



## Species

# Annual Forages Seeding Rates

## Illinois

### General Information

The use of annual plants for alternative forages has dramatically increased in the past several years in Illinois. The types of plants used as alternative forage crops can be lengthy. This document is focused on the primary annual forage plants used for both summer and winter forage purposes for haying or grazing.

### Seeding Rates

The following seeding rates are suggested regardless of the tillage system you are using; reduced tillage, no-till or conventional tillage:

Spring drilled summer annual species:	Pounds PLS/acre:
Hybrid Pearl Millet	35#
Sudangrass	25#
Sudangrass & hybrids	20-25#
Sorghum	7-15#
Sorghum-sudangrass hybrids	25-30#
Foxtail/German Millet	25#
Forage Turnips (Brassics) & Swedes	1.5-2#
Forage Rape & Oats	4# & 1.5 bu.
Corn-Maize	25,000 seeds per acre
Spring oats	64-96#
Cowpeas	30-60#
Turnips/Rape Hybrid	4#
Annual or Italian Ryegrass	25#
Fall drilled winter annual species:	Pounds PLS/acre:
Cereal Rye (winter rye)	120#
Oats	64#
Forage Turnips& Swedes	2#
Triticale	80-100#
Barley	96#
Wheat	120#
Forage Turnips (Brassics) & oats	2# & 64#
Cereal rye & Oats	90# & 32#
Cereal rye & Oats & Turnips	90# & 32# & 2#
Annual or Italian Ryegrass	25#
Fall Arial broadcast seeded species:	Pounds PLS/acre
Cereal Rye	120#
Oats	80#
Forage Turnips/Swedes & Kale/Rape	2# & 4#
Triticale	100#
Wheat	120#
Forage Turnips & Oats	2# & 64#
Cereal Rye & Oats	90# & 32#
Cereal rye & Oats & Turnips	90# & 32# & 2#
Annual or Italian Ryegrass	30#

-more-

**References** Purdue University: Forage Selection and seeding guide for Indiana, (Bulletin AY-253), K.D. Johnson, C.L. Rhykerd, and J.O. Trott: Agronomy Dept.

Ohio State University: (bulletin 872-98) – Maximizing Fall and Winter Grazing of Beef Cattle and Stocker Cattle

Ohio State University: (AGF – 020-92) – Brassicas for Forage

Pennsylvania State University: (Agronomy Facts - 33) Use of Brassica Crops to Extend the Grazing Season

University Of Illinois: (Agronomy Facts F-51) – Winter Forage from Turnips, Swede, Rape, Chinese Cabbage Hybrids, and Kale

USDA/Natural Resources Conservation Service, Field Office Technical Guide, eFOTG: Pasture and Hayland Planting Standard 512.

**Prepared by** Roger Staff and Matt Bunger, NRCS Grazing Specialists

December 2006



Species

Chicory

Illinois

### General Information

Forage chicory (*Cichorium intybus* L.) is a relatively deep tap-rooted perennial broadleaf cool-season herb that belongs to the sunflower family. Chicory produces leafy growth and if properly managed, is highly palatable and similar in nutritional value and mineral content to alfalfa or cool-season grasses. 'Wild' chicory, or the weed type, is commonly seen growing along roadsides and produces very low forage yields.

Chicory originated in Central Europe and has been grown in other countries for more than 300 years. Much recent breeding for improved forage characteristics has been done in New Zealand including development of the variety 'Puna', which has been marketed in the United States. Additional forage varieties include 'Forage Feast' and 'Lacerta'.

### Adaptability

Chicory is suited to well or moderately well drained soils that have medium to optimum phosphorous and potassium levels and a soil pH of 5.5 or greater. Waterlogged, heavy clay soils tend to limit stand life.

### Characteristics

Chicory has good seedling vigor and due to its relatively deep taproot tolerates drought conditions well. The taproot can be damaged by overgrazing, trampling, or frost heave. Chicory is a low-growing rosette plant with broad leaves in the winter, resembling dandelion. As temperatures warm in the spring, it produces large number of leaves from the crown. In the late spring, the year after establishment, a few flower stems begin to develop (or bolt) from the crown and the shoots will reach heights of 6 feet if not grazed.

Iowa State University trials show that Lacerta and Forage Feast were less winter hardy than was Puna. Lacerta and Forage Feast were more likely to 'bolt' in the seeding year, while Puna remained vegetative in the seeding year and bolted in subsequent years. Root and crown diseases caused Puna plants to die by about the 3<sup>rd</sup> or 4<sup>th</sup> growing season.

-more-

**Establishment** A soil test is needed to determine fertility and pH levels. A firm, moist seedbed is needed for chicory, either seeded solo or in a mixture with grass or legume. Spring seedings have been the most successful, especially in areas of severe winters.

When seeding into a tilled seedbed, drilling is preferred over broadcasting. Good seed-to-soil contact is critical. No-till seeding of chicory into existing pastures has been successful, but proper management is needed to suppress the existing sod. If seeded solo, 3 - 5 pounds per acre planted  $\frac{1}{4}$  to  $\frac{1}{2}$  inch deep should produce optimum stands. In mixtures, seed 2 - 3 pounds of chicory with amounts of the usual seeding rate of the other forage(s). Chicory is a non-legume and 35 pounds of nitrogen per acre should be applied at seeding. This amount can be reduced if chicory is seeded with a legume.

**Management** Chicory is normally not grown in mono-culture (solo seeding), but is most often included in mixtures with grasses and legumes to add forage diversity, improve uniformity of growth during the grazing season, and have nitrogen 'fixed' by the legume.

If chicory is grown without a legume, 100 - 150 pounds of nitrogen per acre per year should be provided in split applications of 50 pounds per acre. The first application is green-up in early spring, then an optional application in early summer, and the third in early fall. Since nitrogen will stimulate stem growth, the forage yield increase must be weighed against the ability to keep chicory grazed so the stems do not bolt.

Spring seeded chicory can be grazed about 85 days after seeding, but leave a 2-inch stubble. A rest period of 25 - 30 days between grazings is suggested. Forage production and persistence is optimized with rotational grazing.

After the seeding year, chicory will grow vigorously and will try to produce flowering stems (bolting). The rest period of 25 - 30 days mentioned above may need to be shortened, or grazing pressure regulated, or have additional mowing to prevent bolting, especially in the spring. Once bolting has occurred, production potential is reduced for the remainder of the grazing season or until the stems are mowed. Preventing bolting will extend the vegetative stage and forage productivity.

Yields (when chicory was solo seeded) in Illinois and Pennsylvania in the seeding year ranged from 2 - 3 tons of dry matter per acre; established stands produced 4 - 6 tons of dry matter per acre. Stands may last five years or more with good grazing management, but soil type, winter weather, and variety will be influencing factors.

**Summary** Proper management is essential to obtain adequate yield, quality, and persistence from this unique forage crop. Additional research and experience will help identify varieties with reduced bolting and stand persistence.

**Where to Get Help** For more information about chicory contact the local office of the Natural Resources Conservation Service (NRCS) or University of Illinois Extension.

**Acknowledgments** Information in this fact sheet was adapted from a number of sources, including Penn State University, Kansas State University, Iowa State University and Forages: An Introduction to Grassland Agriculture, Volume 1, 6<sup>th</sup> Edition.

December 2003

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call 202-720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.



## Species

## Annual & Alternative Species

# Brassicas for Forage

# Illinois

---

### General Information

Brassicas are members of the mustard family (crucifer) and are commonly used for sheep and cattle feed in Europe, Asia, and New Zealand. Brassicas can increase mid-summer forage availability but have a particular advantage for late fall-winter grazing. Thus, reducing the need for stored harvested forages. Forage brassicas, such as turnips, rape, kale, and swedes (rutabaga) are high yielding, high quality fast growing crops. Dry matter yields of 7,000 lbs. (turnips), 8,000 lbs. (rape), and 12,000 lbs. (kale) have been recorded. The leaves and stems have tested 17 to 25% crude protein and 65 to 80% digestibility. The roots have 10 to 14% crude protein and 80 to 85% digestibility. Grazing may begin as early as 60-70 days with turnips, 60 days with kale, 150-180 days with swedes for maximum production. Number of grazings depends upon planting date, rainfall and growth rate.

### Applicability

These crops maintain quality, if not heading, well into freezing temperatures. Grazing from mid-September to January depends upon critical temperatures and snow cover. Top growth generally can survive temperatures between 15-20 degrees F, while the roots are about 5 degrees hardier. The cold tolerant crop is not drought or heat resistant. Moisture requirements are relatively high; however, on waterlogged soils they have reduced winter hardiness and increased levels of root diseases.

### Characteristics

Brassicas are very high in crude protein and energy, but extremely low in fiber. Their low fiber content results in rumen action similar to concentrate feeding; thus, proper roughage supplementation is necessary. They should never comprise more than two-thirds of the forage portion of the diet with the remainder provided by grass hay or stockpiled pasture. Adequate grass supplementation prevents animal health problems when grazing brassicas.

