



# The Forager

A Publication of the Wisconsin Forage Council, 353 Moore Hall, 1575 Linden Drive, Madison, WI 57306-1597

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**W**elcome to the Spring issue of the 1999 *Forager*. Another mild winter is just ending. Hay prices have remained low throughout the winter. One thing that may affect this is dry weather as we go through spring. Hopefully, this will not be the case. Our WFC Symposium was held in January in

Appleton. It was a good program, and while attendance was not what we had hoped, it was still a good event. Make plans now for the WFC Forage Expo September 8 in Manitowoc County. We are looking forward to a good show in eastern Wisconsin.

## UPCOMING EVENTS

September 8, 1999	WFC Forage Expo – Manitowoc, WI
January 25 & 26, 2000	WFC Symposium & Annual Meeting – Wisconsin Dells, WI
July 2000	American Forage & Grassland Council Annual Meeting – Madison, WI

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We would like to thank Knowles Produce & Trading Co. and O & S Harvesting for Sponsoring This Issue of *The Forager*

If you have not renewed your membership to the WFC for 1999, please do so you won't miss the next issue of *The Forager*. If you need a membership form, please contact your local council or the WFC at 608-846-1825.

## What's New in Autotoxicity

By: Dennis Cosgrove, Extension Agronomist

We have discussed autotoxicity in these pages a couple of times in the last few years, but I thought I would bring you up to date on some recent work that adds to our knowledge of this important topic. Our work has shown severe yield decreases in the seeding year when alfalfa is planted

Time After Alfalfa	Alfalfa Yield (Tons/Acre)		
	Seeding Year	Second Year	Third Year
2 weeks	1.9	4.7	3.9
1 year	2.1	5.2	4.1

*Nelson, J. Univ. of Missouri*

following alfalfa. One question I have been asked many times is if these effects carryover into subsequent years. Recent work at the University of Missouri suggests that the answer is yes. Table 1 shows results of a study showing yield differences for alfalfa planted within two weeks after alfalfa versus one year after. Although the yield differences are small, they do persist into the second and third year of the stand. It is likely that larger initial yield decreases (we found nearly 90% reduction when we planted within two weeks on very sandy soil) would result in larger effects in subsequent years as well.

Other work at Missouri has shown that, while seed germination is affected somewhat, the autotoxin or toxins in alfalfa have their main effect on root growth. Roots of affected plants are stunted and more highly branched than unaffected plants. In addition, young roots are swollen and have fewer root hairs. Considering this, it is easy to see why yield effects would persist beyond the seeding year. Plants get a poor start and never catch up to where they would be had they not been affected by the autotoxicity. Our work supports this in that stand densities were similar when alfalfa followed alfalfa, but yields were decreased.

At this time of year, autotoxicity comes following winterkill or poor stand establishment. Remember that stands less than two years old have not presented a autotoxicity problem. Consequently, stands seeded last year that experienced winterkill or were lost for some other reason, can be seeded back to alfalfa. If older stands were lost, the best option is to rotate out of alfalfa. Another option is to late summer seed following an oat crop or some other short season crop.

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### WFC TO OFFER ADVERTISING OPPORTUNITY TO MEMBERS

**Do you have a forage-related service, forage equipment or forage (hay, haylage or straw) you would like to advertise for sale?** If you do, the Wisconsin Forage Council is offering, as a service to our members only, the opportunity for you to advertise in *The Forager*. For a small fee of \$5.00, you can place your ad in up-coming issues of *The Forager*.

**Size:** Your ad must be 25 words or less, or fit into this box.

**Deadline:** Your ad must be postmarked by May, 7 for the June Issue or August 6, for the September Issue.

**Questions:** If you have any questions, please contact Shelly at 608-846-1825.

Please send what you would like to include in your ad, and a \$5.00 made out to Wisconsin Forage Council to the following address: Wisconsin Forage Council, 813 W Lexington Pkwy, DeForest, WI 53532

# Sorghums, Sudangrasses, and Sorghum-Sudangrass Hybrids For Forage

By: *Dan Undersander - Dept. of Agronomy &  
Woody Lane - Dept. Meat and Animal Science*

Sorghums are warm weather crops that originally came from Africa. They did very well throughout Wisconsin during the 1987 and 1988 seasons because of their drought tolerance and the above average temperatures for the growing seasons. Sorghums are either annuals or perennials, but all act as annuals in Wisconsin. Sorghums are diverse, but generally fall into the following categories:

**Grain Sorghum** - also called milo, used for grain production in arid regions. This type grows 3.5 to 5 feet tall depending on variety and conditions. It is usually not considered for forage production because of low dry matter yield.

