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### QUALITY ALFALFA REQUIRES GOOD FERTILITY

**Alfalfa is an important component of agricultural production in many regions of North America.** For example, over the past 3 years total average alfalfa hay production in the Southern and Central Great Plains Region has exceeded 2 million tons. Demands for high quality alfalfa are increasing, especially in areas where dairy cattle numbers are climbing. There are many factors involved in producing a high quality alfalfa crop. Some of these factors, like rainfall and temperature, are uncontrollable; however, many other critical components can be carefully managed. Among the controllable factors important in the production of quality alfalfa is an adequate supply of nutrients.

**A few of the benefits of a complete and balanced fertility program include:**

- Increased yield
- Improved quality
- Higher profit potential
- Greater water use efficiency
- More resistance to pests
- Improved winterhardiness
- Enhanced drought tolerance
- Improved nodulation and N fixation

**In most areas, alfalfa begins growth in the early spring and continues into the late fall.** Thus, there is a continuous demand on the soil nutrient supply for several months. Alfalfa hay removes about 56 pounds of nitrogen, 15 pounds of phosphate ( $P_2O_5$ ), 60 pounds of potassium ( $K_2O$ ), and 5 pounds each of sulfur and magnesium per ton of production. Most nitrogen comes from biological fixation, but phosphorus, potassium, and other nutrients can be depleted from alfalfa fields if not replaced by fertilization.

**Phosphorus performs several vital functions in alfalfa plants.** It is involved in energy storage and transfer, is a structural component of biochemicals, and is involved in maintenance and transfer of genetic code, root growth, crop establishment, hastening maturity, and accelerated recovery. Phosphorus fertility can also significantly affect nodulation and nitrogen fixation of alfalfa. One study showed that increasing soil test phosphorus...from 4.5 to 22 parts per million (ppm)...resulted in a greater than 10-fold increase in number of nodules.

**Alfalfa takes up and removes large amounts of potassium, in fact more potassium is removed than any other soil nutrient (50 to 60 pounds of  $K_2O$  per ton).** Fertilized to optimum, alfalfa forage contains 2 to 3% potassium. Potassium has many critical roles in plant growth and development. In addition to the well-recognized role of potassium in stomatal regulation and photosynthate transport, potassium also has an important role in enhancing nitrogen fixation in alfalfa. Adequate potassium also helps to reduce grass and weed invasion and improves stand persistence and winter survival.

**Ruminant animals fed alfalfa hay have a higher potassium requirement than non-ruminants.** Potassium is essential for rumen microorganisms. A commonly observed effect of suboptimal potassium in the diet of ruminants is decreased intake of feed and water. Lactating dairy cows, especially high-producing cows, require the highest levels of dietary potassium of most livestock. Under high heat stress, their optimal level of dietary potassium can be as high as 1.9%, but the normal requirement (National Research Council) is about 1% potassium of the dietary dry matter. Less dietary potassium (0.5 to 0.6%) is required for dry cows, calves, and heifers.

**Alfalfa provides excellent forage.** Stands can remain productive for years with proper care and nutrition. To determine best rates of fertilization of alfalfa in a specific area use tools such as soil testing, plant analyses, local information, and nutrient input and removal history.

—WMS—

For more information, contact Dr. W.M. (Mike) Stewart, Southern and Central Great Plains Director, PPI, 2423 Rogers Key, San Antonio, TX 78258. Phone: (210) 764-1588. E-mail: [mstewart@ppi-far.org](mailto:mstewart@ppi-far.org).

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