### Establishment

Brassicas require good soil drainage and grow best on soils with a pH between 5.3 and 6.8 with medium levels of phosphorus and potassium. Apply 50-75 lbs. of nitrogen at planting. Brassicas can be no-tilled into a sod killed with glyphosate or seeded into small grain stubble. Clean till seedings work well but may have increase insect pressure. Use 1.5 to 2 lbs./A of seed for turnip and swedes and 3.5 to 4 lbs./A for rape and kale. Planting higher rates can cause smaller tuber development. Large tubers reduce choking and permit extended grazing. Drill the seed in 6-8" row spacing for no-tillage and conventional tilled seedbeds. Seed can be broadcast and incorporated by cultipacking. Planting depth should not exceed .5" deep. If broadcasting is an option, consider mixing the seed in fertilizer to keep the seeding rates low enough.

No-till seeding in sod is recommended for erosion control but the sod must generally be controlled by herbicides. Broadcast spray gramoxone extra will control the grass long enough for establishment. Brassicas can also be seeded with cereal rye which will protect the soil after grazing and add roughage to the forage mix.

-more-



# Species

## Annual and Alternative

# Field Peas for Forage

## Illinois

### General Information

The Field pea is an annual cool-season grain legume crop. There are two main types of field peas. One type has normal leaves and vine lengths of 3' - 6'; the second type is semi-leafless and has modified leaflets reduced to tendrils, resulting in shorter vine lengths of 2' - 4'. Field peas are well adapted to cool, semiarid climates. Field pea seeds germinate at a soil temperature of 40°F. Field peas can withstand heavy frost once established. They do not grow well in hot weather. Optimal growing temperatures are between 60 and 70°F. Field peas prefer well limed soils with a pH near 7.0, but are reported to tolerate soil pH as low as 4.2 and as high as 8.3.

### Use

Field peas can be used as a cover crop, green manure, or forage and hay and silage. Hay is good quality, but peas are more succulent than vetches and more difficult to cure. Regrowth after mowing or grazing is poor. Field peas are often planted in mixtures with cereal grains for grazing or silage. Field peas grown with barley, oats, triticale, or wheat provide excellent livestock forage. The cereal crop protects the soil during winter when field pea growth is slow, and provides a support for vines to climb, keeping pea vegetation off the ground where it is more likely to rot. Field peas can produce between 1 - 3 tons of dry matter per acre.

### Management

Field peas can be grown on a wide range of soil types, from light sandy to heavy clay. Field peas have moisture requirements similar to those of cereal grains. However, field peas have lower tolerance to waterlogged soil conditions than cereal grains. Poorly drained soils should be avoided when growing field peas.

Field peas are most often grown on re-crop following small grains. Being a legume, field peas will fix the majority of required nitrogen if the seed is properly inoculated. Residual nitrogen will also be present for the succeeding crop.

Field peas can be grown in a no-till or conventional-till cropping system. Field pea seed requires considerably higher amounts of moisture for germination than cereal grains. Avoid excessive tillage in the spring to avoid drying out the seedbed. Field peas should be seeded in early spring, April to mid-May, so that flowering will occur during potentially cooler weather. The seeding rate depends on seed size. Field pea varieties will range from 1,600 to 5,000 seeds per pound. A plant population of 300,000 plants per acre or 7 - 8 plants per square foot is recommended. For optimal results, drill the seed into a smooth seedbed at a depth of 1 - 2 inches.

December 2003





Species

# Annual and Alternative Species Grazing Maize (Corn)

## Illinois

**What** Grazing standing corn as a winter-feed source for beef cows. Grazing standing corn is becoming a viable option where pasture acres are limited and the cattle need a higher energy feed to carry them through the demanding winter months.

**Why** Corn is a readily available food source for beef cows on most Midwestern farms. The research and field trials are taking place from Ohio to Nebraska, in the Corn Belt. If the producer watches the economics closely he can feed his cows from 50 cents to 60 cents per day. This is calculated from the estimated bushels of corn times the market value of the crop. This option also allows for a rest period for the grasses that can be stockpiled for winter grazing, such as, tall fescue. It is easier for most cattlemen to reduce the costs than raise the production levels.

**How** First a producer must look at the best corn hybrids for grazing, if that is the goal. Most seed corn companies have specific hybrids that are recommended for silage. These hybrids tend to have a higher leaf to stalk ratio. Also the plants will have smaller stalks, which are bred to be more digestible for silage and grazing.

There are different methods of managing your corn for grazing that can be used. One client mows a path through the field to put up the electric fences in; this allows the farmer to build the fence easier. The cows will pike up the shredded stalks and corn from under the fence, so nothing is lost anyway. Another client shells his corn and leaves every other corn head pass standing, this allows for the fence to be built in the existing shelled rows. This also allows the cows to have a wider access to more stalks in the field than corn. Most all that graze standing corn will limit the area of access to about one tenth of an acre at a time. This is done even with 90 to 100 cows. Some clients have allowed a limited access to the corn, at first, for only an hour or two at a time for the first day into each new section. This is done because the cows will usually go from ear to ear and feed first only on the grain.

**Where** For more information about grazing maize, contact your local office of the USDA Natural Resources Conservation Service, listed in the telephone book directory under U.S. Government, or the University of Illinois Extension.

November 2000





# Species Annual and Alternative Oats/ Spring and Fall for Grazing Illinois

## General Information

Oats can be used for grazing and can be planted in both the spring and fall. Oats can provide a very palatable, high quantity, of a moderate quality forage. Spring oats can be planted in the fall for late fall and winter grazing. Oats will continue growing long after they would need to be cut for hay. Unlike cereal rye, wheat and triticale that go dormant in the fall, spring oats continue growing until they are killed by several hours of temperatures that fall below 27° F.

Oat forage is nutritious enough for sheep, dry dairy cows, beef cattle, and horses. Typically, they will contain 25-30% crude protein level from green up until jointing. The plants need to be at least 8 -10 inches tall before grazing. Protein levels will drop 14-16% as the plants start to head out. Planting spring oats in August can produce a large amount of excellent winter feed. Turnips can be added to the seeding to provide more energy for acres that can be grazed.

## Fall Seeding

Grazing fall-seeded spring oats is a common practice in Illinois. Spring oats may be grazed in the autumn as soon as they have enough top growth, or they maybe stockpiled for late fall and early winter grazing. Fall seeding can begin the first half of August to ensure pasture is available in autumn. Later seeding can also produce ample feed for late fall grazing. Seeding rates for spring oats alone is 2 - 3 bushels per acre. If mixed with turnips and other cereal grains, use 1 bushel per acre. Fall seeding of oats can produce from one half ton to one and one-half tons of forage per acre.

Use a soil test to determine how much fertilizer to apply. Oats can utilize carry over fertilizer applied for a crop not planted or not totally used by previous crop. The nitrogen rates should range from 40 - 80 pounds per acre. Higher rates of nitrogen increase the amount of top growth available for autumn grazing. Phosphorus and potassium should be applied according to soil test levels before planting.

## Grazing Management

Fall grazing should be delayed until plants are well established (6 - 8 inches tall). Oat plants grazed before this time will likely suffer from severe defoliation and result in lower fall production. On the other hand, excessive delay will result in rank, succulent plants, which are easily damaged during grazing. For continued growth in the fall and spring, stocking rate should be light enough to avoid continuous complete removal of top growth (graze to about 2-3 inches).

Rotational grazing has been shown to increase production of oats similar to perennial grass pastures.

-more-

## Spring Seeding

Spring-seeded oats make excellent pasture in the spring and summer. Seeding rates and fertility are similar to those in the fall. Start grazing the plants when they are 8 - 10 inches tall graze down to 2 - 3 inches tall, and rest for three to four weeks between grazing. Application of nitrogen after grazing will help increase future production.

## Maximize Fall Yields

Seeding a fall mixture of spring oats, turnips, and cereal rye will help maximize total forage yields. The spring oats and turnips will produce excellent fall growth and then if the crop is rotational grazed, the cereal rye will be available for spring growth. Annual ryegrass maybe used in place of the cereal rye.

December 2003

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call 202-720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.



## Species Annual and Alternative Rape for Forage *Illinois*

### General Information

Rape is a multi-stemmed crop with fibrous roots. Stems vary in length, diameter, and palatability to livestock according to variety. The giant types are used for cattle and sheep pasture, while the dwarf type is best suited for finishing lambs. The giant types of rape have higher yields and are more palatable than the dwarf versions. Rape is ready to harvest about 90 - 120 days after planting, and should be rotationally or strip-grazed. The plant develops a reddish tinge when ready for harvest. Rape leaves and stems have lower protein level (14-17%) than turnips. Leave a ten-inch stubble to facilitate rapid regrowth. Rapes can attain over 8,000-lb/ acre of dry matter.

