

POTASSIUM LEVELS A CONCERN FOR ALFALFA AND CORN FORAGE PRODUCTION

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Forage growers recognize that balanced soil fertility is critical for achieving crop genetic potential and for maximizing profitability on the farm. Recent evidence suggests that inadequate soil levels of potassium could be limiting crop yields in several Midwestern states. Potassium removal from the soil through forage and grain harvesting has increased in corn and alfalfa as yields for both crops have increased over the past 30 years. Although yields have gone up, potassium fertilizer applications have remained flat or declined in some areas; which raises the question of whether deficient soils could be limiting further gains in yield.



The International Plant Nutrition Institute (IPNI) surveyed potassium soil test levels in North America in 2001 and again in 2015. They summarized median soil test levels and the frequency of samples testing below critical levels for key plant nutrients. Results of this survey showed that insufficient potassium levels were common and the frequency of samples testing below state critical levels was variable, but moderately high (Table 1). A similar 2016 soil survey by Pioneer® Agronomists showed the same trend, with the percent of samples below critical levels ranging from 20-73%. In a summary of potassium fertilization needs, the IPNI concludes that 40% of the acres in the U.S. require annual K fertilizer applications to avoid a profit loss in most major crops.

Table 1. Critical levels for potassium and percent of samples testing below critical levels for major crops in a 2015 IPNI survey.

State	Critical K Level, ppm	Percent of Samples Below Critical K Level, %	
		2001	2015
Illinois	145	47	37
Indiana	100	28	26
Iowa	170	59	39
Michigan	150	63	63
Minnesota	160	51	47
Nebraska	125	7	9
North Dakota	160	14	16
Ohio	125	33	35
South Dakota	160	17	20
Wisconsin	170	80	65

On many dairy farms, alfalfa is the largest user of potassium. Improved alfalfa management has resulted in higher yields and higher total soil nutrient removal, including potassium. Based on University research, growers who harvest 6 DM tons/ac, will remove as much as 360 lbs of K₂O. Corn silage potassium removal rates are about half of alfalfa for a 20 ton/ac yield. Since alfalfa and corn silage crops consume large amounts of potassium, growers need to implement management practices which promote healthy, high-yielding crops and use fertilizers in the most efficient way possible.

Here are six tips for managing potassium fertility in forage crops.

1. Know your soil test levels. Sample fields routinely to understand the levels of K and to identify fields with declining K levels. Account for manure-sourced nutrients when applied to the field.
2. Don't reduce K application rates in low-testing soils, even for rented fields. The payback for K fertilizer applications is high whenever you are trying to grow corn or alfalfa on low-testing soils.
3. For alfalfa, apply K after first and last summer harvest periods. Over the winter, soils release potassium for use by the plant during the spring growth cycle. Apply K after first harvest to supply potassium for the mid-summer growth periods. Then apply again after your last summer harvest to increase the availability of K in the fall to improve alfalfa's ability to survive winter.
4. For corn, annual or bi-annual broadcast applications of potassium will help meet total K demand, depending on soil K status. To help young corn plants quickly access potassium, place a portion of your K fertilizer near the seed as a starter fertilizer
5. Don't apply K fertilizer in high-testing soils, especially if plant health is good. This is a place to cut down on fertilizer since the risk of yield loss is low on these fields. With alfalfa, excessive K can lead to luxury consumption of potassium by the plant which increases animal health risks.
6. Avoid practices that inhibit root development and nutrient uptake. Excessive wheel traffic and tillage in wet conditions are two of the ways soils get compacted and will reduce root growth and development.