



Intensive management of forage fertilizer pays economic returns.

Forage analysis information is useful for managing mineral nutrition, just as much for field crops as for animals. The information in **Table 2** shows nutrient concentrations and removals measured in different categories of hay and silage submitted for analysis from farms in the Northeastern USA. Most cool season forages, when fertilized at levels adequate for optimum yields, will contain 2.6 to 3.4% N, 0.27 to 0.33% P (Bélanger and Ziadi, 2008), and 2.0 to 3.0 % K. These very general ranges will be modified depending on:

- species (legumes tend to have higher nutrient concentration);
- stage of growth at harvest (nutrient concentrations decline as the sward matures);
- harvest conditions (hay that is rained on loses mineral nutrients; fermentation of silage tends to increase nutrient concentration).
- age of the sward (older grass swards tend to have lower nutrient concentration)

For diagnostic purposes, consult guidelines for critical nutrient concentrations appropriate to the crop species, stage of growth, and harvest conditions.

Mineral nutrient concentrations in forages play major roles in the indexes for either grass tetany or milk fever. The ratio of K to Ca and Mg is critical for grass tetany, and the DCAD, calculated from K, Na, Cl, and S, is important for minimizing risk of milk fever when feeding dry cows. Choosing the right sources, rates, timing, and placement of fertilizers helps ensure a forage composition meeting the needs of the livestock.

Forages remove large amounts of nutrients, whether harvested as hay or haylage (**Table 2**). Nutrient removals give

approximate values of fertilizer replacement required per unit of forage harvested from the field. This information guides decision-making in selecting best management practices for fertilizing forages.

Changes in price ratios rarely call for large changes in application rates. When prices increase, first ensure the agronomy behind the management of plant nutrients is sound. Is every tool available being used to choose the right product, to predict the right rate, to apply it at the right time, and to place it where it's most effective? Price ratio theory can help fine-tune rates, but only after sound agronomic principles have been applied. Here is a decision checklist for the fundamentals of fertilizing forages.

Right Source

- Balance NPK, as well as secondary nutrients and micronutrients.
- Analyze for nutrients in manures and composts.
- Credit N from legumes.

Right Rate

- Assess soil nutrient supply using soil tests, forage analysis, and crop scouting.
- Consider long-term as well as short-term.
- Calculate nutrient removal and balance.

Right Time

- Build up soil fertility before establishing a stand.
- Apply P and K, if required, after first cut and before critical fall harvest period.
- Split-apply N for each cut from grasses.

Right Place

- Calibrate equipment for accurate spread.
- Map soil zones for site-specific management.
- Near-seed placement for forage establishment. **DC**

Dr. Bruulsema is Director, Northeast Region, IPNI North America Program. He is located in Guelph, Ontario, Canada; e-mail: tom.bruulsema@ipni.net. Dr. Bélanger is Research Scientist, Soils and Crops Research and Development Centre, Agriculture and Agri-Food Canada, Québec; e-mail: gilles.belanger@agr.gc.ca.

References

- Bélanger, G., J.E. Richards, and R.B. Walton. 1989. *Can. J. Plant Sci.* 69: 501-512.
- Bélanger, G. and N. Ziadi. 2008. *Agron. J.* 100: 1757-1762.
- DairyOne Laboratories. 2009. <http://www.dairyone.com/default.htm>.
- Pelletier, S., G. Bélanger, G.F. Tremblay, P. Virkajärvi, and G. Allard. 2008. *Can. J. Plant Sci.* 88: 1043-1055.

11th International Symposium on Soil and Plant Analysis July 2009

The Soil and Plant Analysis Council will present the “11th International Symposium on Soil and Plant Analysis” July 20-24, 2009, at Santa Rosa, California. The purpose of the symposium is to ensure a forum for research, practitioners, and experts working in agricultural laboratories, fertilizer consulting, or instrumentation industries to meet the challenges of the 21st century while meeting its needs for environmental sustainability (soil, water, air, biosphere). Main topics for the 2009 Symposium include water analysis, managing nutrients in a vineyard, petiole and soil testing in vineyards, turf analysis, precision agriculture, global warming, and management for biofuels. For more information, call the Soil and Plant Analysis Council at 970-686-5702, or visit the website at: www.spcouncil.com/symposium.htm **DC**