

# 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 <sub>4</sub> -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 <sub>2</sub> O <sub>5</sub> )	8	120-180	60-90	0-45
	12	180-270	90-130	0-60
Potassium (K <sub>2</sub> 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 P<sub>2</sub>O<sub>5</sub>, and single applications of potassium should not exceed 200-300 lbs K<sub>2</sub>O. 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.