Forage News

MISSISSIPPI STATE UNIVERSITY EXTENSION
Center for Forage Management and Environmental Stewardship

Soil Testing and Nutrient Removal: How They Impact Fertilization?

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In today's agricultural environment, forage and livestock producers are considering reducing fertilizer rates due to higher input costs. Forage crops depend on 17 essential nutrients to ensure plant health, optimal yields, high nutritive value, and stand persistence and longevity. These nutrients are classified as primary and secondary macronutrients and micronutrients (Figure 1). Macronutrients are quired in larger quantities while micronutrients are required in smaller quantities and are generally obtained from the soil. Most of the macronutrients include nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), and sulfur (S). The micronutrients include chlorine (Cl), boron (B), iron (Fe), manganese (Mn), copper (Cu), zinc (Zn), nickel (Ni), and molybdenum (Mo). Understanding the important role of each nutrient and its availability to the plant will ensure better yield returns.

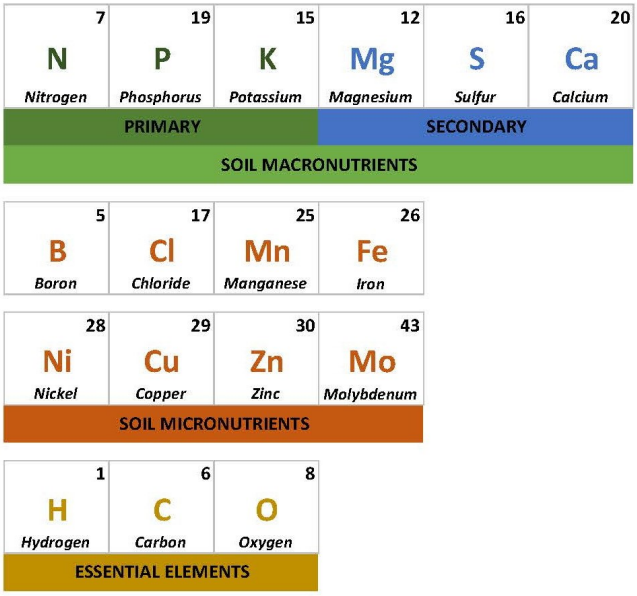

Figure 1. Forage crop nutrient requirements for persistence and production.

Producers need to have a better understanding of plant nutritional requirements, supply, and removal rates to make more informed decisions on the types and rate of fertilization practices that can reduce losses and reduce economic losses. To make such decisions, they need to know their soul nutrient levels and understand nutrient demand and removal.

Know Your Soil Nutrient Levels – There is a large percentage of producers that make blind applications of fertilizer without knowing what the crop nutrient requirements are and what is available in the soils. Most of them indicate that $10 for a soil sample is too expensive, but at the same time are making applications without knowing the requirement. A soil sample is a guide that allows determining the probability or likelihood of response to fertilizer for a specific forage crop. Estimation of soil nutrients in Mississippi in pasture and hayfields is that 60% of P and 90% of fields are below the critical levels causing yield losses. This indicates that producers are leaving forage yield on the table by not fertilizing adequately. Figure 2 provides an indication of the amount of fertilizer required and the probability of yield increase when the right source, time, and place of fertilization is implemented. When soil tests are very low to low, producers will need to apply fertilizer rates to maintain and build up nutrient reserves. In the medium to high rate, will concentrate on maintenance fertilizer rates. In

