FERTILIZERguide
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Irrigated clover–grass pastures

Eastern Oregon—east of Cascades

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This guide to fertilization is intended for pastures consisting of white clover in combination with orchardgrass or tall fescue. The optimum response of irrigated pasture to fertilization depends on good management.

The following management factors are important:

1. Maintenance of a good stand of adapted, improved clovers and grass with estimated 30 to 50 percent clover. Fifty percent or more clover might cause a bloat problem and require extra care in grazing.
2. Adequate irrigation without over-irrigation.
3. Harvesting at 5–8 inches using rotation grazing or green chop. Green chop management results in more rapid depletion of soil fertility than grazing.
4. Close grazing to 2 inches favors white clover, and light grazing to 4 inches or higher favors the grass.
5. Well-fertilized grass will outgrow clover in the fall. Excessive grass growth could result in smothering the clover. Either grazing or clipping will reduce the problem.
6. Avoid soil compaction by eliminating grazing when the surface soil is saturated with water.
7. Inoculate clover seed with the correct strain of fresh inoculum immediately prior to seeding.
8. Retest the soil and adjust fertilizer applications at least every 2 years.

Follow recommended soil sampling procedures in order 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.

Nitrogen (N)

N fertilizer favors the growth of grass over that of clover. Excessive fertilization with N can result in a decrease in the clover stand.

Clover-grass pastures

For new seedings, an application of 40 lb N/a is suggested where adequate available N is not present in the soil. Where the presence of residual available N in the soil is suspected because of heavy N fertilization the previous year or from a previous legume crop, a soil test for N is useful in determining the N fertilizer requirement.

If the nitrate-N level in the soil exceeds 7 ppm in the surface foot, N fertilization should not be necessary. N fertilization of new seedings usually is not practiced in northeast Oregon.

For established stands, an application of 30–40 lb N/a in the spring will stimulate the grass and provide early feed. Single applications of N should not exceed 40 lb/a.

If the clover stand is adequate, summer N applications seldom pay. In some lower altitude areas, an application of 30–40 lb N/a in late August will stimulate grass growth and may provide additional fall grazing.

Pure grass

Productive irrigated pure grass pastures require 125–300 lb N/a each year. N should be applied in two or three equal applications in early spring and about June 1 and August 1. The higher rates of application are suggested for lower altitude, longer growing-season areas such as Ontario and Hermiston.

Phosphorus (P)

The need for P fertilizer can be estimated using a soil test (Table 1). Adequate fertilization with P is particularly important to the maintenance of a good stand of clover.

Table 1.—P fertilization rates for irrigated clover.

If the soil test for P is (ppm)	Apply this amount of phosphate (P_2O_5) (lb/a)
0–5	60–80
6–10	40–60
over 10	0

Broadcast P in fall or early spring on established pasture.

If possible, band phosphate 1/2–1 inch to the side or below seed when seeding. Some soil should separate the seed from the fertilizer.

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Potassium (K)

An adequate level of available K is essential to the optimum growth of clover–grass pastures. K is particularly important to the growth of clover. Grass competes vigorously with clover in the uptake of K.

Most of the soils in eastern Oregon contain adequate amounts of K for pasture production. The need for K fertilization can be determined by a soil test (Table 2).

High-producing pasture can cause rapid depletion of soil K, particularly when pastures are not grazed. Test soils frequently to determine available K levels.

K can be supplied most effectively by working it into the seedbed prior to planting. On established stands, apply K in the fall or early spring.

Table 2.—K fertilization rates for irrigated clover.

If the soil test for K is (ppm)	Apply this amount of potash (K_2O) (lb/a)
0–100	100–120
75–150	50–100
over 150	0

In central Oregon, a response to K fertilizer may be obtained when the soil test value exceeds 150 ppm.

Sulfur (S)

S requirements vary with soil texture, leaching losses, and the soil parent material. Soils developed on pumice in central Oregon have a particularly high S requirement. In some cases, irrigation water contains appreciable amounts of S.

1. In central Oregon, when sulfate is used, 60–80 lb S/a should be applied annually on the coarse sandy loam and loamy sand soils; 30–50 lb S/a should be applied annually on the silt loam and finer textured soils. When elemental S is used, the rate of application can be reduced to 20 lb/a on central Oregon soils.
2. In north-central, south-central, and northeast Oregon, 15–25 lb S/a should be applied on an annual basis. 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 in Malheur and Harney Counties when irrigation water contains S.
4. Apply S in the fall or early spring.
5. When elemental S is used as the S fertilizer, applying 30–40 lb S/a 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 through a 60-mesh sieve.
6. As elemental S gives a slow response, it is not recommended for application to pastures where S deficiency symptoms are apparent. In this case, use the more rapidly available sulfate form of S.
7. S frequently is applied as a component of fertilizer materials such as single super phosphate, ammonium sulfate, and 16-20-0.
8. Much of the irrigation water contains appreciable amounts of S, which can be utilized by plants. Water containing 1 ppm S would supply 2.70 lb S/a for each foot of water applied. Growers should have their irrigation water analyzed for S content.

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

S fertilizer probably is not required if the soil test for SO_4-S exceeds 3 ppm.

Boron (B)

Boron deficiencies are not common in irrigated pastures in eastern Oregon. If the soil test value for B is below 0.4 ppm, an application of 2–4 lb B/a could be applied on a trial basis.

As B can be toxic to plants, the recommended application rate should not be exceeded, and B should be uniformly applied and not banded.

Magnesium (Mg)

Yield responses of pastures to applications of Mg have not been observed in eastern Oregon. Mg is important in animal nutrition. Low levels of Mg in forage have been related to grass tetany.

Other Micronutrients

Economic responses of pastures from the application of micronutrients, except possibly B, have not been observed in eastern Oregon.

Lime

Responses to lime have not been measured in experiments with irrigated pasture in eastern Oregon. In some fields, surface soil values below pH 6.0 cause some concern about the need for lime, particularly in central Oregon.

Before liming, test soil samples, including subsoil samples (8- to 20-inch depth). In many cases, the subsoil is more basic, and the acid reaction in the surface soil can be corrected by deep plowing.

For the satisfactory growth of white clover, the pH of the soil should exceed 5.6. Where the soil pH is below 5.6 and this condition cannot be corrected by deep plowing, the following liming rates are suggested (Table 3).

Table 3.—Lime application rates for irrigated clover.

	Apply this amount of lime (t/a)	
If the soil pH is	**Sandy soils**	**Silt/clay loam soils**
under 5.0	1–1½	2–3
5.0–5.6	1	1–2
over 5.6	0	0

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.

To order copies of the above publications, send the complete title and series number, along with a check or money order for the amount listed (payable to Oregon State University), to:

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Fertilizer and Lime Materials, FG 52, by J. Hart (reprinted 1997). No charge.

You can access the above publications, as well as FG 21, *Irrigated Clover–Grass Pastures: Eastern Oregon—East of Cascades,* our Publications and Videos catalog, and many other publications via our Web site at **eesc.orst.edu**

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