

Nutrient Management Opportunities for Crops and Forages— Fall 2003



Forage Harvest as Hay and Silage Results in Huge Nutrient Removal

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OVER HALF THE LAND AREA in the U.S. is used for grasslands, to provide feed for livestock and to convert fiber to milk and meat for human consumption. According to agricultural statistics data from the U.S. and Canada, hay is harvested from about 78 million acres of these grasslands each year. This hay production supplements livestock grazing demands and helps offset feed expenses during winter and during drought periods. It can also be an additional profit center as hay is sold to other livestock producers on the cash market.

Often, the impact of hay harvest on the soil fertility resources is not fully appreciated. Consider the harvest removal of the major plant nutrients by some of the principal forages in the U.S. and Canada (**Table 1**).

Table 1. Nutrient removal by harvest of major forages.

Forage	N	P ₂ O ₅	K ₂ O
	- - - lb/t, dry matter basis - - -		
Alfalfa ¹	56	15	60
Annual ryegrass	68	16	67
Bahiagrass	43	12	35
Bermudagrass	46	12	50
Bromegrass	36	13	59
Clover ¹ -grass	50	15	60
Fescue	38	18	52
Orchardgrass	50	17	62
Sorghum-sudan	40	15	58
Timothy	38	14	62
Vetch ¹	56	15	46
	- - - lb/t (67% moisture basis) - - -		
Corn silage	8.3	3.6	8.3

¹ Legumes obtain most of their N from the air

Modest forage grass hay harvests of 4 t/A remove in excess of 160 lb nitrogen (N)/A, 50 lb P₂O₅/A, and 180 lb K₂O/A by most forage grasses. Continued harvest removal without replacement mines the soil of available phosphorus (P) and potassium (K). Failure to replace harvested nutrients on forage and livestock farms will reduce forage yields and livestock production, decrease farm profits, potentially increase risk of erosion and runoff to waterbodies, and lower farm sustainability.

Raising soil test P and K to optimum levels helps ensure that forage production goals are met and that livestock receive proper nutrition. To increase soil fertility levels where they have been depleted in sandy loam and silt loam soils, it is estimated that from 12 to 28 lb P₂O₅/A and 8 to 16 lb K₂O/A ...in excess of harvest removal of nutrients...are needed to raise soil test P and K levels by about 1 part per million (ppm)...1 ppm equals 2 lb/A, assuming a 6 in. soil sampling depth.

Fall is a great time to evaluate fertilizer requirements for forage resources and desired production levels. Soil sampling is the place to start, but a sound forage nutrient management plan also considers the harvest removal of nutrients. Frequently, the harvest removal of nutrients on a given farm or field can exceed the average published nutrient removal values. Many soil testing laboratories do not account for the harvest removal of nutrients in making fertilizer recommendations, or they may assume only the average forage production potential. Nutrient analyses of the harvested hay, haylage, and silage should be considered along with the yield, to accurately account for the harvest removal of plant food on a per-field basis.

Hay and silage production have a huge impact on nutrient balance and fertilizer use in North America. **Figures 1 and 2** illustrate the large proportion of the total nutrient removal by hay plus silage, compared to other crops in the U.S. and

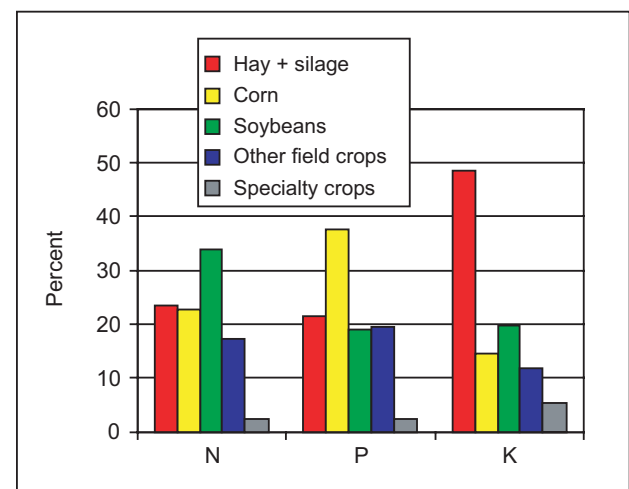


Figure 1. Percent of total nutrient harvest removal by different crops in the U.S.

Canada. Although corn and soybeans are often perceived as having the greatest nutrient use and harvest removal, these figures clearly show that nutrient removal by hay plus silage ranks first or second in the U.S. and Canada compared to all other crops.

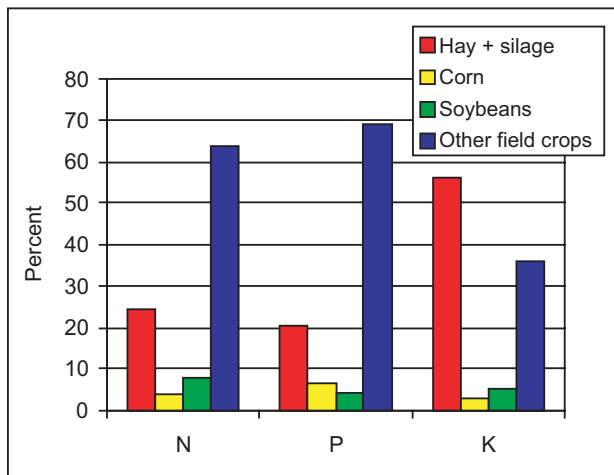


Figure 2. Percent of total nutrient harvest removal by different crops in Canada.

Hay and silage represent only a fraction of the total grassland acreage in North America, yet they account for a major portion of the total crop harvest removal of nutrients. Grazed pastures are also fertilized, but accurate acreage estimates are not available for these lands from published national agricultural statistics. If grazed pastures were included in estimates of nutrient uptake and harvest removal, the forage factor would be even greater.

North American forage and livestock producers, their professional advisers, and the fertilizer industry have the opportunity this fall to identify fields in need of improved nutrient management. Fields of cool season forages can be fertilized this fall with recommended N, P, and K, and many fields of warm-season forages can also benefit from fall applications of P and K. This will ensure that these forages survive the winter and begin spring growth in excellent condition.

Be sure to factor in forage nutrient removal in your fall plans this year. ■

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