K-Mag AGRI FACTS

Brought To You By IMC — Producers of Quality Crop Nutrients

High-Yielding, High-Quality Alfalfa Requires Balanced Fertilization

- **Increasing numbers of alfalfa growers are recognizing the benefits of using K-Mag in their fertility programs.**
- **K-Mag contains 11% magnesium (Mg), a very important nutrient for the production of high-quality alfalfa.**
- **K-Mag contains 22% sulfur (S) in a non-acidifying form.**
- **K-Mag contains 22% potash (K_2O) in the premium, sulfate form.**
- **K-Mag is highly water soluble. This means its nutrients can move through the soil profile to the rooting depth of alfalfa. Thus, the nutrients in K-Mag are readily available for plant uptake.**

For optimum yields and profits, alfalfa requires intensive management in frequency of harvesting, choice of varieties, pest control, water management and fertility. In Maryland, soil fertility and fertilizer practices are key elements in high-yield alfalfa management. Recent research has shown that the highest yields (6 to 8 tons/A) were obtained from, and applications of 460 lb P_2O_5, 645 lb K_2O, 67 lb S, 134 lb Mg/A. In contrast, many of the better alfalfa growers in Maryland typically topdress alfalfa with approximately 150 to 200 lb K_2O/A annually. When you consider that the average K_2O removal rate is 60 - 70 lb K_2O/ton of harvested hay, it follows that most farmers are fertilizing for the average yields of 3 to 4 tons/A. Unfortunately, these fertilization rates are typical for many major alfalfa producing areas and lead to a gradual reduction in available soil potassium (K), available phosphorus (P) and eventual loss of stand.

High Yields Remove Large Quantities Of Nutrients

Many producers do not realize the high nutrient demand of alfalfa and the effects of the crop on soil nutrient availability. The nutrient removal of alfalfa at various yield levels is shown in Table 1.

Table 1.

Yield	N*	P_2O_5	K_2O	Mg	S
			lb/A		
4 tons/A	225	60	240	20	20
6 tons/A	338	90	360	30	30
8 tons/A	450	120	480	40	40
10 tons/A	500	150	600	50	50

* Most of the N requirement is supplied by N-fixing bacteria.

Not all of these nutrients come from direct fertilization. However, a good yielding alfalfa soil must be fertile and then be fertilized at a level which maintains high soil tests. In Ontario, research has shown an 86% increase in production on high K soils with intensive management vs. low K soils with average management. In addition, K removal required an annual application of 430 lb K_2O/A just to replace that removed and maintain K soil test levels.

High yield irrigated alfalfa research in Kansas (11.5 tons/A/year) has emphasized the tremendous amounts of nutrients removed by the crop. Total nutrient removal was 719 lb N, 143 lb P_2O_5 and 531 lb K_2O. That study emphasized that variety and cutting date both affect total yield and nutrient removal per ton of harvested hay.

Arizona alfalfa producers have matched or exceeded research plot yields of 14 tons/A. The significance of those yield levels are emphasized in the amounts of nutrients demanded by and removed by the crop. For example, a 15 ton/A crop removes 207 lb P_2O_5/A, 1024 lb K_2O/A and 100 lb Mg/A.

Balanced Fertility Is Important

Phosphorus is the first limiting nutrient in alfalfa production in many producers' fields. Crop removal at approximately 15 lb P_2O_5/ton of hay quickly depletes soil reserves without adequate fertilization. Poor P availability leads quickly to loss of stand and shortened stand life. Winter kill, for instance, is much more a problem where P availability is low. Kansas research has emphasized the magnitude of P responses in high-yield alfalfa production and the importance of annual applications of P in maintaining high yields. Annual applications of P were more effective than heavy initial rates through annual replacement of P removed by the crop.

North Dakota research has shown good economic returns from P and K fertilization of irrigated alfalfa. The results of this study indicated the necessity of high nutrient levels prior to alfalfa establishment and that producers must soil test and apply P_2O_5 and K_2O to maximize yields of aging alfalfa stands.

Another aspect of a balanced fertilization is the relationship of K to Mg. It has been shown in many crops that increased K fertilization will reduce plant content of Mg and potentially reduce the plant's ability to produce chlorophyll, the green pigment in plants. Therefore, it is important that the Mg levels in alfalfa be maintained at adequate levels. Magnesium also helps carry P throughout plant tissues. Alfalfa research in several Western states has shown greater response to P than any other nutrient. Again, as alfalfa management intensifies, balanced fertilization is critical.

An often neglected nutrient in alfalfa fertility programs is sulfur (S). A shortage of this nutrient can severely affect yields and quality of alfalfa. That's because S is a component of plant proteins and is essential for adequate N fixation by nodule bacteria on alfalfa roots. Many experiments have conclusively shown that under conditions of S deficiency, plant protein content is markedly reduced, and the feeding value of the forage is adversely affected.

Effect Of Yield On Profit

Table 2 provides the expected profit per acre for alfalfa at various yield levels with various lengths of stand life. These data are calculated from figures presented in Auburn University (Alabama) budgets of alfalfa. Either increasing yield or increasing stand life increases profitability. However, it is of particular interest to note that increasing the tons of alfalfa produced per acre increases profit at a much more rapid rate than adding extra years to the stand life. This clearly emphasizes the fact that ***when growing alfalfa, it pays to strive for high yields!*** The reason is that many of the costs associated with producing alfalfa are ***fixed costs*** which are much the same regardless of yield.

Table 2. Estimated Profit Per Acre From Alfalfa At Various Yields And Lengths Of Stand Life.[1]

Yield	Stand Life(Years)			
Tons/Acre	2	3	4	5
3	-95	-56	-39	-28
4	15	53	71	82
5	125	163	180	192
6	235	275	291	301

[1] Based on Auburn University Alfalfa Budgets.