



Alfalfa

Willamette Valley and Northwest Oregon

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Alfalfa is capable of producing high yields of forage when grown on deep, well-drained soils. Good management practices are essential if optimum fertilizer responses are to be realized. These practices include use of recommended varieties, selection of adapted soils, weed control, disease and insect control, good seedbed preparation, proper inoculation and seeding methods, and timely harvest.

Alfalfa removes substantial amounts of mineral nutrients. Field experiments have shown that under different conditions in western Oregon, alfalfa has responded to phosphorus, potassium, sulfur, boron, and lime. The need for nutrients other than sulfur can be determined with a soil test. With borderline test values, retest every year.

Follow recommended soil sampling procedures to estimate fertilizer needs. The Oregon State University Extension Service agent in your county can provide you with soil sampling instructions, soil sample bags, and information sheets.

Inoculation

All alfalfa seed should be inoculated immediately before seeding to ensure an adequate supply of nitrogen-fixing bacteria. Use a fresh, effective, live culture of the correct strain of Rhizobia.

Nitrogen (N)

If alfalfa responds to applied N, the alfalfa has not been nodulated effectively.

Phosphorus (P)

The need for P fertilization can be determined by a soil test (Tables 1 and 2).

P can be applied to alfalfa fields most effectively by banding 1/2–1 inch to the side or below the seed when seeding. Some soil should separate the seed from fertilizer.

Do **not** include boron in band applications.

Broadcasting and working P into the surface 2 inches of soil during seedbed preparation is more effective than broadcasting following seeding.

P recommendations assume the soil pH is above 6.0

On established stands, apply P in the fall (Table 2).

Table 1.—P fertilization rates for new alfalfa seedings.

If the soil test for P is (ppm)	Apply this amount of phosphate (P ₂ O ₅) (lb/a)*
0–10	100–150
10–20	70–100
20–40	40–70
over 40	0

*For nonband applications, increase the P rate by 50 percent.

Table 2.—P fertilization rates for established alfalfa stands.

If the soil test for P is (ppm)	Apply this amount of phosphate (P ₂ O ₅) (lb/a)
0–10	80–100
10–20	50–80
20–40	30–50
over 40	0

Potassium (K)

Alfalfa requires large amounts of K. Available soil K may decline rapidly under established stands. Check soil tests every year on soils with borderline values. Retesting is especially important on “Red Hill” soils.

Table 3.—K fertilization rates for alfalfa.

If the soil test for K is (ppm)	Apply this amount of potash (K ₂ O) (lb/a)
0–75	200
75–150	100–200
150–200	100 on hill soils 0 on valley floor soils
over 200	0

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On new seedings

Broadcast K and work it into the seedbed prior to seeding.

On established stands

On nonirrigated alfalfa, broadcast half of the K in the fall or early spring and apply the other half after the first cutting.

A K deficiency is indicated by light-colored spots around the margins of the leaves. If K deficiency symptoms become apparent on alfalfa leaves, apply at least 90 lb K₂O to provide the needs of the following crop.

Responses to K fertilizer often are obtained before leaf deficiency symptoms are apparent.

Sulfur (S)

Include 20–40 lb S/a in the annual fertilizer program. Apply S in the fall or early spring. An early spring application is suggested for valley floor soils.

One ton of alfalfa hay removes about 5 lb S.

S is contained in several fertilizer materials used to supply other nutrients. Plants absorb S in the form of sulfate. Fertilizer materials supply S in the form of sulfate and elemental S. Elemental S must be converted to sulfate in the soil before the S becomes available to plants. The conversion of elemental S to sulfate usually is rapid for fine-ground (less than 40-mesh) material in warm, moist soil.

The S requirements of alfalfa can be provided by:

1. Annually applying 20–40 lb S/a in the form of sulfate or fine-ground (finer than 40-mesh) elemental S. Elemental S will not be available to plants until the soil warms up.
2. Applying 40–60 lb S/a as sulfate or fine-ground elemental S every second year.
3. Applying coarser ground elemental S at higher rates and less frequently.

Magnesium (Mg)

Responses to Mg applications have not been measured in alfalfa fertility experiments to date. Trial applications are suggested when soil test values are below 0.8 meq Mg/100 g or when the amount of calcium is more than 10 times the amount of Mg.

Mg can be applied in the form of dolomite lime, which is equal to ground limestone in reducing soil acidity.

Boron (B)

On established stands, apply 3 lb B/a if the soil test is 1 ppm B or less. The application of B is not recommended for new seedings.

Apply B uniformly to the soil. B and other materials should be thoroughly mixed when B application is combined with other fertilizers. Apply B in fall or early spring.

B can be toxic to plants if applied at rates higher than recommended.

Response to B is most apparent on the second or third cutting

Lime

Alfalfa is sensitive to soil acidity and is responsive to liming of acid soils. Apply lime if the soil pH is below 6.4 or the soil test for calcium is below 5 meq Ca/100 g of soil.

Table 4.—Lime application rates for alfalfa.

If the SMP buffer test for lime is	Apply this amount of lime (t/a)
under 5.2	5–7
5.2–5.5	4–5
5.5–6.0	3–4
6.0–6.4	2–3
6.4–6.6	1–2
over 6.6	0

These liming rates are based on dry 100-score lime. Check liming materials for moisture content and score.

Apply lime preferably a season ahead, or at least several weeks before seeding, and thoroughly mix it with the surface 5–6 inches of soil. A lime application is effective for several years. Broadcasting lime on established alfalfa fields is not effective.

Dolomite lime, which can be used as a source of Mg, is equal to ground limestone in reducing soil acidity.

For More Information

How to Take a Soil Sample ... and Why, EC 628, by E.H. Gardner (revised 1997). No charge.

A List of Analytical Laboratories Serving Oregon, EM 8677, by J. Hart (revised 1997). No charge.

You can access the above publications, FG 18, *Alfalfa: Willamette Valley and Northwest Oregon*, our Publications and Videos catalog, and many other publications via our Web site at eesc.orst.edu

Fertilizer recommendations are based on experiments conducted by T.L. Jackson, E.H. Gardner, D.B. Hannaway, and H. Hickerson, Oregon State University.

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Revised March 1983. Reprinted January 2000.