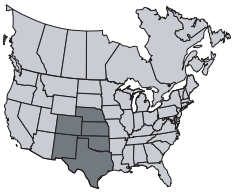
IPNI INSIGHTS
INTERNATIONAL PLANT NUTRITION INSTITUTE

Potassium…Still Important in Bermudagrass Forage Production



May 2009

Bermudagrass is an important summer perennial crop for livestock grazing and hay production in the southern USA. It has several characteristics that make it attractive to producers, including high yield potential, drought resistance, and a degree of soil acidity tolerance. Hybrid bermudagrass is generally more productive than common. Coastal has been the standard hybrid over much of the southern part of the country; however, other hybrids such as Tifton 85 have made inroads over the past few years. Bermudagrass is highly responsive to N fertilization and requires comparable amounts of available K (**Table 1**).

Approximately 50 lb of potash (K_2O) is required to produce each ton of bermudagrass. Uptake of K can equal 4 lb/A/day in a rapidly growing crop. In a pasture situation, much of this (as much as 85%) is returned to the soil in animal excrement. But, in a hay meadow essentially all nutrient uptake is exported from the field. Considering this, it stands to reason that soil K may be rapidly diminished under intensive bermudagrass hay production, especially in coarser textured soils. This was well demonstrated in an east Texas study where on two sandy soils the level of soil test K was decreased after 3 years of Coastal bermudagrass production to about one-third the initial levels (**Figure 1**). Even with application rates of 300 lb K_2O/A/year, soil test levels were reduced with haying.

Potassium input is currently under considerable scrutiny in production agriculture because of price levels and, as a result, reductions in K input may seem expedient over the short-term. But the potential consequences of such reductions should be weighed and considered carefully. For example, consider that K nutrition can affect bermudagrass stand density and longevity, N input use efficiency, and of course yield level.

Table 1. Approximate total nutrient uptake by hybrid bermudagrass. (after Bade and McFarland. TAEX. SCS-1998-30.)

Yield, ton/A	N	P_2O_5	K_2O	S	Mg
	- - - - - - - - - - - - - - - lb/A - - - - - - - - - - - - - - - -				
6	300	60	270	36	18
8	400	80	360	48	24
10	500	100	450	60	30

Abbreviations and notes for this article: N = nitrogen; K = potassium.

Dr. W.M. (Mike) Stewart
Southern and Central Great Plains Region Director
International Plant Nutrition Institute (IPNI)
2423 Rogers Key
San Antonio, TX 78258
Phone: (210) 764-1588
Fax: (210) 764-1593
E-mail: mstewart@ipni.net
Website: www.ipni.net

K and Stand Density

Potassium input can have a substantial impact on bermudagrass (stand) density, which in turn affects other important production factors such as weed encroachment and longevity of production. Stand deterioration is frequently attributed to winterkill, disease pressure, and lack of "physiological hardening"—all factors that to some degree can be associated with K nutrition.

A classic study showing the impact of K input on Coastal bermudagrass stand density was conducted some years ago at the Texas A&M University Overton station. **Figure 2** shows results from this study, where stand density and rhizome production were measured in the summer/fall after 3 years of K applications were discontinued. Stand

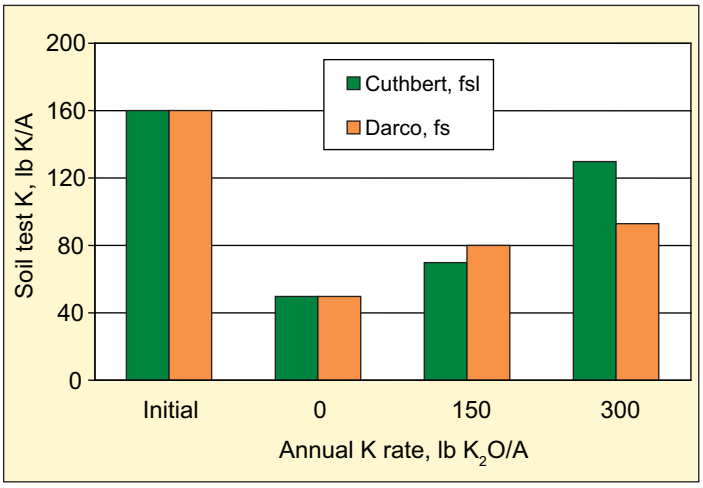


Figure 1. Effect of K fertilizer input on soil test K level after 3 years of bermudagrass production on two sandy soils in east Texas. Potassium was applied yearly as KCl. (Source: Nelson et al. 1983. Soil Sci. Soc. Am. J. 47: 963-965.)