### Establishment

Rape requires good soil drainage and the soil pH should be in the range of 5.5 - 6.8. Rape can be no-tilled into a sod, provided it has been killed with glyphosate. This reduces insect problems. They can also be seeded into wheat stubble. Clean till seeding works well but may have increased insect pressure. If seeding after crop farming, herbicide carryover residues are an enormous problem for rape. Some commonly used herbicides can affect the establishment and growth of turnips for up to 24 months. As a rule, carry-over label recommendations for sugar beets are usually applicable to most members of the turnips varieties. Use 3 - 4 lbs/acre of seed for rape; the higher seeding rate is recommended for spring planting. Rape can be seed conventional, no-till or aerial. Drill the seed on 6-8 inch row spacing and place seed no more than 1/2 to 1/4 inch deep.

Fertilizer should be applied at the time of seeding to give the rape competitive edge on weeds. Apply 75 - 80 pounds per acre of nitrogen and fertilize with phosphorus and potassium similar to what would be applied for a small grain.

### Management

Rape crops are most often grazed. Rotational grazing or strip grazing help reduce trampling and waste by livestock. During the growing season, strip-grazing with a break wire in front of and behind the animals can be used to control consumption, allow regrowth, prevent wastage, and conserve available dry matter. Strip-grazing limits grazing damage to the root and lower leaf, allowing leaf surface for regeneration of plant growth. If regrowth is desired, at least ten inches of leaf should be left intact.

-more-

**Feed** Rape is highly digestible, and does not contain much “effective fiber”—the sort of fiber that makes an animal chew. Feeding extra fiber means more chewing and more salivation for the animal. It is important to feed dry roughage with rape in order to prevent disease problems and achieve maximal daily gains. When introducing animals to rape, allow stock access to pasture, or feed hay, straw or silage before letting stock onto rape crop. This helps prevent gorging by some animals and helps rumen microbes adjust to the feed. Two to three pounds of grain, grass hay, alfalfa hay, or straw should be fed per head per day. Although quality need not be high, the palatability of the dry roughage must be good enough that the animal will consume adequate amounts daily. One alternative is to allow free access to corn stalk field adjacent to the rape field. Another alternative is to plant small grain crops with the rape.

**References** Brassicas for Forage (AGF-020-92) Ohio State University Extension  
Forages-Species: Brassicas, PennState University  
Brassicas for Fall Grazing, David W. Koch, Extension Agronomist, Department of Plant Sciences



# Species Annual and Alternative Soybean for Forage Illinois

## General Information

This fact sheet will discuss both grain soybean and the forage soybean cultivars used as a forage crop. Grain soybean has been utilized as an “emergency” or alternative forage crop when traditional forages are in short supply.

Three forage soybean cultivars (Derry, Donegal, and Tyrone) were released by the USDA-ARS in 1997 and were developed for forage and not for grain production.

## Adaptability

If growing a grain soybean variety for forage, it should have an indeterminate growth habit (vegetative growth continues beyond flowering) and be of a Maturity Group (MG) adapted for the area. Wisconsin research has shown that with grain soybean the greatest forage yield (3 - 3.5 tons dry matter per acre) and highest quality (19% crude protein) is obtained at R6 (full seed or ‘green bean’ stage) to R7 (beginning maturity) when the pod proportion of total forage is high.

Of the USDA-ARS forage soybean, Derry (MG VI) is adapted to the northern Midwest, Donegal (MG V) adapted to the Northeast, and Tyrone (MG VII) is adapted to the Southern States.

## Characteristics

Forage soybean has the same appearance as grain soybean but demonstrates a big growth increase in August. Forage soybean has an upright-growing habit and may reach heights of 6 feet or more. Derry has good lodging resistance, Donegal is prone to lodging, and Tyrone has moderate resistance to lodging. Both grain and forage soybeans do not regrow following harvest.

## Establishment

With timely planting, soybean harvested as forage should be planted in row widths of 20 inches or less and plant population should be comparable to that recommended for grain production (160,000 to 170,000 seeds per acre).

Minnesota research found that soybean planted in 10 inch rows yielded 4.6 tons dry matter per acre while soybean in 30 inch rows yielded 4.2 tons dry matter per acre. However, row width did not affect forage quality. Wisconsin data indicated 0.5 ton dry matter per acre increase when row widths were reduced from 30 inches to 8 inches.

## Management

The optimal stage to harvest forage soybean has not been conclusively determined. As a guide, consider harvest at the R3 stage or when pods are forming at the upper nodes on the main stem.

-more-

## Management (Continued)

Iowa State University research found that by 135 days after planting, forage cultivars yielded 5 - 19% more dry matter than the top forage yielding grain cultivar. Forage cultivars were 37 - 69% taller than the tallest grain cultivar. Research at Ames, found that the Derry forage cultivar harvested 116 days after planting had 15% crude protein. In summary, the research showed that forage cultivars produced more dry matter yield than grain cultivars, but had lower leaf to stem ratio and lower leaf + pod to stem ratio in August and September, respectively, which may decrease the forage quality.

Research from Minnesota found the forage cultivars reached an average maturity of R3 (beginning pod stage) when the grain cultivars had reached R6 and R7. The forage cultivars produced little or no grain.

USDA research in Wisconsin found that two of the new forage cultivars appear to ensile better than a grain soybean cultivar. With all three cultivars, ensiling is improved if harvest is delayed until at least late August (50% pod fill in the grain cultivar). As a guide, forage soybean harvested for silage should be cut at the green pod stage and prior to the foliage turning yellow.

Be aware of the feeding/grazing restrictions on the labels of pesticides that have been used. Very few herbicides and insecticides are cleared for use in soybean that will be harvested as forage (i.e. hay, silage, and grazing).

Some work has shown promise for a mixed planting of forage soybean with grain sorghum or sorghum-sudangrass. Ohio data has suggested a 2 to 1 ratio (dry matter basis) of grass crop to grain soybean forage is optimum for improved fermentation and palatability.

## Summary

Forage soybean provides an optional crop for silage and grazing, but to reduce selective grazing it may be best to utilize the crop as silage. Many of the specific production and management guidelines for forage soybean are not yet established. Improvements in forage soybean will occur as additional research is conducted.

## Where to Get Help

For more information about soybean for forage, contact the local office of the Natural Resources Conservation Service (NRCS) or University of Illinois Extension.

## Acknowledgements

Information in this fact sheet was adapted from a number of sources, including the USDA, Agronomy Journal, Volume 93, Numbers 1 and 5; and Crop Sciences, Volume 38.



## Species

# Annual and Alternative Turnips for Forage

## Illinois

### General Information

Turnips are short-season root brassicas that provide roots, stem and leaf growth rotational grazing or strip grazing 70 - 90 days after seeding. Leaves can be grazed from mid-September until April depending upon critical low temperatures and snow cover. Top growth generally will survive temperatures between 15-20 °F, while bulbs will be about 5 °F colder.

### Growth Characteristics

The proportions of tops and roots varies markedly depending on variety, crop age and planting date. Turnip crops can vary from 90% top/10 % roots to 15% top/85% roots. Yields can be up to 12,000 lb/acre of dry matter. The tops can have 15 - 24% crude protein while roots contain 12 - 15% crude protein. This has some significance in that stockpiled tops appear to be more vulnerable to weather and pest damage than roots. Some of the new forage type turnips produce relatively more top dry matter than roots. They also feature several growing points for regrowth. Turnips can be seeded either in spring or fall for grazing. Turnips should not be planted in the spring until soil temperatures is at least 50° F. Maximum production occurs during a 70 - 75 day growing period.

### Establishment

Turnips require good soil drainage and a soil pH should be in the range of 5.5 - 6.8. Turnips can be no-tilled into a sod provided it has been killed with glyphosate. This reduces insect problems. They can also be seeded into wheat stubble. Clean till seeding works well but may have increased insect pressure. If seeding after crop farming, herbicide carryover residues are an enormous problem for turnips. Some commonly used herbicides can affect the establishment and growth of turnips for up to 24 months. As a rule, carry-over label recommendations for sugar beets are usually applicable to most members of the turnips varieties. Use 2 - 4 lbs of seed per acre for turnips. Turnips can be seed conventional, no-till or aerial. Turnip seed is small and it is essential that it be seeded into a fine, firm seedbed with adequate moisture for germination. Drill the seed on 6 - 8 inch row spacing and place seed no more than 1/2 to 1/4 inch deep. Some producers have had success in aerial seeding of turnips, small grain crops in to standing corn in mid-August. Again, check out your herbicide program for potential carryover and grazing restrictions before attempting this seeding method.

Fertilizer should be applied at the time of seeding to give the turnips a competitive edge on weeds. Apply 75 - 80 pounds per acre of nitrogen and fertilize with phosphorus and potassium similar to what would be applied for a small grain.