**Forage Sorghums** - including sorgo, sweet sorghum, dual purpose (grain and forage) varieties and hybrids. They usually grow 8 to 13 feet tall. Major use is for silage. Stems and leaves are similar in size to corn. Yields in central Wisconsin have ranges from 4 tons/A in cool years to 11 tons/A dry matter in years with above average temperatures. Feeding value of sorghum silage is 80 to 90% that of comparable corn silage. Some long-season and/or non-flowering types will need to be killed by frost to dry down enough for ensiling.

**Sudangrass** - grows from 4 to 7 feet tall, has leaves about 1/2 inch wide and stems about 1/4 inch in diameter. It can be harvested as pasture, green chop, hay or silage. Yields have ranges from 3 to 5 tons/A dry matter. It can be ready for harvest about 45 days after planting. The smaller stems give it better drying characteristics than other sorghums for hay making. Hybrids are available that are slightly larger and higher yielding.

**Sorghum-sudangrass Hybrids** - are intermediate in plant size between sorghum and sudangrass. Yield is generally less than for forage sorghums, but similar, to slightly higher, than sudangrass. It can be used for hay, haylage, green-chop and pasture. Larger stems make drying for hay more difficult than for sudangrasses.

## Establishment

Sorghum can be established either by conventional or reduced tillage methods. Soil pH should be between 6 and 7.5, with 6.5 being considered optimum. Soil temperature at 2 to 4 inches should be 65 to 70° F. Recommended seeding

depth for all sorghums is 3/4 to 1-1/4 inches in heavy soils, and up to 2 inches in sands. Seed at the rate of 20 to 30 lbs/A.

## Prussic Acid (Cyanide) Poisoning

Young plants, including roots, and leaves of older plants contain a compound called dhurrin which can break down to release a substance called prussic acid or hydrogen cyanide (HCN). Sudangrass has low levels of this compound and rarely kills animals. Sorghum has the highest levels and sorghum-sudangrasses are intermediate. There is also considerable varietal difference in prussic acid content for all types of sorghums. This compound is highest in young plants. Therefore, the recommendation is not to graze or cut for green chop until the plant is 18 to 20 inches tall. It is important to watch for young regrowth in pastures. After a drought, new shoots may appear and the cattle will switch from the taller forage to the new tender shoots. Also, do not graze or green chop for 10 days after a killing frost. High levels of nitrogen fertilizer will increase the likelihood of prussic acid poisoning as well as nitrate poisoning. Very dark green plant growth often contains higher levels of prussic acid. Most prussic acid is lost during the curing process. Therefore, hay and silage are seldom toxic, even if the original forage was. Do not leave green chop in a wagon over night and then feed. The heat that occurs will cause a release of prussic and make the feed more likely to be toxic. Individual animals vary in susceptibility to prussic acid poisoning. Cattle are more susceptible than sheep. Animals receiving grain with the pasture are less likely to be affected.

## Harvest

**Silage** - Forage sorghums should be harvested at the mid dough stage for ensiling. At this point, quality is still good and most types have dried down enough for ensiling. Non-heading types usually require a killing frost for the plant to get dry enough to ensile. This can be a problem in that lodging and leaf loss (therefore quality) may occur during the drying period after frost.

**Hay** - Highest yields are obtained when sudangrass and sorghum-sudangrass hybrids are harvested at the soft-dough stage, if a heading type. Curing is difficult and quality is low when harvested so late. So, the general recommendation is to harvest either type for hay whenever forage is about 30 inches high. Sorghum-sudangrass hybrids are generally more difficult to make hay out of because of the larger stems.

