FALL FERTILIZATION OF ALFALFA

Alfalfa is well-adapted to many of Utah's climate and soil conditions. With proper variety selection and favorable irrigation, fertility, pest, and harvest management, Utah farmers have reported yields of 8 and even 10 tons/acre. Management is the key to successful alfalfa production. Supplying the correct amount of nutrients is one important management factor in profitable alfalfa production. Fall fertilizer applications are usually best for alfalfa.

Alfalfa removes large quantities of nutrients from soil. Historically, phosphorus has been the nutrient needed in largest quantities for alfalfa production in Utah. Potassium, sulfur, zinc, and boron deficiencies have also been documented in some locations. Nutrient deficiencies can significantly reduce alfalfa yields and shorten stand life.

It is difficult to generalize about the location and occurrence of specific nutrient deficiencies. Soils are inherently variable due to both geologic processes and historic manure and inorganic fertilizer use. In addition, some irrigation water sources add nutrients to soil. For these reasons, soil testing is essential to determine which nutrients are needed and in what amounts.

Alfalfa is a legume and through a symbiotic relationship with bacteria obtains all of the nitrogen required for growth from the atmosphere. During establishment and before the bacterial symbiosis develops, a small amount of nitrogen (20 to 40 lb N/acre) is beneficial. Applications of larger amounts of nitrogen during establishment inhibit bacterial symbiosis and may actually reduce the growth of mature alfalfa plants.

Nitrogen application on established alfalfa is not recommended. Multiple studies have evaluated alfalfa yield and protein responses to nitrogen fertilization, and very few have shown any positive effects. In studies where yield responses to nitrogen were obtained, the response was relatively small and inconsistent. Nitrogen rates were often high and not economical, and responses were frequently due to a stimulation of grass in the stand.

Phosphorus deficiency is common throughout Utah and can often be detected by thin, weak stands with stunted plants of a dark color. Phosphorus movement in soil is very limited. As such, where possible place phosphorus into the root zone by applying and incorporating fertilizer prior to establishing a new stand of alfalfa. Broadcast applications are also effective and should be made in the fall or early spring. Fall applied phosphorus is preferred since winter moisture helps to dissolve the fertilizer pellets.

Various sources of phosphorus are available in Utah, including triple superphosphate (0-45-0), monoammonium phosphate (11-52-0), and liquid phosphoric acid (various P_2O_5 concentrations). Comparisons indicate that, when applied at the same rate of P_2O_5, the materials mentioned above are equally effective. Select a phosphorus source based on local availability, ease of application, and cost per unit of P_2O_5.

Potassium deficiency is associated with sandy soils, fields irrigated with clean waters low in potassium, and sites with a long history of high-yielding alfalfa production. Alfalfa removes large amounts of potassium from soil. Once a need for potassium has been identified, annual

applications will generally be necessary to maintain soil test potassium and high yields. Growers must be careful, however, since alfalfa will absorb more potassium than needed for maximum growth.

This trait is referred to as *luxury consumption* and results in the harvest of hay containing high concentrations of potassium. Commonly available potassium sources in Utah are potassium chloride (0-0-60), potassium sulfate (0-0-50), and liquid potassium (various K_2O concentrations). Select a potassium source based on local availability, ease of application, and cost per unit of K_2O.

Sulfur deficiency, although not a frequent occurrence has been documented in some locations throughout Utah. Generally, sandy, low organic matter soils in areas with clean irrigation waters are subject to sulfur deficiency. Severe sulfur deficiency significantly reduces yield and lowers alfalfa quality. Common sulfur sources in Utah include ammonium sulfate (21-0-0-24S), potassium sulfate (0-0-50-18S), gypsum (17% sulfur), and elemental sulfur (0-0-0-90S). Where sulfur deficiency has been identified, application of 50 lb sulfate-sulfur (SO_4-S)/acre as ammonium sulfate, potassium sulfate, or gypsum combined with 100 lbs/acre of elemental sulfur (a slow release form of sulfur) will correct deficiencies for two to three years.