-more-

## Types of Turnips



**Leafy  
-7 Top**  
Lower Forage  
Yield  
Lower  
Bulb Yield



**Forage  
Turnip**  
High Forage  
Yield  
Low Bulb  
Yield



**Globe**  
Medium  
Forage  
Yield  
Medium Bulb  
Yield



**Tankard**  
High Bulb  
Yield  
Med Forage  
Yield

## Management

Although turnips can be harvested for green chop, or baled, they are most often grazed. Rotational grazing or strip grazing help reduce trampling and waste by livestock. During the growing season, strip-grazing with a break wire in front of and behind the animals can be used to control consumption, allow regrowth, prevent wastage, and conserving available dry matter. Strip-grazing limits grazing damage to the root and lower leaf, allowing leaf surface for regeneration of plant growth. If regrowth is desired, at least two inches of leaf should be left intact. Generally, animals will consume the leafy portion of the plant before progressing to the root portion.

## Feed

Turnips are highly digestible, and do not contain much “effective fiber”—the sort of fiber that makes the animal chew. Feeding extra fiber means more chewing and more salivation for the animal. It is important to feed dry roughage with turnips to prevent disease problems and achieve maximal daily gains. When introducing animals to turnips, allow stock access to pasture, or feed hay, straw or silage before letting stock onto turnip crop. This helps prevent gorging by some animals and helps rumen microbes adjust to the feed. Two to three pounds of grain, grass hay, alfalfa hay, or straw should be fed per head per day. Although quality need not be high, the palatability of the dry roughage must be good enough that the animal will consume adequate amounts daily. One alternative is to allow free access to corn stalk field adjacent to the turnip field. Another alternative is to plant small grain crops with the turnips.

## References

Brassicas for Forage (AGF-020-92) Ohio State University Extension  
Forages-Species: Brassicas, PennState University  
Brassicas for Fall Grazing, David W. Koch, Extension Agronomist, Department of Plant Sciences,

December 2003

## **Establishment** (Continued)

Turnips can be seeded any time from when soil temperature reaches 50 degrees F until 70 days prior to a killing frost. Seeding normally occurs mid-April through May for summer grazing or in mid-July to mid-August (eight weeks before the ideal wheat planting date) for fall/winter grazing.

Do not plant brassicas on the same site more than two consecutive years due to disease buildup. Insecticide for flea beetle control may be necessary in some years.  
Turnips at 60 days post planting

## **Management**

Strip grazing where forage is rationed every day or two provides the most efficient usage. Rape, kale and mustard have regrowth potential if not grazed below six inches. Turnips will regrow if the growing point at the top of the bulb is not removed. Two cycles may be possible with rotational grazing if rainfall is adequate.

Grazing can begin when the forage is about 12 inches tall (60-90) days after planting. The pasture should be grazed for a short period and the livestock removed to allow regrowth of brassica.

The forage quality is so high that it should be considered similar to concentrate feeds and precautions taken accordingly. Brassica crops can cause animal health disorders if not grazed properly. The main disorders are bloat, atypical pneumonia, nitrate poisoning, hemolytic anemia (mainly kale), hypothyroidism, and polioencephalomalacia. These disorders can be prevented by good grazing management practices:

- 1) Introduce grazing animals to brassica pastures slowly (over 3-4 days). Avoid abrupt dietary changes from dry summer pastures to lush brassica pastures. Don't turn hungry animals that are not adapted to brassicas into a brassica pasture.
- 2) Brassica crops should not constitute more than 65-75% of the animals diet. Supplement with dry hay or stockpiled grasses while grazing brassicas. No-tilling into grass sod or planting with rye can help to reduce potential grazing problems.

## **References**

**Ohio State University** (Bulletin 872-98) – *Maximizing Fall and Winter Grazing of Beef Cows and Stocker Cattle*

**Ohio State University** (AGF-020-92) – *Brassicas for Forage*

**Pennsylvania State University** (Agronomy Facts 33) – *Use of Brassica Crops to Extend the Grazing Season*

**University of Illinois** (Agronomy Facts F – 51) – *Winter Forage from Turnips, Swede, Rape, Chinese Cabbage Hybrids, and Kale*

**University of Nebraska** (NebGuide G89-933-A) *Supplemental Pastures for Sheep*

**University of Wisconsin** (FC 15.4.1) Dan Undersander Extension Forage Agronomist – *Use of Brassica Crops in Grazing Systems*

## **Where To Get Help**

For more information Brassicas for forage testing contact your local office of the USDA Natural Resources Conservation Service, listed in the telephone Directory under "U.S. Government," or the University of Illinois Extension.

November 2000

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audio tape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.



# Species

## Biennial Legume

# Red Clover

# Illinois

### General Information

Red Clover is valuable for hay, pasture and soil improvement, and fits well into established crop rotations.

Red Clover is often seeded with other legumes and grasses for hay and pasture, but can be used for hay and seed production.

The protein content of Red Clover hay is slightly lower than that of alfalfa. However, is relished by all classes of livestock. The nutritional value is excellent, with high levels of digestible protein.

### Characteristics

Red Clover is a biennial (or short-lived perennial) upright, leafy legume that grows to a height of 15 to 30 inches. The numerous, thick, hairy stems rise from the crown. The large, velvety, leaves are finely haired beneath, and marked above with a characteristic light-colored spot.

Red Clover can withstand more shading in the seedling stage than most other legumes, making it easy to establish in grass sods. The high magnesium content aids in the prevention of grass tetany, and does not withstand drought conditions well. Red Clover is very palatable, and can yield three-to five tons per acre of forage per year.

### Adaptability

Red Clover can be grown over a wide range of climatic adaptations and adapts best to fertile, well-drained soils with high moisture-holding capacity.

Red Clover does not do well in light, sandy or gravelly soils. Top yields require a pH of 6.0 to 6.5 with adequate levels of potash and phosphate.

### Establishment

Check with the Natural Resources Conservation Service or University Extension for proper seeding rates.

Seeds should be planted at a depth of one-fourth inch or less.

Use proper inoculant for red clover. Inoculated seed should not be exposed to sunlight, and should be planted within 12 hours of inoculation.

Use a well prepared, firm seedbed or a thin stand of grass sod. Drill or broadcast seed on grass sod in January or February to let freezing and thawing work the seed into the soil. Red Clover can be no-till drilled into small grains or grass sods.



-more-

## Management

When grazing red clover, turn livestock in when plants are six to eight inches tall. Remove the animals when three to four inches of the plants remain. Do not graze after September 15 to allow plants to store up reserves in the root systems. Graze again after the first killing frost.

Seed production is dependent largely on insect activity. Plants do not self pollinate. Bumble bees are particularly effective.

Normal fertility requirements are about 30 pounds of phosphate and 90 pounds of potash per year to maintain fertility levels when used for hay. Soil tests should be used as a guide.

## Where To Get Help

For more information about red clover, contact the local office of the Natural Resources Conservation Service listed in the telephone directory under "U.S. Government," or the University of Illinois Cooperative Extension Service.



November 2000

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audio tape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.



# Species

## Biennial Legume

# Sweet Clover

# Illinois

### General Information

Sweet Clover may be utilized as good quality hay, somewhat comparable in palatability and feeding value to alfalfa.

The second year's growth produces coarse stems, and is high in moisture content. However, the best use may be as a silage crop.

The best quality silage is made when the crop is cut before the plant begins to bloom. To provide excellent grazing during the spring and summer of second year.

### Characteristics

There are two species of biennial Sweet Clovers: yellow and white.



White Sweet Clover grows two to seven feet tall. Yellow Sweet Clover grows one-and-one-half to five feet tall.

The yellow type is finer stemmed, has smaller leaves, and blooms 10-20 days earlier than the white species.

There are 10 to 96 florets per bloom stem. One way to tell the difference between Sweet Clover and alfalfa is that the Sweet Clover leaf is serrated around the edge completely, whereas the alfalfa leaf is serrated only on one-third to one-half of the margin nearest the tip.

### Adaptability

Sweet Clover is very adaptable to most soil types, but it requires a pH of 6.0 or higher and has a higher calcium requirement.

Sweet Clover obtains phosphorus from relatively unavailable soil phosphates, and will grow in soils where alfalfa, red clover or ladino clover fail.

Sweet Clover will produce under dry conditions. The Madrid variety is especially tolerant to dry conditions.

### Establishment

Sweet Clover can be planted from February 15 to April 1.

Check with the Natural Resources Conservation Service or University Extension for proper seeding rates.

Plant seeds about one-half inch deep with a grain drill, cultipacker seeder with a small-seed attachment or by broadcasting. Inoculate the seed with Group 1 commercial inoculant.

-more-

## Management

Sweet Clover will provide its best quality hay if mowed just as first blooms appear, usually in May or June.

Livestock will learn to like Sweet Clover if they are allowed to start grazing when the plants are eight to ten inches tall.

Under a system of continuous grazing, maintain a minimum average top growth of about four inches.

With rotational grazing, the plant may be grazed to a minimum average height of about three inches. The grazing animals should be removed when this level of usage is reached.

