material). For established fields, potassium can be applied anytime.

Post-harvest residue management strongly affects potassium need. Straw contains 7 to 10 times more potassium than seed. Potassium in chopped grass straw, or ash from burned straw, is immediately available to the next crop. Straw removal eliminates this source of potassium and can accelerate reduction in soil test potassium.

Table 2.—Potassium fertilizer application rates for perennial ryegrass based on a soil test using the ammonium acetate extractant for determination of plant-available K.

If soil test* for K is (ppm)	Apply this amount of K_2O: New seeding (lb/acre)	Established stand: Bale (lb/acre)	Established stand: Burn/chop (lb/acre)
0–50	200–250	150–200	100–150
51–100	100–200	75–150	50–100
101–150	30–40	0–75	0–50
over 150	0	0	0

* Ammonium acetate

Sulfur (S)

A spring sulfur application of 10 to 15 lb S/acre is preferred, but sulfur also can be applied in the fall.

Micronutrients

Seed yield increases from micronutrient application have not been documented in Oregon. Although soil test boron (B) levels normally are low (less than 0.2 ppm), seed yield increases from boron application have been limited and inconsistent. Tissue and soil test boron increase with a soil boron application. A single application of 1 lb B/acre will increase tissue boron for several years.

Zinc (Zn) usually is adequate for grass seed production when the DTPA soil test is above 0.6 ppm. If the soil test is below 0.6 ppm, apply 1 to 5 lb Zn/acre on a trial basis.

Lime

Stand establishment can fail if soil pH is below 5.0. When soil pH is less than 5.5, lime is recommended. Use Table 3 (page 3) to determine lime rate from SMP buffer. Do not exceed 5 tons lime/acre in a single application even if the SMP lime requirement is greater.

For best results, mechanically incorporate lime during seedbed preparation. Topdressing lime is not as effective as incorporation. Topdressing lime without incorporation raises soil pH in only the surface inch of soil and will not produce changes in plant growth for at least 1 year after application. Topdressed lime applications should not exceed 1 to 2 tons/acre.

Table 3.—SMP buffer lime requirement for perennial ryegrass.

SMP buffer	Amount of 100-score lime needed to raise pH of surface 6 inches of soil to the following pH* 5.6 (tons/acre)	6.0 (tons/acre)
4.8–5.0	6–5**	8–7**
5.1–5.3	5–4	7–6
5.4–5.6	4–3	6–4
5.7–5.9	3–2	4–3
6.0–6.2	2–1	3–2
6.3–6.5	0	2–1
over 6.5	0	1

*The combination of calcium carbonate equivalent, moisture, and fineness determines lime score. Lime application rates are adjusted for score. Rates in Table 3 are based on 100-score lime. Lime score is legally required for all materials marketed as “liming materials” in Oregon. For more information about lime score and liming materials, see FG 52-E, *Fertilizer and Lime Materials Fertilizer Guide*.

**The higher lime rate is required for the lower buffer test reading.

Calcium (Ca) and magnesium (Mg) exist in the soil in adequate quantities when soil pH is above 5.5. For acidic soil with less than 0.5 meq/100 g soil or 60 ppm magnesium, apply 1 ton/acre dolomite. Dolomite and lime have approximately the same capability to neutralize soil acidity and increase soil pH. An alternative to dolomite is to broadcast 30 lb Mg/acre. Compare material cost before choosing a magnesium source.

Use of most common nitrogen fertilizers increases surface soil acidity and lime need. Urea or other ammoniacal nitrogen sources acidify soil approximately 0.1 pH unit for each 100 lb N/acre. For example, if nitrogen is applied at the rate of 140 lb N/acre, the soil pH will decrease by approximately 0.14 pH unit. If 140 lb N/acre is used for 3 years, soil pH will decline approximately 0.4 pH unit.

Thus, the use of nitrogen fertilizer beyond crop need has a double cost. The first cost—the nitrogen fertilizer itself—is not offset by increased seed yield or economic return. Second, the additional nitrogen acidifies soil, which then requires additional lime to raise the soil pH. Application of 50 lb N/acre above crop need will require an additional 0.3 to 0.6 ton lime/acre in 3 years.

For more information

OSU Extension publications

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Fertilizer and Lime Materials Fertilizer Guide, FG 52-E (revised 1990).

A List of Analytical Laboratories Serving Oregon, EC 628 (revised 2002).

Monitoring Soil Nutrients Using a Management Unit Approach, PNW 570-E (October 2003).

Nitrogen Uptake and Utilization by Pacific Northwest Crops, PNW 513 (1999).

Soil Test Interpretation Guide, EC 1478 (published 1996, reprinted 1999).

Other publications

Mellbye, M.E., G.A. Gingrich, N.W. Christensen, J.M. Hart, and M. Qureshi. 1997. “Nutrient Uptake by Tall Fescue Under Full Straw Load Management.” In: W.C. Young III (ed.), *1996 Seed Production Research at Oregon State University, USDA-ARS Cooperating*, Department of Crop and Soil Science Ext/CrS 110 (April 1997).

Young, W.C. III, M.E. Mellbye, G.A. Gingrich, T.B. Silberstein, T.G. Chastain, J.M. Hart, and S.M. Griffith. 2003. “Defining Optimum Nitrogen Fertilization Practices for Grass Seed Production Systems in the Willamette Valley.” In: W.C. Young III (ed.), *2002 Seed Production Research at Oregon State University, USDA-ARS Cooperating*, Department of Crop and Soil Science Ext/CrS 122 (May 2003).

Young, W.C. III, T.B. Silberstein, T.G. Chastain, and C.J. Garbacik. 2003. “Fall Nitrogen on Tall Fescue.” In: W.C. Young III (ed.), *2002 Seed Production Research at Oregon State University, USDA-ARS Cooperating,* Department of Crop and Soil Science Ext/CrS 122 (May 2003).

Young, W.C. III, T.B. Silberstein, T.G. Chastain, and C.J. Garbacik. 2004. “Fall Nitrogen on Tall Fescue.” In: W.C. Young III (ed.), *2003 Seed Production Research at Oregon State University, USDA-ARS Cooperating*, Department of Crop and Soil Science Ext/CrS 123 (March 2004).

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