**Green chop** - Sudangrass and sorghum-sudangrass hybrids can be used to provide green chopped forage over summer. Begin chopping after the plant is 18 inches tall or cut at least 10 days after a killing frost. Forage at either time will have elevated levels of prussic acid. First cutting should be taken by heading.

**Pasture** - Sudangrass or sudangrass hybrids can be grazed any time after the plant has reached a height of 18 inches, which is usually 5 to 6 weeks after planting. For best results, it should be grazed rotationally with a sufficiently heavy stocking rate to remove forage down to a 6 to 8 inch height in a few days. The pasture will grow rapidly when the cattle are removed for more total tonnage. Additionally, if the grazing period is short, cattle will be less likely to be grazing regrowth that is high in prussic acid.

### **Feeding Value**

Although these forages are generally similar to corn silage in feed value for beef cattle and sheep, there are some differences. Sudangrass grazed in its early vegetative stage contains as much available energy as corn silage and considerably more protein. However, mature sudangrasses and most sorghum and sudangrass silages are 15 to 20% lower in available energy than corn silage. This is because of the lower

grain-to-forage ratios of the sorghums, and also because the seed coat is harder than corn and far more grain passes undigested through the animal. Crude protein levels are similar to corn silage, but they are rather variable and depend in part on the amount of nitrogen fertilization. Calcium and phosphorus levels are somewhat higher than corn silage, and the calcium-phosphorus ratio is better. Sorghum and sudangrass contain relatively high levels of potassium. Sheep producers should be aware that these forages evidently accumulate copper more than corn and often show copper levels of more than 30 ppm. This is usually not a problem for cattle, but sheep grazing or being fed sorghum and sudangrass forage should have access to a mineral mixture containing molybdenum and no additional copper. There are no reports of prussic acid (Cyanide) poisoning from feeding hay or silage made from these forages. Only the fresh forage is dangerous. The drying and ensiling processes greatly reduce the level of the cyanide-containing compound. However, never enter a silo during the first 2 to 3 weeks after making sorghum or sudangrass silage, because traces of the escaping cyanide gas may still be in the atmosphere. Cyanide has the distinctive odor of bitter almonds. As of this writing, wet chemistry methods should be used to analyze for the feed value of sorghum and sudangrass forages. Infrared analysis (NIR) will not give accurate results because the essential calibration curves for these types of forages have not yet been developed.

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### **Forage Quality Sticks to Determine Timing of First Cutting Alfalfa**

The Wisconsin Forage Council has been conducting scissors clipping trials in the spring for many years to help producers determine when to take first cutting alfalfa for high quality. We are continuing this effort, but have been testing a new tool for timing of alfalfa harvest that seems to be working very well. Producers can measure height and maturity of the tallest alfalfa plant, and use this to estimate forage quality of the standing alfalfa. We have been testing this in Wisconsin for approximately 5 years, and it seems to work well. The developers, Ken Abrecht and Mark Sulc, and cooperators have tested this procedure in several other states with good results.

This year several seed companies will be offering forage quality sticks (also call PEAQ sticks) with the

scales on three sides, and a yardstick on the fourth. Those who do not have access to one of these can use a standard yardstick to measure plant height from the ground and determine forage quality using extension publication A3681, available at Wisconsin county extension offices. The information is also available on the web at:

<http://www.uwex.edu/ces/crops/peaqest1.htm>.

The forage quality sticks predict quality of the standing forage, not the harvested forage. Stored forage should be sampled for forage quality due to variable quality losses during harvest. The sticks will also vary some with unusual growth conditions, such as drought.

# DIAGNOSING AND MANAGING WINTER INJURY

By: Dennis Cosgrove, Extension Agronomist

Winter injury occurs someplace in Wisconsin every year. Being able to diagnose and manage winter damaged stands may help prolong stand life and increase production. Below is a brief discussion on diagnosing and managing winter damaged alfalfa.

## Diagnosing winter injury

### Slow Green Up

One of the most evident results of winter injury is that stands are slow to green up. If other fields in the area are starting to grow and yours are still brown, it is time to check those stands for injury.