Forage should be allowed to make a minimum average regrowth height of about six inches before the animals are returned to the field. When this minimum height is maintained for an extended period of time, the minimum regrowth height should be about nine inches before the animals are returned to the field.

These minimum grazing heights pertain only to the growing season, when there is ample moisture and fertility to generate adequate regrowth during the rest period. Maintain a minimum height of four inches when the plant normally becomes dormant, or when it quits growing.

Two or more fields or pastures are needed for a rotational grazing system. However, this system is generally more productive and manageable when three or more grazing units are used to complete a grazing schedule. A 24-day to 30-day rest normally is required, depending upon rainfall, temperature, fertility, etc.

With a two-pasture system, graze 12 to 15 days and rest the pasture 12 to 15 days. With a three-pasture system, allow the animals to graze eight to 10 days, and then rest the pasture 16 to 20 days.

Restrict or exclude grazing during the hot, dry months. Sweet Clover may be grazed lightly during this period when fertility and soil moisture are adequate to produce new growth.

When managing Sweet Clover for seed, combine it direct when the majority of seeds are mature, and before excessive shattering begins.

When about two-thirds of the seeds turn brown, (usually in July) mow the crop, and windrow it with a side delivery rake in the early morning when the crop is slightly damp and tough. After a few days of drying, thresh directly from the windrow with a rotary pickup attachment on the combine.

When Sweet Clover is used to improve soil, best results are obtained if turned under or cut into the surface with a disk at maximum growth. Follow with a summer or early fall crop.



## Where To Get Help

For more information about Sweet Clover, contact the local office of the Natural Resources Conservation Service listed in the telephone directory under "U.S. Government," or the University of Illinois Cooperative Extension Service.

November 2000

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audio tape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.



Species  
Cool-Season Grass  
**Kentucky Bluegrass**  
Illinois

**General Information**

Kentucky bluegrass is a cool-season grass that was introduced from Europe. Because of its sod-forming ability, bluegrass is well suited for erosion control and recreational uses. Bluegrass is very compatible when grown with other grasses and legumes.

**Adaptability**

Bluegrass is adapted to well-drained, loamy or heavier textured soils. It does best in soils with a pH of 5.3 or higher that are of limestone origin.

**Characteristics**

Bluegrass grows one to two feet tall, reproducing both by budding and by seeding. The leaf blades are one-eighth-inch wide and four to eight inches long, tapering to a boat-shaped point. The leaves are on the stem in an alternating pattern. The seed head is open with three to five branches at each joint.

The base of the seed has a white, cotton-like material attached. The root system is fibrous with short rhizomes.

**Establishment**

Kentucky bluegrass should be planted during the normal cool-season seeding dates. Check with the Natural Resources Conservation Service or University Extension for proper seeding rates.

The seedbed should be smooth, firm and free of weeds. The seed should be placed one-eighth to one-fourth inch deep.

When seed is broadcast, the soil needs to be at least 80% weed-free, rolled, seeded, and rolled again to ensure good seed to soil contact.

**Management**

Bluegrass is able to withstand the pressure of heavy grazing. If grazed excessively, though, plants may not recover.

When other species of grasses are grazed heavily, they die, enabling bluegrass to spread and eventually dominate the pasture.

Bluegrass provides excellent forage during the spring. During this lush growth period, it will have a protein content of 20 percent.

To improve forage yields, plant bluegrass with legumes such as ladino clover, Korean lespedeza, red clover, alfalfa and bird's-foot trefoil.

Bluegrass should not be grazed until it reaches a height of six inches, and it should not be grazed closer than three inches.



-more-

## Management

(Continued)

When bluegrass has been properly grazed, allow at least 21 days for it to recover before resuming grazing.

Lime and fertilizer should be applied according to a soil test. Bluegrass is recommended for grazing, but seldom is recommended for use as a hay crop.

## Where To Get Help

For more information about Kentucky bluegrass, contact your local office of the USDA Natural Resources Conservation Service, listed in the telephone directory under "U.S. Government," or the University of Illinois Extension.



November 2000

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audio tape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.



# Species

## Cool-Season Grass

# Orchard

# Illinois

### General Information

Orchard grass is a cool-season grass that grows in clumps, producing an open sod. Native of Europe, but has been grown in North America for more than 200 years. However, not widely accepted in the United States until 1940.

Orchard grass is leafy, productive and adapted to a wide range of environmental conditions. Seedlings are competitive enough to withstand competition from weeds and other plants. Once established, Orchard grass will survive many years if properly managed. Suited for pasture, hay, green chop and silage. Can be utilized alone or in a combination with legumes.

Orchard grass is commonly found growing in shady places, such as orchards, undoubtedly led to its most widely known common name. Also is known as cocksfoot, due to shape, especially in the British Isles.

### Adaptability

In the United States, orchard grass is found from Maine to the Gulf states and from the Atlantic coast to the eastern Great Plains. It is common throughout the Appalachian Mountains. It also is found in the high rainfall regions of the western mountains and in irrigated areas throughout the West.

### Characteristics

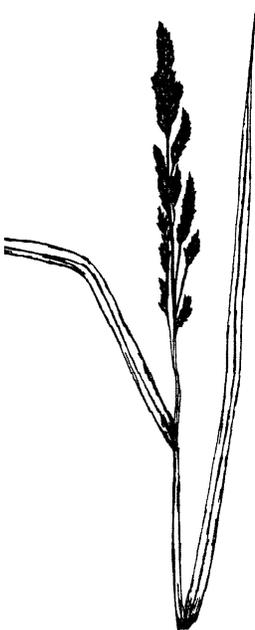
Orchard grass starts growth in early spring, develops rapidly, and flowers during late May or early June. Leaves are folded in the bud, and in a cross section appear V-shaped. The sheath is distinctly flattened and strongly keeled. Orchard grass reproduces by seed and tiller formation. Tillering occurs almost continuously. In field conditions, the production of new tillers gives orchard grass its perennial character.

Like other grasses, orchard grass produces a fibrous root system. The root system is extensive and deeper than those of Kentucky bluegrass and timothy, but not as well distributed as that of smooth brome grass.

If soil fertility is low, a large portion of the total production of orchard grass occurs in the spring, whereas at high fertility levels, production is well distributed throughout the growing season. Orchard grass is more heat tolerant than timothy or Kentucky bluegrass, but is less heat tolerant than smooth brome grass or tall fescue. Grows rapidly in cool temperatures and is especially productive in early spring, and reasonably productive in late fall, but less so than tall fescue.

The optimum daytime temperature for growth of orchard grass is about 70 degrees. However the combination of a daytime temperature of 71.5 degrees and a nighttime temperature of 53.5 degrees is most favorable for the production of top growth. Temperatures above 82 degrees greatly reduce growth and tillering. Orchard grass is shade tolerant, and is found growing in many areas where there is reduced light. Orchard grass can also withstand high light intensity.

Orchard grass is more drought tolerant than either timothy or Kentucky bluegrass, but smooth brome grass is more drought tolerant than orchard grass and is better adapted to areas that have a combination of low rainfall and high temperature. Drought tolerance of orchard grass probably is related to its extensive root system. Orchard grass persists



-more-

## Characteristics

(Continued)

and grows well on soils that have moderately poor drainage, but does not tolerate flooding or wet soils as well as reed canary grass.

Orchard grass will persist on shallow, rather infertile soil and be moderately productive, yet is responsive to fertilizer applications, especially nitrogen, and becomes very competitive when nutrients are available. Tall fescue and timothy will compete successfully with orchard grass only when nitrogen and potassium are lacking. In the area of adaptation, orchard grass becomes the dominant species when an abundance of nutrients is available.

At the vegetative growth stage, orchard grass approaches the feeding value of alfalfa. At full bloom, about half the value of alfalfa. Aftermath forage is leafy and generally does not decline in feeding value. Thus, time of harvest is much less important with aftermath than with the first crop.

## Establishment

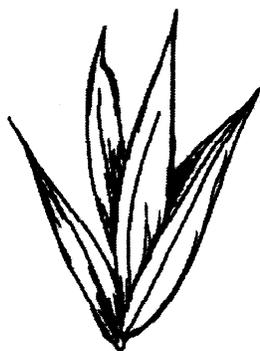
In the area of adaptation, orchard grass usually is established with ease. Orchard grass is recommended to be seeded in early spring or late summer. Contact your local NRCS or University Extension office for specific seeding recommendations.

Oats are frequently used as a companion crop with an orchard grass/legume seeding. The oats are harvested for hay, silage or grain during the summer, and the grass/legume mixture is harvested the next year.

When planting orchard grass, the seedbed should be loose on top and firm underneath. The seed should be planted no deeper than one-fourth of an inch. Press wheels or a cultipacker help ensure stand survival.

## Management

Orchard grass is well suited to early spring pastures due to growth characteristics and better suited to rotational grazing than to continuous grazing. When grazed continuously, animals tend to graze the same areas until the plants are weakened by frequent removal of leaves. Close cutting or grazing, especially when reserves are low, is detrimental to orchard grass. Cutting several times at ground level or continuous close grazing almost always results in a reduction of reserves and serious stand injury, especially at high rates of nitrogen. Orchard grass should not be grazed until eight inches tall, and then no closer than three inches.



