

SUL-PO-MAG[®] AGRI-FACTS

Pasture & Forages

To produce high yields of high-quality forages, a well-balanced fertility program is absolutely essential. Sul-Po-Mag can play a very important role in such a program. Sul-Po-Mag is a naturally occurring mineral (langbeinite) that contains three essential plant nutrients: potassium (21-22% K₂O), magnesium (10.5-11% Mg) and sulfur (21-22% S). These three nutrients contribute substantially to the production of high quality pastures and forages.

Potassium. Forage crops in general have a high requirement for potassium. A twenty-ton crop of alfalfa will absorb about 600 kg K₂O/ha. Twenty tons of bermudagrass absorbs about 420 kg K₂O/ha. Thus, applications of substantial amounts of potash are essential to maintain high yields on most soil types. In addition to maintaining high yields, potassium is often observed to improve forage quality. Studies in the U.S.A. showed the effects of high potash application rates on yield and some quality factors of Coastal bermudagrass over a period of 5 years (Table 1).

TABLE 1. Potash Increases Yield and Quality of Bermudagrass. U.S.A.

Annual K ₂ O rates	-----Yield, kg/ha (five year)-----					
	Forage Yield Avg	Forage Yield Total ¹	Crude Protein Avg	Crude Protein Total ¹	Dig. Dry Matter Avg	Dig. Dry Matter Total ¹
0	9989	49946	1400	7000	5252	26255
112	13561	67805	1858	9290	7323	36613
224	15000	75001	2017	10086	8140	40701
448	15913	79565	2149	10746	8650	43249
672	16111	80556	2154	10769	8789	43943

¹Total of 19 cuttings over 5 years.

A total of 448-168-100-2 kg/ha of N-P₂O₅-S-Boron was applied to all treatments. Crude protein was increased 54% and digestible dry matter by 67% at the highest K₂O rate. These are very important parameters in determining the quality of forage.

Magnesium. This nutrient has received a great deal of attention over the past few years in relation to its use in forage fertilization programs. A major reason is the increasing rates of potash being applied by top producers reduces the amount of Mg absorbed, often to the point of inducing Mg deficiency. And whether or not yields are reduced, low Mg levels can cause serious

health problems in foraging animals.

Grass tetany has become a serious health problem in many livestock-producing areas. This condition is a complex one. Many factors are involved insofar as the causes of tetany are concerned. However, it is generally agreed that grass tetany results from low levels of Mg in the animal's blood serum. Only ruminant animals seem to be affected, and the condition often occurs in springtime when the animals are grazing pastures that are low in Mg content. It is generally agreed that as levels of Mg in plant tissue rise above 0.20% (dry matter basis), the threat of grass tetany is largely reduced. Fertilization practices can have a direct effect on blood serum Mg levels as can be seen in Table 2.



TABLE 2. Effect Of Fertilizer Treatments On Blood Serum Mg Levels.

Treatment	Average serum Mg levels (cows) mg/100 ml
Low N, Low K	2.43
High N, Low K	2.15
Low N, High K	1.74
High N, High K	1.41

High levels of fertilizer N and, especially, fertilizer K can have a marked depressing effect on blood serum Mg levels. As serum levels of Mg drop below 2.0%, the danger of tetany rises. Although it can't be said that applications of Mg fertilizer will eliminate tetany problems, recent findings indicate applying Mg, especially together with phosphorus, effectively increases plant Mg levels, thereby reducing the potential for tetany.

Regardless of whether or not tetany is a concern, application of Mg fertilizers can have a marked effect on yield of forages. Recent studies in New Zealand showed that pasture yields were as much as doubled by the application of magnesium sulfate (Table 3).

TABLE 3. Magnesium Increases Yield and Mg Content of Mixed Pasture. New Zealand.

Treatment per/ha	Yield, kg/ha		Tissue Mg (% dry matter)
	Year 1	Year 2	
Control	2700	3300	0.11
24 kg Mg	5300	5600	0.21
48 kg Mg	5300	5400	0.29

Sulfur. Sulfur is essential for the formation of proteins in plants, and also for the synthesis of several vitamins. so it's obvious that this nutrient can have a marked effect not only on yield, but on crop quality as well. Some very interesting studies from the U.S.A. showed a direct effect of S fertilization on animal performance. Forage fertilized with various rates of S were fed to different groups of animals, and performance characteristics of these animals was measured over a period of time (Table 4).

TABLE 4. Sulfur Affects Feeding Value of Ryegrass Lambs.

S applied kg/ha	Avg. wt. gain grams/day	Efficiency kg feed/kg gain	% S in forage
0	46	34	0.09
11	33	34	0.11
22	92	15	0.17
45	99	13	0.17
90	144	11	0.21

Both the daily gain in weight and the efficiency of the forage were increased approximately threefold due to S fertilization. Studies from Ireland have shown that forage yield responses to S fertilization generally tend to increase as the season progresses (Table 5).

Table 5. Effect of S on Forage Yields. Ireland.

Cut	Month	Yield of dry matter kg/ha		Yield increase %
		Control	50 kg S/ha	
1	April	3640	3917	8
2	June	2296	2546	11
3	August	1589	2735	72
4	October	2050	4370	113
Cuts 1 - 4		9575	13568	42

In associated trials, it was observed that S fertilization increased the stock-carrying capacity of pastures approximately 20%. So results from around the world have shown that the three nutrients contained in Sul-Po-Mag can have a marked effect not only on the yield of forages and pastures, but also on crop quality and animal performance.

Using Sul-Po-Mag in a balanced fertility program.

Application rates for Sul-Po-Mag will depend on a soil analysis, but typical rates are in the range of 150-250 kg/ha. Sul-Po-Mag is used to supply the Mg (and/or S) requirements. Usually, additional K₂O is required and this is applied as muriate of potash (MOP, 60% K₂O). For instance, if soil tests call for 25 kg Mg and 200 kg K₂O, this could be supplied as follows:

230 kg Sul-Po-Mag	=	25 kg Mg + 50 kg K ₂ O + 50 kg S
250 kg MOP	=	150 kg K ₂ O
TOTAL	=	25 kg Mg + 200 kg K₂O + 50 kg S

When applied with optimum rates of nitrogen, phosphorus and any needed micronutrients, this mixture will help produce maximum economic yields of high-quality forages and pastures.