

FERTILIZERS: NEW METHODS AND PRACTICES

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Alfalfa's importance to California growers and livestock producers goes well beyond its immediate cash value. The "premier" forage crop commands the attention of growers and fertilizer dealers throughout the United States.

Our efforts over the past fifteen years have been to improve the accuracy of our recommendations and through these enhanced programs to improve the growers net profits.

This has meant extensive soil and plant tissue testing including adoption of the Potassium Release Test as developed by Dr. James Green II. This method augments the "available" extraction with ammonium acetate. The test shows the rate that a particular soil will release potassium on a daily basis. Results are given in parts per million and can be easily converted to soil volume by multiplying by bulk density.

Knowing the crops daily requirement it is apparent if a major availability difference exists. This has allowed for a more accurate program. With a six hundred pound per acre requirement for a ten ton crop alfalfa is among the highest potash removers we grow.

The analytical method has been licensed to most of the commercial laboratories in the state by UNOCAL.

TABLE 1

RATE OF K-UPTAKE BY SEVERAL CROPS

<u>CROP</u>	<u>GROWTH PERIOD</u> (days)	<u>YIELD</u> (tpa)	<u>K-UPTAKE</u> (lb)	<u>DAILY RATE</u> (lb/a/day)
Alfalfa (2nd cut)	0-35	3.0	170	4.8
Suger Beet	0-120	33	500	4.2
Potatoes	30-90	22.5	240(80%)	4.0
Corn	30-60	4.2	99(55%)	3.3
	30-90		144(80%)	2.4
Tomatoes	0-120	33	450	3.8
Cotton	75-100	1.5	55(50%)	2.2
Snap Beans	0-40	6.7	98(75%)	2.4
Celery	122-164 (POST PLANTING)	84	700	11.4
Lettuce	80-180 (POST PLANTING)	24	185	5.9

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The other major nutrient required in amounts as large as potassium is nitrogen. The same ten ton per acre crop that requires 600 pounds of potassium needs 560 pounds of nitrogen. It is a popular fallacy that since alfalfa is a legume that it will supply its own nitrogen through rhizobial bacteria fixation. We have found responses to moderate (30-40 pounds per acre) application particularly during the first part of the season and as stands age. It goes without saying that the microbiological research and fertilizer interactions necessary to produce locally adapted strains of rhizobia would be most rewarding.

The last of the major nutrients, phosphorous, is required at rates that are one fourth the amount of potassium for the same yield. On those soils having a high fixative rate, particularly the calcareous ones, we have found the acid based mixes such as PHOSPHURIC[®] to be particularly effective. This is especially true of use during the winter where they can be used as a carrier for pre-emergent herbicides, such as hexazinone or diuron and supply highly available phosphorous for the first two cuttings.

TABLE II

		PHOSPHURIC [®] IN ALFALFA Tissue Analysis in p.p.m.				
		54 lbs P205/acre		89 lbs P205/acre		
		CHECK	11-48-0	8-27-0-8S	CHECK	11-49-0 8-27-0-8S
4/22		750	1000	1250		
					750	1750 1875
		1500	1500	1875		
6/28	1250	1750	2125	1188	1688 1928	

The final nutrient we have found that most commonly limits yield potentials is the secondary element, Sulfur. The advent of more concentrated fertilizers, combined with cleaner air, and greatly lowered pesticidal use of sulfur has meant lower available sulfurs are more frequently found in our analysis. A ten ton crop requires 50 pounds of S per acre.

Sulfur greatly influences the protein levels of the crop as well as adding to the microbiological activity of the soil. The proteins/amino acids that are sulfur dependent are methionine, cystine and lysine. Lysine and methionine are among the so called "by-pass" proteins that are thought to be keys to high milk production. These are often supplied by protein supplements in a livestock ration at considerable cost.

TABLE III

Sulfur Supply Level	Amino Acids Mole Percent	
	Cystine	Methionine
Low	.48	1.02
Medium	.50	
High	.58	

It has become apparent to us that with proper soil, water and tissue analysis that the fertility requirements of the crop can be met with use of a myriad of materials that can effectively cover all eventualities. Whether it's acid to cover highly buffered soils and waters or multiple nutrient fertilizers such as Potassium Sulfate or Potassium Thiosulfate, the economically viable alternatives are available for the asking.