Ladino or white clover is well suited for use in combination with orchard grass for pasture. Clover provides the nitrogen for the grass, and if properly managed, both species will remain productive for many years. When grazing is delayed, excessive competition from grass may cause elimination of the legume. Orchard grass should be grazed when eight to twelve inches tall to provide an acceptable balance between yield and persistence of white clover.

Orchard grass may be grown for hay either in pure stands or with legumes. When pure stands are used for hay production, it is imperative that nitrogen be used in combination with other nutrients for high yields. Split applications of nitrogen will help prevent lodging, and tend to give better distribution of forage during the growing season. Nitrogen at a rate of 50 to 75 pounds per acre in early spring and after each cutting is generally recommended; however, application of nutrients should be based on a soils test.

Legumes and orchard grass can be grown successfully in mixed stands if care is taken to favor the legume. Nitrogen or manure should not be applied because it stimulates growth of orchard grass, often at the expense of the legume. High rates of potassium should be applied to enhance legume vigor and survival.

## Where To Get Help

For more information about orchard grass, contact your local office of the USDA Natural Resources Conservation Service, listed in the telephone directory under "U.S. Government," or the University of Illinois Extension.

November 2000

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audio tape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.



Species  
Cool-Season Grass  
**Redtop**  
Illinois

**General Information**

Redtop is a cool-season grass introduced from Eurasia. Because of its ability to establish and spread quickly, redtop is well suited for erosion control. Redtop will provide soil protection when other plants are establishing.

**Adaptability**

Few other grasses are adapted to such a wide range of soil and weather conditions. Because redtop will tolerate standing water for short periods of time, it is one of the best grasses planted in association with wetlands and wet soils.

It also grows well on dry soils, clayey soils, acidic soils, alkaline soils and soils with low fertility.

Redtop provides good nesting habitat, escape cover and food for wildlife.

Before 1940, redtop was the second most important pasture grass, behind Kentucky bluegrass.

**Characteristics**

Redtop grows three feet tall on productive soils. The leaf blade is one-fourth inch wide, and four inches to 24 inches long, tapering to a point.



The top leaf surface is hairy, and the bottom is smooth. Stems are slender, with a sheath that is shorter than the internode.

The seed heads are loose pyramidal, and will turn red when mature.

The rooting system forms a loose, coarse turf. It has a creeping growth habit, which enables an isolated plant to spread to a diameter of three feet.

**Establishment**

Redtop should be planted during the normal, cool-season seeding dates in a firm, smooth and weed-free seedbed.

Check with the Natural Resources Conservation Service or University Extension for proper seeding rates.

When seed is broadcast, the soil needs to be at least 80% weed-free, rolled, seeded and rolled again to ensure adequate seed-to-soil contact.

**Management**

Redtop is capable of producing fair hay yields in unproductive soils. These yields can be increased by applying lime and fertilizer in accordance with a soil test. Overall, hay yields are low, with very little fall regrowth. Protein content runs 8 percent to 9 percent when cut at full bloom, and 12 percent to 14 percent when cut before bloom.

-more-

## Management

(Continued)

Redtop can be planted with timothy, Korean lespedeza, alsike clover and some native grasses.

When added to native, warm-season grass plantings, redtop provides more rapid establishment of cover on fields where erosion could be a problem.

Redtop should not be grazed until it reaches a height of eight inches. It should not be grazed closer than three inches.

## Where To Get Help

For more information about redtop, contact your local office of the USDA Natural Resources Conservation Service, listed in the telephone directory under "U.S. Government," or the University of Illinois Extension.



November 2000

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audio tape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.



Species

Cool-Season Grass

**Smooth Brome grass**

**Illinois**

### **General Information**

Smooth Brome grass is an introduced, rhizomatous, long-lived cool season perennial grass.

The grass is leafy and quite tall, growing to a height of three to four feet. Smooth Brome grass produces an abundance of basal and stem leaves. Blades are eight to 12 inches long and from one-fourth to one-half inch wide, flat with prominent veins and a W or M water mark.

The leaf sheath is four to six inches long, smooth, and closed forming a tube around the stem. The seed head is a confined panicle that emerges from the upper leaf sheath in late spring or early summer.

Smooth brome grass should not be confused with many, less desirable annual or at best short-lived perennial cousins.

### **Adaptability**

Smooth Brome grass was introduced to the United States in the 1880s, a native of Europe, China, and Siberia, and adapted to most temperate climates.

The region of best adaptation in North America is centered in the corn belt and adjacent areas northwest and northward into Canada.

Smooth brome grass survives periods of drought and extreme temperatures, but will become dormant during prolonged dry periods. Growth begins again only with the return of cool, short days when moisture is available.

The grass will grow on a variety of soil types, but prefers deep, fertile, well-drained silt or clay loam soils.

### **Establishment**

Seeds are chaffy and tend to bridge in the seed box of seeding equipment when agitation is not provided.

Seeds should be placed one-fourth to one-half inch deep, and the soil should be firmed around the seed with packer wheels or with the use of a cultipacker after seeding.

Check with the Natural Resources Conservation Service or University Extension for proper seeding rates.

Often alfalfa or other adapted legumes or grasses are planted with smooth brome grass to form mixtures. In these cases the seeding rate should be reduced accordingly.

Weeds need to be controlled to protect seedlings from competition for moisture and sunlight. Varieties best suited to Illinois include Barton, Beacon, Regs, Southland, and Lincoln.



-more-

## Management

Smooth brome grass will begin growth in late March or early April, with peak growth in May and early June.

- Grows into early summer better than most cool-season grasses. A second smaller growth peak will take place in September and October if soil moisture is adequate.
- Species compares favorably to orchard grass, reed canary grass and tall fescue in total productivity, and may provide the highest spring yields. In addition, Smooth Brome grass is probably the most winter hardy of the cool-season grass species listed above.
- Nutrient value and palatability for grazing livestock makes it one of the best cool-season grasses for pasture use.
- Uses a mixture of smooth brome grass and alfalfa has proved to be a popular pasture mixture, and provides added wildlife benefits to the planting.
- Legume adds feed value while the grass in the mixture reduces the danger of bloat.
- Too early, continuous spring grazing can damage productivity of the stand. Grazing management that provides short periods of grazing followed by adequate rest periods will ensure vigorous productive pastures, whether planted as a single species or as a mixture in pastures.
- Requires a higher level of nutrient management than some species of cool-season grasses if the stand is to remain productive. Stands can become sod-bound unless they are kept well fertilized or mechanically renovated.

## Where To Get Help

For more information about smooth brome grass, contact your local office of the USDA Natural Resources Conservation Service, listed in the telephone directory under "U.S. Government," or the University of Illinois Extension.



November 2000

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audio tape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.



# Species

## Cool-Season Grass

# Tall Fescue

# Illinois

### General Use

Tall fescue is widely used as forage, but it also is ideal for waterways, ditch and pond banks, farm lots and lanes.

Animals readily graze fescue during April, May, early June and again in the fall, but show reluctance during most of June, July and August. Fescue is one of the best cool-season grasses available for accumulating growth for fall and winter providing much of the fall and winter feed for a beef herd.

Tall fescue should be part of a forage system, where adapted. Fescue should be rested during the late summer so the growth can accumulate for fall and winter. If fescue is grazed in the summer, every effort should be made to maintain at least 30% of a legume species.

Tall fescue may be used in forage programs for most beef herds, but is not recommended for use as a forage for dairy cows. *See management for additional precautions.*

### Adaptability

Tall fescue is well adapted to the soil and weather conditions of Illinois. Fescue is especially adapted to the growing conditions of southern Illinois, producing more on acid, wet soils of sandstone and shale origin than other cool-season grasses.

Fescue is one of the more drought-resistant field plants grown in Illinois, and will maintain itself under rather limited fertility conditions.

Varieties suggested for Illinois are Illinois 96, Kentucky 31, Alta, Kenmont and Fawn. Fawn matures about a week earlier than Kentucky 31, and has excellent seeding vigor, but is somewhat more susceptible to leaf diseases. Kenmont matures a few days later than Kentucky 31, and produces slightly more during the summer. Of those, Illinois 96 may be the best option since being free of endophyte, a fescue fungus that greatly effects grazing animals.

### Establishment



Because of differences in growth habits, palatability and the time of year when they should be used, unless a good pasture rotation is planned, other grasses should not be included with tall fescue at seeding time. However, one or two legumes should be used in the seeding mixture with fescue, but can only be maintained with good grazing management. The legumes will furnish high quality forage serve as a source of nitrogen for the fescue, and dilute endophyte effects.