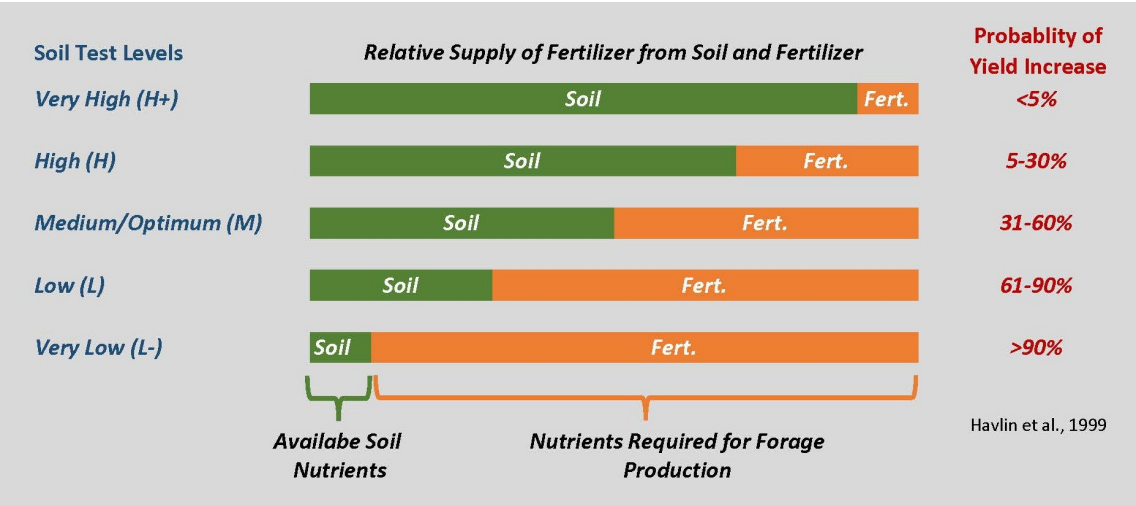

Figure 2. Soil Nutrient levels and probability of response to fertilizer applications.

Table 1. Nutrient removal per ton of hay produced across selected forage cropping systems.

	Nutrient (lb/ton DM Forage)				
Forage Crop	**Nitrogen (N)**	**Phosphate (P_2O_5)**	**Potash (K_2O)**	**Magnesium (Mg)**	**Sulfur (S)**
Alfalfa	56	15	60	5	5
Annual Ryegrass	68	15	60	5	5
Bahiagrass	43	12	35	--	6
Bermudagrass	46	12	50	3	5
Clover/Grass	50	15	60	--	--
Dallisgrass	45	12	50	--	6
Mixed Grass Hay	40	60	13	--	5
Sorghum Sudan	40	15	58	6	--
Tall Fescue	39	19	55	4	4

the high rate, fertilizer application can be eliminated or reduced to starter rates for a short-term depending on the specific nutrient and crop removal rates. It is not recommended to reduce or eliminate fertilization rates below the crop removal rate unless a specific nutrient is in a very high range. A soil sample does not cost money, it pays in the long term!

Understand Forage Nutrient Removal – A producers try to increase yield production; total nutrient requirements also increase and must be supplied for optimal yields. Every forage crop has different crop removal rates. This is a very important issue in hay production more than in a grazing situation since most nutrients harvested in a bale of hay are either exported out of the farm by selling or the hay by feeding hay in a different part of the farm. In a grazing situation, when using a good grazing management approach such as rotational grazing and the correct stocking rate, most nutrients (especially P and K) can be recycled back to the pasture by urine and manure deposition. When we focus on nutrient removal with forage harvest, it is important to take into consideration that forages crops will require additional nutrients to support root and biomass growth. In general, most forage crops remove between 15 and 20 pounds of P and between 45 and 60 pounds of K per ton of hay equivalent. Table 1 provides an estimated mean nutrient removal for some forage crops grown in the southern USA. Although nutrients removal could provide us with some estimated nutrient uptake by the forage crop, it does not account for the soil's ability to supply many essential nutrients. Nutrient removal does not indicate that all nutrients are used at 100 percent efficiency.

The most profitable fertilization approach needs to consider the cost of inputs and environmental concerns. Successful nutrient management begins with soil sampling. The economic benefits of a sound plan for a soil/ plant fertility program needs to consider the nutrients removed by the forage crops so that the same can be replenished to maintain soil fertility at a reasonably high level. However, using just nutrient removal is not a substitute for soil tests and knowing which nutrients need to be replenished and to what extent. A producer that does not soil test and looks at nutrient removal may under- or over-fertilizing and impact economic returns. Contact your local County Extension Office for recommendations on how to collect a proper soil sample for analysis.

Upcoming Events

June 2, 2022— **White Sand Experiment Station Field Day | White Sand (Poplarville), MS**
More information coming soon.

For upcoming forage related events visit: ***http://forages.pss.msstate.edu/events.html***

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