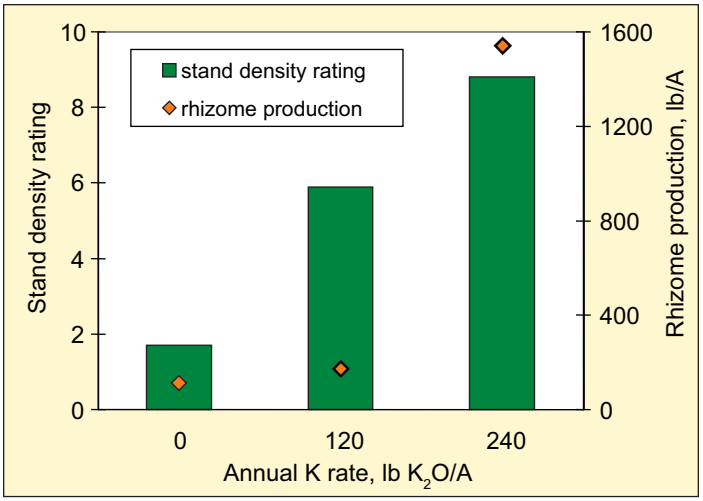


Figure 2. Effect of K fertilizer on stand density and rhizome production of Coastal bermudagrass (Cuthbert soil series). Potassium fertilizer was applied for 3 years. These measurements were made in late summer and fall the year after applications were discontinued. (Source: Keisling et al. 1979. Agron. J. 71: 892-894.)

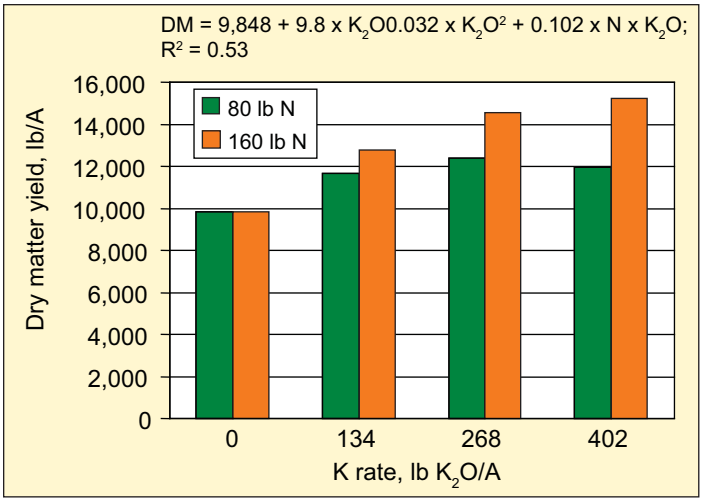


Figure 3. Effect of increased N rate on Tifton 85 bermudagrass response to K in 2004 (Overton, TX). The N rate was applied for each of 5 harvests and K rate was split into 3 in-season applications. (Source: Haby et al. 2008. Great Plains Soil Fertility Conf. Proceed. p. 134-139).

density rating in this work was improved by an order of three to five times by K input. Note also in **Figure 2** that rhizome production was dramatically improved by K fertilizer. The amount of rhizomes and the associated stored energy reserves are important factors in stand maintenance and the regeneration of top growth. It is worth noting here that overall root vigor generally paralleled rhizome production, and that this improved root vigor likely translates into better moisture and N use efficiency as well. The results of this study provide an excellent demonstration of the observation that what happens above-ground is a reflection of what's going on beneath the surface.

K and N Interaction

Potassium fertility has long been known to interact with N nutrition in crop production. To get the most out of N fertilizer inputs, it is necessary to have an adequate supply of available K. A recent study on Tifton 85 bermudagrass has helped demonstrated this (**Figure 3**). Notice in the figure that addition of some K improved yield response to N at the lowest N rate, thereby implying an improvement in recovery of applied N (actual efficiencies were not measured outright). This effect was not observed beyond the first increment of K at the lowest N rate. However, at the highest N rate there was a yield benefit to the higher levels of K. This interactive effect is such that K input can influence the effectiveness of applied N, and for that matter other inputs too. Indeed, for any production system to function at optimal efficiency, complete and balanced nutrition is essential.

One of the best ways to determine K need is with a representative soil sample. That said, keep in mind that soil test K can be variable, both across the field and over years. For this reason, it may require careful management and attention to detail, especially when regularly scheduled K applications are reduced or omitted. Doing a good job of monitoring K soil fertility is a good investment of time and resources to ensure crops, including bermudagrass, are capable of yielding their full potential. ■

IPNI Crop Nutrient Deficiency Photo Contest—2009

Once again, IPNI opens our crop nutrient deficiency photo contest as part of a continuing effort to encourage the art of field observation and increase understanding of the physical appearance of crop nutrient deficiencies and the varying conditions in which they may appear in the field.

Some specific supporting information is required for all entries, including: the entrant's name, affiliation, and contact information; the crop and growth stage, location, and date of the photo; and supporting and verification information related to plant tissue analysis, soil test, management factors, and additional details that may be related to the deficiency.

There are four categories in the competition: **Nitrogen (N), Phosphorus (P), Potassium (K), and Other**. Entrants are limited to one entry per category (one individual could have an entry in each of four categories). Cash prizes are offered in each of the four categories as follows: First place = US$150.00; Second place = US$75.00; and a Grand Prize of US$200.00 will be awarded to the entry with the best combination of photographic quality and supporting evidence across all categories.

Photos and supporting information can be submitted until December 15, 2009, and winners will be announced in January of 2010. Winners will be notified and results will be announced at the IPNI website.

Entries can only be submitted electronically as high resolution digital files to: >**www.ipni.net/photocontest**<.