Fescue and accompanying legumes - except for lespedeza, which should be seeded in the winter or early spring - may be seeded in the spring, fall or winter. Spring seedings should be made early to avoid annual weeds and early summer droughts. Fall seedings usually have far less weed competition and more favorable moisture conditions than late spring seedings. See your local Natural Resources Conservation Service or Extension office for best seeding dates and current recommended seeding rates.

Test soil before making a new seeding. Several alternative fertility plans will be included with the soil test report. Select the one that best fits the individual situation.

Fescue has limited response to rock phosphate. Unless legumes are to be maintained with the fescue, only processed phosphate should be used to meet the phosphorus requirements.

-more-

## Establishment

(Continued)

A liberal supply of processed phosphorus helps to promote root development and plant establishment. While small amounts of nitrogen and potash are also of benefit at seeding time, too high a concentration of these elements will interfere with germination and discourage inoculation of the legumes

The starter fertilizer is more effective when banded into the soil rather than broadcast.

## Management

Fescue may be infected with an endophyte fungus. Due to the fungus, animal performance is not as high on fescue as on most other cool-season grasses during the summer. Under these conditions, maintaining a legume with the fescue dilutes the level of ingested fungus. Incorporating a legume also increases forage production during the summer. Fungus-free varieties, such as Illinois 96, Mozark and Martin also lessen the problem.

Legumes are difficult to maintain in a fescue sod, but there are a number of management practices that help to prevent legume disappearance from the Mixture.

Good management of both tall fescue and cattle grazing is important to minimize fescue foot, summer slump and other diseases found in cattle that graze fungus-infected tall fescue. Pastures comprised of tall fescue and legumes have less trouble than pure stands of tall fescue.

Fescue has more resistance to low temperatures than orchard grass, brome grass, timothy or reed canary grass. Leaves remain green later into the winter than other pasture grasses.

Despite the retention of leaves, fescue grows very little after October 15 in Illinois. If fescue produces up to its potential, 60 to 70 percent of its total production will occur by July 1. Most of the later growth occurs in August and September. Therefore, nitrogen fertilizer to stimulate fall growth on straight fescue sods should be applied in the late summer. Dry matter produced after August 1 in several Illinois trials indicate that 30-60 pounds of nitrogen would be enough to encourage optimum production during the late summer.

The greatest benefits for stockpiling fescue occur, from nitrogen; however, don't forget phosphorus and potassium. Soil testing is the best way to determine phosphorus and potassium needs. When fertilizing fescue intended for fall and winter use, remember to keep the ration of nitrogen high and to apply it by August 15 so that the fescue has an opportunity to use the nitrogen.

To get the best results from stockpiled fescue, the early spring or elongated growth should be removed by haying or clipping by June 1. Many producers harvest a seed crop from the fescue and then stockpile the re-growth for winter use. If a good seed crop is desired the following year, clipping the fescue soon after seed harvest is essential. Removing excess growth after seed harvest will improve quality of fall stockpiles.

If pure fescue stands are used for hay, high yields can be expected if fertilizer - especially nitrogen - is applied during the winter or very early spring. Fescue to be used for hay should receive at least 60 pounds of nitrogen during winter. Phosphorus and potassium may be applied anytime during the year.

Fescue will withstand closer grazing and more abuse than most cool-season grasses. But can be overgrazed to the point that vigor as well as production is reduced. Don't graze closer than three or four inches, and allow at least 30 days for the fescue to recover.



## Where To Get Help

For more information about tall fescue, contact your local office of the USDA Natural Resources Conservation Service, listed in the telephone directory under "U.S. Government," or the University of Illinois Extension.

November 2000

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audio tape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.



Species  
Cool-Season Grass  
**Timothy**  
Illinois

---

**General Information**

Timothy is a cool-season bunchgrass that is best suited for hay production due to being a bunchgrass, and leaves open areas at ground level. Timothy is well suited for wildlife plantings. However, Timothy is not recommended for erosion control because of the shallow root system. Timothy is not drought tolerant, but cold tolerant, and lives longer in cool, humid regions.

**Adaptability**

Timothy is adapted to fertile, heavy-textured soils with good water-holding capacity.

Timothy is poorly suited to droughty or wet soils, but can withstand flooding for a few days during the growing season or for a few weeks during dormant period.

**Characteristics**

Timothy grows two to three feet tall, and forms large clumps. The leaf blades are flat, one-fourth-inch wide, and four to 12 inches long, tapering to a point.



The top leaf is shorter than the others, and extends sharply upward. The seed heads are two to five inches long, and one-fourth-inch in diameter. The sheath is split and hairless with overlapping margins. The rooting system is fibrous and shallow. The plant reproduces by seed.

Timothy differs from most other grasses in that one or two of the lower internodes swell to form a bulb-shaped growth. This is a carbohydrate storage organ which decreases in size at the time of seed maturity.

**Establishment**

Check with the Natural Resources Conservation Service or University Extension for proper seeding rates.

The seedbed should be free of weeds, smooth and firm. Timothy should be planted no deeper than one-fourth-inch during the normal cool-season seeding dates.

If the seed is planted using the broadcast method, the soil needs to be 80% weed-free, rolled, seeded, and rolled again to ensure adequate seed-to-soil contact. A good stand of timothy is quick to establish, and seldom lodges.

**Management**

Timothy can be grazed, but management is necessary to avoid close grazing by livestock. Timothy is a medium-to-late maturing grass with peak periods of production in late spring and fall.

Timothy is best managed for livestock grazing when planted in pure stands with redtop or in a mixture with any legume except alfalfa.

-more-

## Management

(Continued)

Grazing should not begin until the grass has grown six to eight inches tall, and should not be grazed closer than three inches.

When cut for hay, timothy cures clean and relatively free of dust and is high in nitrogen and phosphate. These should be applied in accordance with soil tests.

If timothy is cut at the early head stage and the nitrogen rate is high, stands will be reduced.

Research shows Timothy is best cut before the early bloom stage has ended. At early bloom growth stage, plant quality, quantity and palatability is very high.

Management contributes to higher, long-term yields, and more growth is left for the pasture in the late summer and fall.

The first cutting of timothy and clover mixtures will be mostly clover. However, by the second or third year, most of the clover will have died.

The lack of competition between grass and clover, combined with the nitrogen clover roots, results in higher grass yields.

Early-cut timothy has a laxative effect on horses. Because of the higher levels of protein, calcium and vitamins, a timothy and legume mixture is recommended for colts and brood mares.

Timothy is very palatable, and is favored by horse owners and dairy and beef cattle producers.

## Where To Get Help

For more information about timothy, contact your local office of the USDA Natural Resources Conservation Service, listed in the telephone directory under "U.S. Government," or the University of Illinois Extension.



November 2000

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audio tape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.



Species  
Cool-Season Perennial Legume  
**Crownvetch**  
Illinois

**General Information**

Crownvetch is a cool-season, perennial legume that may be utilized for livestock grazing, hay production, wildlife habitat, seed production or erosion control. Following are some pros and cons associated with crownvetch.

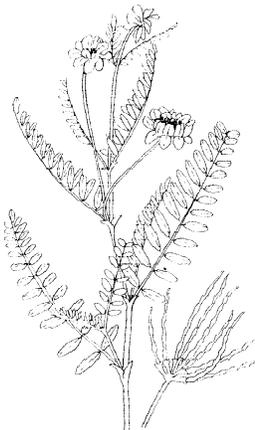
**Livestock Grazing:** Palatability is high in early growing stages, but becomes poor at full maturity because of bitterness from high glycoside content. Protein value can reach 18 percent with optimum fertility and if grazing is properly managed.

**Hay Production:** Yields range from three to four tons per acre. Curing hay may be a problem because of thick, heavy stems.

**Wildlife Habitat:** Crownvetch provides excellent escape cover and nesting for rabbits and quail, and an excellent food source for deer, turkey and rabbits during its young and tender growth stages.

**Seed Production:** Seed is difficult to harvest because seeds mature at different times. Harvesting methods involve a combine or seed stripper.

**Erosion Control:** Crownvetch makes an excellent cover for road banks, farm pond levees, mine spoils and other disturbed areas.



**Adaptability**

Crownvetch has a wide range of climatic adaptations, but performance has been much superior on well-drained soils. Crownvetch is tolerant of both low pH and low fertility, but is highly responsive to lime, phosphorus and potassium. Growth usually peaks around the end of May to early June. Varieties available include Emerald, Penngift and Chemung. Seedlings of Emerald and Chemung are more vigorous than Penngift. Chemung and Emerald usually have taller growth and broader leaves than Penngift. Chemung appears to be better adapted to low fertility sites.

**Characteristics**

Crownvetch produces creeping stems two to six feet long, and grows to a height of three to four feet, and looks similar to a young alfalfa plant in seedling stages.

Adult plants produce long, narrow, finger-like seed pods, and the plant may extend to a length of 10 feet or more.

Crownvetch is compatible with Orchard grass and Fescue. It will not tolerate wet soils or shade, but is very drought tolerant. Crownvetch is a nonbloating legume, and a good source of nitrogen for associated grasses.

