

ALFALFA FERTILIZER PRACTICES IN THE LOWER COLORADO DESERT

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There are approximately 240,000 acres of alfalfa presently grown in the lower Colorado Desert. The alfalfa receives approximately 100 lbs. P_2O_5 per acre per year for a total of 12,000 tons annually. Therefore, alfalfa receives more phosphorus than any other crop in the area. This fact is surprising since the area is known for its midwinter vegetable production...and vegetables are notoriously high users of fertilizer.

Soils of the lower Colorado Desert usually require applications of nitrogen and phosphorus for maximum crop growth. Since alfalfa is a legume, then phosphorus would be the only nutrient that has to be applied. These requirements are different from other alfalfa producing areas of the United States which commonly report growth responses to lime and potassium.^{3/} Sulfur and magnesium deficiencies are also becoming more widespread in the United States.

Soil Formation

In geological terms, the soils of the lower Colorado Desert are very young. The area is mainly an old structural valley which has been partly filled by accumulations of sediments washed in from the surrounding mountains and by fine sediments carried in by the Colorado River.^{4/} The soils are not developed into horizons commonly found in other areas. The soils are deep and often extend from 1200 feet to two miles to bedrock. The soils are derived from a wide range of igneous and sedimentary rocks found within the watershed of the Colorado River.

Alfalfa Foraging Ability

Alfalfa produces a large root system often extending 20 feet deep in some arid areas. The rooting depth in the Imperial Valley is often limited to 5 feet or less due to soil stratification and water table. Ordinarily the weight of the roots exceeds the weight of the tops. Alfalfa is able to forage for nutrients even at very low levels. In one Imperial Valley location, alfalfa was grown on a soil containing the lowest zinc level known in Southern California and showed no response to zinc sulphate applications.^{2/} Soil potassium levels in the area range from 25-400 ppm exchangeable K. To date, there have not been any yield responses to K on any crops reported in statistically conducted field experiments in the Imperial Valley. The low soil K levels occur on very sandy soils. Often these are sand dune areas that have been leveled and farmed.

Phosphorus and Alfalfa Production

A ten ton alfalfa hay crop removes about 100 lbs. P_2O_5 per acre. Therefore, there should be at least as much phosphorus applied as that removed. In calcareous soils such as those found in the lower Colorado Desert, phosphorus is rapidly fixed as dicalcium phosphate, tricalcium phosphate and hydroxyapatite, reducing P availability.

The rate of fertilizer applied depends upon the preceding crop. If alfalfa follows other field crops then greater quantities of preplant phosphorus are required than if following a highly fertilized vegetable crop.

In practical terms, how do growers in the desert fertilize their alfalfa? Actually the question can be compared to asking a dozen coaches what city has the best pro football team. There are many methods successfully used. The following are some of the methods used by local growers.

Grower A

Preplant 144 lbs. P_2O_5 as 11-48-0 disced.

Annual topdress 144 lbs. P_2O_5/A as 11-48-0 dry applied broadcast at reseeding (Oct).

Grower B

Preplant 144 lbs. P_2O_5/A as 11-48-0 disced.

Annual topdress 50 lbs. P_2O_5/A as 10-34-0 liquid water run in March. 96 lbs. as 11-48-0 broadcast in September.

Grower C

Preplant 180 lbs. P_2O_5/A as 11-48-0 disced.

Annual topdress 20 lbs. P_2O_5/A as 10-34-0 water run in March. 85 lbs. P_2O_5/A as 10-34-0 water run in September.

Fertilizer Company A

Preplant 98 - 144 lbs. P_2O_5/A as 11-48-0 disced.

Annual topdress applications 50 - 100 lbs./A as phosphoric acid (0-52-0) or 10-34-0 liquid in 2-8 water run applications. Applications are in the Spring (March-April) and Fall (September-October). Most commonly 4 applications are made.

Fertilizer Company B

Preplant 98 lbs. P_2O_5/A as 11-48-0 disced.

Annual topdress applications 35 lbs. P_2O_5/A as 10-34-0 water run during March, and September.

Most preplant applications are standard but annual topdress applications vary considerably in timing. There is more water run 10-34-0 than 0-52-0 due to product availability.

In the literature there are several references concerning frequency of P applications. Several experiments have shown little difference between a large initial P application and smaller annual applications at yields of 6 tons alfalfa per acre or less.^{2/} One researcher indicated that at yields above 6 tons there are benefits from a P application in the fall.

Topdressing appears to be an effective method of maintaining alfalfa fertility since the P comes into contact with a smaller quantity of soil than when it is disced. This is said to reduce fixation. In addition alfalfa roots are active near the soil surface.^{3/} Some P is also absorbed by the alfalfa crowns.^{5/}

With ammoniacal phosphates, there may be a visual boost in growth. This may be misleading; however, since there are reports which indicate that N fertilized alfalfa appears to be slightly taller, a darker green color and possibly slightly higher moisture content than alfalfa not receiving nitrogen.^{1/} Most growers agree that P sources containing nitrogen should be avoided in weedy fields.

References:

^{1/} Doll, E. C. 1962 Agron. J. 54:469.

^{2/} Hagemann, R. H. and K. S. Mayberry 1969 U. C. Ag. Extn. Report of Work, Imperial County, El Centro.

^{3/} Hansen, C. H. 1972 Alfalfa Science and Technology Agron. 15:46,447

^{4/} Kocher, A. A. 1923 Soils Survey of the Brawley Area, California U. S. Government Printing Office.

^{5/} Tisdale, S. L. and W. L. Nelson 1966 Soil Fertility and Fertilizers 2nd ed. MacMillan Company, New York.