

Grain yield was increased by an application of 50 lbs N per acre with no further increases in yield with higher rates of N applied (Table 1). Two hundred pounds of N applied either at preplant or 100 lbs preplant plus 100 lbs sidedress tended to decrease grain yield. There was no significant increase in grain yield due to applied phosphorus.

Bushel weight (Table 1) was increased slightly by P addition but N applications had little effect upon bushel weight. The percent of grain kernels that were yellowberries was decreased with N applications and there was a slight increase in the incidence of yellowberry due to applied P. The phenomenon was observed primarily at the lower rates of N.

Nitrate and phosphate levels in wheat stems at various dates are shown in Table 2. The levels in wheat stems were responsive to the amount of N applied to the wheat. Higher rates of N applied resulted in higher levels of NO₃-N in the stems. Nitrate levels in the stems were not significantly affected by P treatment. Phosphate levels in the stems were increased significantly by P application. As has been previously reported, the PO₄-P levels are relatively high early in the season but soon fall to very low levels that are not suitable for diagnostic purposes.

The nitrate levels were inversely related to the percent yellowberry. Lower NO₃-N levels resulted in a high incidence of yellowberry in the grain. It has been previously reported that N-deficiencies that occur during seed formation result in a high incidence of yellowberry.

The yields levels obtained were disappointing; however, the data indicate that N and P were not the limiting factors.

TABLE 2. Nitrate and phosphate levels in wheat stems.

Treatment		Stem NO ₃ -N			Stem PO ₄ -P		
Preplant 12-17-80	Topdress 2-15-81	3-16	4-9	4-24	3-16	4-9	4-24
lb N/acre		-----ppm-----					
0	0	200a	150a	83a	3265d	510	180
50	0	800b	225a	0a	3260d	550	210
100	0	2130d	710b	80a	3020c	480	160
200	0	2650e	3810d	1370b	2730b	500	225
50	50	1790c	920b	185a	2240a	520	175
100	100	2690e	2950c	1490b	2670b	625	245
	LSD	338	400	292	151	N.S.	N.S.
lb P ₂ O ₅ /acre							
0	0	1770	1530	400	2480a	420a	115a
100	0	1650	1390	670	3250b	640b	280b
	LSD	N.S.	N.S.	N.S.	431	111	110

Fertilizing Alfalfa in Arizona

Dean Pennington, Extension Soils Specialist

Summary

Alfalfa often responds to applied phosphorus. The need for phosphorus fertilizers can be determined by soil testing before planting or tissue analysis of stems at one tenth bloom.

Nitrogen

Nitrogen fertilizers are generally not needed for alfalfa. Responses to applied nitrogen usually indicate that the alfalfa plant is not effectively nodulated due to lack of proper seed inoculation or an old stand.

When planting alfalfa with a cover crop, both crops compete for the nitrogen. Under these conditions, 30 to 40 pounds of nitrogen are suggested to hasten alfalfa stand establishment.

Phosphorus

A) Preplant Soil Analysis

Alfalfa often responds well to applied phosphorus. The need for phosphorus fertilization can be determined by testing a soil sample which has been collected before plowing. Phosphorus materials should be broadcast and plowed or worked down. Table 1 can be used to determine rates of P₂O₅ to apply, preplant for a 3 year alfalfa crop.

Table 1. Soil Test Values and Phosphorus Recommendations for Application Before Planting Alfalfa

<u>Soil Test P*</u> ppm P	<u>Lb P₂O₅/Acre To</u> <u>Be Applied For 3 Yr Crop</u>	<u>Comments</u>
Greater than 4	None	Probably Sufficient
2 to 4	50 to 150	2nd Year Response
0.7 to 2	150 to 250	1st Year Response
Less than 0.7	200 to 300	Immediate Response

* CO₂ extractable phosphate reported as ppm elemental phosphorus. To convert ppm P to ppm PO₄ multiply by 3.1.

B) Tissue Analysis

Analysis of alfalfa tissue samples can also be used to evaluate the phosphorus status of a field. Tissue samples are generally more reliable than soil analysis; although, both are good and soil analysis is the only alternative at preplant times.

Tissue samples should be taken in spring and/or early summer and in the fall. Avoid sampling during the hot summer months. Randomly take 20 to 30 plants from the field for each sample. Collect the above ground portion (stems and leaves) at approximately 1/10th bloom. One tenth bloom is when 10% of the stems have at least one bloom. After receiving the analysis results, Table 2 can then be used for interpretation and recommendations.

Table 2. Tissue Test Values and Phosphorus Recommendation for Established Alfalfa.

<u>% Total P</u> <u>in Plant</u>	<u>Lb P₂O₅/Acre To</u> <u>Be Top Dressed</u>
Greater than 0.20	None
0.18 to 0.20	50 to 100
0.14 to 0.18	75 to 150
Less than 0.14	100 to 200

Phosphorus applications to established alfalfa stands will provide best results if applied in fall or early spring. Application is usually made by broadcasting dry materials to soil surface or less often by injecting to about 3 to 4 inches.