Fertilizer Guide

FG 20
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ALFALFA

(Eastern Oregon - East of Cascades)

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 seed bed preparation, proper seeding methods, and timely harvest.

Consult OSU Fact Sheet 253, "Growing Alfalfa for Forage" for establishment and management information.

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

Recommended soil sampling procedures should be followed in order to estimate fertilizer needs. The Oregon State University Extension Service agent in your county can provide you with soil sampling instructions and soil sample bags and information sheets.

INOCULATION

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

Additional details on legume seed inoculation are described in OSU Extension Circular 1055, "Inoculating Alfalfa and Clover Seed."

NITROGEN (N)

A response of alfalfa to applied N usually indicates that the alfalfa has not been effectively nodulated. N fertilizer can reduce effective nodulation. N is sometimes applied when monoammonium phosphate (11-48-0) is used as the P source. The small amount of N (usually less than 15 lb N/A) applied in this way should not interfere with nodulation. Grass grown in combination with alfalfa can respond to N fertilizer, but this may reduce the growth of alfalfa.

PHOSPHORUS (P)

The need for P fertilization can be determined by a soil test.

If the OSU soil test* for P reads (ppm)	Apply this amount of phosphate (P_2O_5) (lb/A):
0 - 5	80 - 120
5 - 15	40 - 80
Over 15	None

*This soil test is based on a 0-12" soil sample and the Olsen sodium bicarbonate procedure as outlined in the OSU Soil Analysis Methods Report.

P can be applied to alfalfa fields most effectively by banding ½ to 1" to the side or beneath the seed. Some soil should separate fertilizer from the seed. Do not include boron in band applications. Working P into the seedbed prior to planting is more effective than broadcasting following seeding.

Where soil tests on an established stand indicate a P deficiency, P should be broadcast during the fall to early spring period.

POTASSIUM (K)

Most of the soils in eastern Oregon contain adequate amounts of K for alfalfa production. The need for K fertilization can be determined by a soil test.

If the OSU soil test* for K reads (ppm):	Apply this amount of potash (K_2O) (lb/A)
0 - 75	100 - 200
75 - 150	50 - 100
Over 150	None

*This soil test is based on a 0-12" soil sample and the ammonium acetate procedure as outlined in the OSU Soil Analysis Methods Report.

K can be supplied most effectively by working into the seedbed prior to planting. On established stands, K should be applied in the fall to early spring period.

Alfalfa requires large amounts of K. Available soil K may decline rapidly under established alfalfa stands. Check soil tests every year on soils with borderline values.

Whenever K deficiency symptoms become apparent on the alfalfa leaves, at least 90 lbs K_2O/A should be applied to provide for the needs of the following crop.

A K deficiency is indicated by light colored spots around the margins of the leaves. Responses to K fertilizer are often obtained before leaf deficiency symptoms are apparent.

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SULFUR (S)

S fertilizer requirements will vary with soil texture, leaching losses, S content of irrigation water, and the soil parent material. Soils developed on pumice in central Oregon have a particularly high S requirement.

1. In central Oregon, 80 to 100 lbs S should be applied annually on sandy loam and loamy sand soils; 40 to 60 lbs S should be applied annually on silt loam and finer-textured soils.
2. In north central, south central, and northeast Oregon, 25-40 lbs S/A should be applied on an annual basis. Each ton of alfalfa hay will remove 5 to 8 lbs S. Two years' needs for S can be provided by applying double the recommended annual rate.
3. S response has not been measured on some soils, such as the river bottom soils in Crook County and Malheur or Harney counties.
4. S fertilizers should be applied in the fall or early spring.
5. When elemental S is used as the S fertilizer, application every second year is sufficient. Elemental S used as S fertilizer should be finely ground so that all will pass through a 32 mesh sieve and most will pass a 60 mesh sieve.
6. Elemental S increases soil acidity. Gypsum can be used as a source of S without affecting soil acidity.
7. As elemental S gives a slow response, it is not recommended for application to alfalfa fields where S deficiency symptoms are apparent. In this case a more rapidly available form of S such as gypsum should be applied.
8. S is frequently applied as a component of fertilizer materials such as single superphosphate.
9. Much of the irrigation water contains appreciable amounts of S which can be utilized by plants. Water containing 1 ppm S would supply 2.72 lbs S/A for each foot of water applied. Growers should have their irrigation water analyzed to determine its S content.

A soil test will provide information about the need for S fertilizer. It is recommended that soil samples for sulfate (SO_4-S) analysis be taken to a depth of 24". Based on a 0-24" soil sample, the soil test value (ppm) is multiplied by a factor of 8 to convert to lbs of SO_4-S/A. Thus, a soil test value of 6 ppm SO_4-S for a 0-24" soil sample would equal 48 lbs of SO_4-S/A.

BORON (B)

Responses of alfalfa to B fertilizer vary in the different areas of eastern Oregon.

In central Oregon experiments, responses to B have not been observed. In this region, B applications are suggested on a trial basis where the soil test value is below 0.3 ppm.

In other areas of eastern Oregon, if the OSU soil test for B is less than 0.50 ppm, 2-4 lbs B/A should be applied.

B should not be banded close to the seed.

MAGNESIUM (Mg) AND MICRONUTRIENTS

An economic response of alfalfa from the application of Mg and micronutrients, except B, has not been obtained in field experiments.

LIME

Soil tests show that a number of surface soils in eastern Oregon have a pH value low enough to cause some concern about the need for lime. Before recommending lime, soil samples, including subsoil samples, should be submitted for analysis. In cases where the subsoil contains calcareous material, an acid surface soil condition can be corrected by deep plowing.

Where the pH of the surface soil is less than 6.5 and deep plowing does not correct the acidity, liming of alfalfa fields is suggested.

If the pH of the surface 12" of soil reads:	Apply this amount of lime (T/A): Sandy soil	Silt & clay loam soils
Below 5.5	1½ - 2	2 - 3
5.5 - 5.9	1 - 1½	1 - 2
6.0 - 6.5	1	1
Over 6.5	0	0

The suggested liming rate is based on 100-score lime.

Apply lime several weeks before seeding and thoroughly mix with the surface 5 to 6 inches of soil.

A lime application is effective over several years.

Broadcasting lime on established alfalfa fields is not an effective practice.

P, K, B, and lime suggestions are based on soil test values from the Soil Testing Laboratory, OSU, Corvallis, Oregon.

Recommendations based on experiments conducted by Vance Pumphrey and Malcolm Johnson, OSU Agricultural Experiment Station; and Harold Kerr, Thomas Thompson, Martin Zimmerman, Bert Wilcox, and Hugh Gardner, OSU Extension Service.

Prepared by Hugh Gardner, Extension Soil Scientist; David Hannaway, Extension Agronomist; Vance Pumphrey, Agronomist; and Bert Wilcox, County Extension Agent; Extension Service and Agricultural Experiment Station, Oregon State University, Corvallis, Oregon. Reviewed by a committee of Eastern Oregon County Extension Agents.