### Asymmetrical Growth

Buds for spring growth are formed during the previous fall. If parts of an alfalfa root are killed and others are not, only the living portion of the crown will give rise to new shoots, resulting in a crown with shoots on only one side, or asymmetrical growth.

### Uneven Growth

During winter, some buds on a plant crown may be killed and others may not. The uninjured buds will start growth early while the injured buds must be replaced by new buds formed in spring. This will result in shoots of different height on the same plant, with the shoots from buds formed in spring several inches shorter than the shoots arising from fall buds.

### Root Problems

Probably the best way to diagnose winter injury is by digging up plants and examining roots. Healthy roots should be firm and white in color with little evidence of root rot. Winter injured roots have a gray, water soaked appearance and/or a brown discoloration due to roots rots. If the root is soft and water can be easily squeezed from the root, it is most likely winter killed. If the root is firm but showing signs of rot, it may still produce, depending on the extent of injury. If over 50% of the root is damaged, the plant will most likely die that year. If less than 50% is injured, the plant will likely survive for one or maybe two

years depending on management and subsequent winters. Table 2 may be helpful in determining the likelihood for survival into the next season. See UW Ext. Pub. 3620 for more details on evaluating root health.

TABLE 2. ROOT HEALTH EFFECTS ON WINTER SURVIVAL

Rating	Condition	Winter Survival
0	Healthy	Excellent
1	Some Discoloration	Excellent
2	Moderate Discoloration	Good
3	Significant Discoloration	Good/Mild Winter Poor/Hard Winter
4	>50% Discoloration	Good/Mild Winter Poor/Hard Winter
5	Dead	-----

## Managing Winter Injured Stands

Winter injured stands required different management than healthy stands if the are to stay in production for one or more seasons. If winter injury is evident, consider the follow:

### Determine yield potential

Potential yield of an alfalfa stand may be estimated by determining the number of stems in a square foot area. Once stem number is determined, use the following formula to calculate yield potential of that stand:

$$\text{Yield (tons/acre)} = (\text{Stems/Ft}^2 \times 0.1) + 0.38$$

For example, an alfalfa stand with 50 stems/ft<sup>2</sup> would have a yield potential of 5.38. Remember, this is potential yield. Soil factors, nutrient deficiency, insects, diseases and many other things may effect the actual yield.

Use the Table 3, in conjunction with Table 2 above to aid in making a decision as to whether or not to keep an existing, winter injured stand.

Density (Stems/Ft <sup>2</sup> )	Action
Over 55	Stem Density Not Limiting Yield
40 - 55	Stem Density Limiting Yield Potential
Under 40	Stem Density Severely Limiting Yield – Consider Replacing

### **Allow plants to mature longer before cutting.**

Allowing plants to mature to early, mid or even full bloom will help the plants restore needed carbohydrates for subsequent production. How long and during which cutting depends on the extent of winter injury. For severely injured stands, allow plants to go to nearly full bloom in first cut, and to early flower in subsequent cuttings. This will give these stands the best chance at survival. Stands with less injury could be harvested somewhat earlier depending on the extent of the injury. Stands with only mild injury could be allowed to go to 10 to 25% bloom at sometime during the season. It may be best to choose second or third cutting with these stands as first crop is usually or largest.

### **Increase cutting height**

This is particularly important when allowing plants to flower before cutting. At this time, new shoots may be developing at the base of the plants. It is important to not remove these shoots as it will further weaken the plant to have to produce new ones.

### **Fertilize**

It is particularly important that winter injured stands have adequate fertility. Soil test and apply needed fertilizer prior to first cutting if possible.

### **Control Weeds**

Herbicide applications to control weed competition will help the stand by eliminating weeds which compete for moisture, light and nutrients.

### **No Late Cutting**

Do not cut winter injured stands after September 1 to allow for the buildup of food reserves prior to winter.



Check us out on the Internet at:  
<http://www.uwex.edu/ces/forage/wfc.htm>

## **WISCONSIN FORAGE COUNCIL**

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