

Alfalfa Fertilization

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Summary Points:

- Proper nutrition is important in maintaining alfalfa yield and quality. This presentation focused on phosphorus (P) and potassium (K) nutritional needs.
- Assess nutritional status by monitoring visual deficiency symptoms and soil and plant tissue nutritional status.
- Establish permanent benchmark sampling locations for collecting soil and plant tissue samples.
- Find an analysis laboratory near you. Use this document to find one:
 - Selected Plant and Soil Laboratories in Northern and Central California. 2012.
By: Rhonda Smith, farm advisor, Sonoma County.
<http://cesonoma.ucdavis.edu/files/27431.pdf>
- Use tables (on back) to guide fertilizer applications, remembering that soil type, climate, and yield will influence fertilizer needs.
- Keep good records to help in developing a long-term, economical fertilization program.

Soil Sampling Procedures:

- Establish benchmark areas that represent different areas of the field.
- Sample soil soon after a rain or irrigation, when soil is at field capacity.
- Remove surface debris.
- Use shovel, trowel, or soil probe. Sample the top 6-8 inches. (If salt is a problem, take another sample down to two feet and possibly a third to three feet.)
- Randomly take 15-20 cores from each benchmark area. These cores can be mixed, but keep benchmark areas separate.
- Air dry samples.
- Sampling every time alfalfa is planted is usually sufficient.

Plant Tissue Testing Procedures:

- Collect 40-60 stems from at least 30 plants, from each benchmark area.
- Best time to collect stems is at one-tenth bloom before first cutting.
- Cut stems into thirds, and dry them in a warm room.
- Remove leaves from middle-third stems. Use middle-third stems to test for P and K.

Fertilizer Application:

- Use a granule (0-45-0, 11-52-0) or liquid (10-34-0) fertilizer to correct P deficiency. These sources are the most economical. Use muriate of potash (0-0-52) to correct K deficiency, or use potassium sulfate (0-0-52, 18% sulfur) if sulfur is also deficient.
- In pre-plant situations, P uptake is improved if fertilizer is incorporated into the top 2-4 inches. Both P and K are effectively taken up by plants when pre-plant incorporated or surface applied in established stands.
- Plant growth response from both P and K fertilizers may not be observed until 60-90 days after fertilizer application. For this reason, fertilizer should be applied between October and February.
- Research shows that fewer applications at higher application rates are more economical than applications every year at lower rates.

See Tables on back for guidelines.

Interpretation of Soil and Tissue Tests:

		Soil Value (ppm)*			
Nutrient	Extract	Deficient	Marginal	Adequate	High
Phosphorus	Bicarbonate	<5	5-10	10-20	>20
Potassium	Ammonium acetate	<40	40-80	80-125	125

		Plant Tissue Value*			
Nutrient	Unit	Deficient	Marginal	Adequate	High
Phosphorus (PO ₄ -P)†	ppm	300-500	500-800	800-1,500	Over 1,500
Potassium†	%	0.40-0.65	0.65-0.80	0.80-1.5	Over 1.5

* Yield response to fertilizer application is very likely for deficient level, somewhat likely for marginal level, and unlikely for adequate level.

† These are values for samples taken at one-tenth bloom. P should be higher if samples were taken at bud stage: 1,200 ppm at mid-bud and 1,600 at early-bud stage. K should be 10% higher.

Fertilizer Application:

		Soil or Plant Tissue Test Result*		
		Deficient	Marginal	Adequate
Nutrient	Yield Level (tons/acre)	Application Rate (lbs/acre)		
Phosphorus (P ₂ O ₅)	8	120-180	60-90	0-45
	12	180-270	90-130	0-60
Potassium (K ₂ O)	8	300-400	150-200	0-100
	12	400-600	200-300	0-150

Note: Single applications of phosphorus should not exceed 100-150 lbs P₂O₅, and single applications of potassium should not exceed 200-300 lbs K₂O. If soil or tissue tests indicate that more is needed, then apply half of what is needed in late fall/early winter and the other half after the second or third cutting.

Tables from *Irrigated Alfalfa Management for Mediterranean and Dessert Zones*. 2008. Edited by C.G. Summers and D.H. Putnam. UC ANR Publication 3512.