-more-

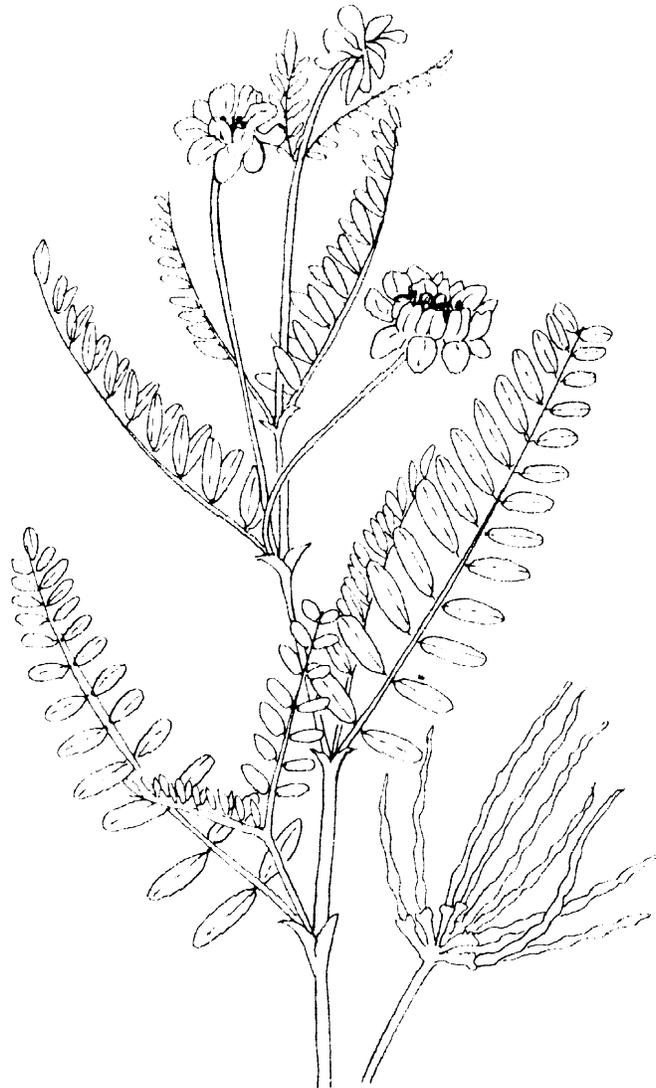
**Establishment** Check with the Natural Resources Conservation Service or University Extension for proper seeding rates.

Lime and fertilizer should be applied according to a soil test. The seed should be inoculated. Use a no-till drill on undisturbed soil. On bare soil, disk, roll and then broadcast or drill the seed. If broadcast roll following seeding to ensure good seed-to-soil contact.

Chemical weed control will encourage a good stand.

**Management** The growing point of crownvetch is at the top of the plant. Graze when eight inches tall, but should not be grazed lower than four inches.

**Where To Get Help** For more information about crownvetch, contact the local office of the Natural Resources Conservation Service listed in the telephone directory under "U.S. Government," or the University of Illinois Cooperative Extension Service.



November 2000

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audio tape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.



Species  
Cool-Season Perennial Legume  
**Ladino Clover**  
Illinois

---

**General Information**

White Clovers can be classified in three general groups: small, intermediate and large. Ladino belongs to the large group.

Ladino Clover is sown primarily with grass for pasture, but also used as hay or silage.

On an experimental basis, good stands of clover were established in a heavy fescue sod by over seeding one pound of ladino clover seed per acre for two consecutive years. No-till was used, but seed was sown during January and February so that freezing and thawing worked the seed into the soil.

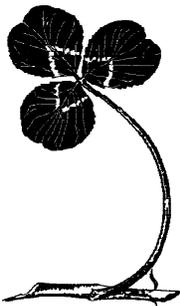
**Adaptability**

Ladino Clover will grow in soils considered too acid for red clover and alfalfa, but is more productive if the pH is 5.5 or higher.

Ladino Clover needs adequate phosphorus and potassium for establishment and growth, and is especially responsive to cool, moist conditions.

Ladino Clover grows best between 50 and 80 degrees Fahrenheit, and responds to irrigation about as much as any other legume. The shallow root system does not adapted to shallow, droughty soils.

**Characteristics**



Ladino Clover is a creeping plant with long basal runners that usually root at the nodes.

All of the leaflets rise from the horizontal stems on long stalks. The leaves and stalks are smooth and without hairs.

The flowers arise on single stalks from the basal runners, and are typically white or pink.

The primary roots and stems of white clover usually die before the second year. The plant is perpetuated by the root systems developed at the nodes along the horizontal stems.

**Establishment**

Check with the Natural Resources Conservation Service or University Extension for proper seeding rates.

The seeds should be spread on a clean, firm seedbed, covered lightly, and can be planted with a cultipacker seeder, a grassland drill, or by broadcasting.

The seed should be inoculated with a commercial culture that is specific for white clover. Double the amount recommended on the container.

-more-

## Management

Ladino clover is primarily not a hay crop. When used as hay, the field should be cut when the companion grasses will make the highest quality hay.



Restrict or temporarily exclude grazing during the spring to allow seed production. Graze companion grasses close during the fall to permit young clover seedlings to become established. Manage the pasture to maintain the stand and vigor of the companion grass so that it will afford at least half of the available forage to minimize the danger of bloat.

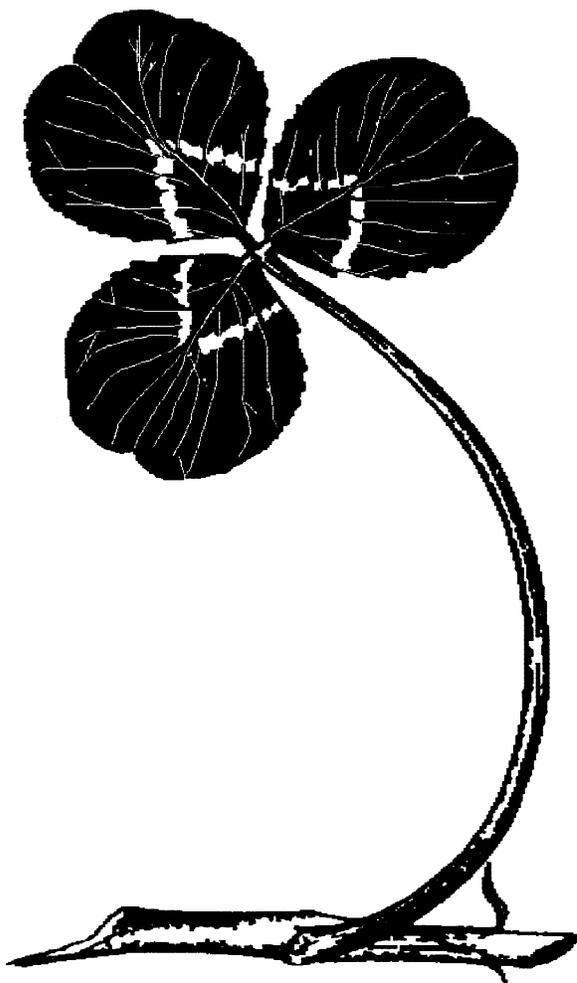
When harvesting seed, cut mature plants with a mower when most heads are brown. Cure in the swath or windrow, and thresh with a pick-up combine.

The average seed yield is 75 to 100 pounds of seed per acre. Yields may be increased by using bees for pollination.

If managed for wildlife -as food for deer, wild turkeys and rabbits -benefits are maximized by controlled grazing by domestic livestock.

## Where To Get Help

For more information about Ladino clover, contact the local office of the Natural Resources Conservation Service listed in the telephone directory under "U.S. Government," or the University of Illinois Cooperative Extension Service.



November 2000

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audio tape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.



## Perennial Legumes

# Kura Clover

## Illinois

### General Information

Kura clover (*Trifolium ambiguum* Bieb.) is a relatively low-growing, persistent, winter-hardy, spreading perennial legume that has excellent potential for grazing. It is also called Caucasian, Pellett's, or honey clover and is native to the Caucasian region of Europe. Kura clover mixes well with the commonly grown cool-season, perennial grasses.

Varieties include Cossack, Endura, and Rhizo. In addition, much seed on the market is uncertified, "variety not stated".

### Adaptability

Kura clover can often withstand poorly drained soils, soils with a high water table, and is better adapted to lower fertility and pH than alfalfa. However, it will be more productive and persistent if fertilized and grown at a soil pH of 6 to 7. Its fertility and pH requirements are very similar to those of red clover. Once established, it is adapted to frequent grazing or cutting.

### Characteristics

Kura clover has a deep, branching taproot and produces rhizomes, which allow it to spread. The above ground portions are very leafy and high in feed value.

The main disadvantage is its slow establishment due to its pattern of development being different from other legumes. The seedlings germinate, emerge, and develop the first three true leaves at about the same rate as other legumes, but then leaf development slows and energy from photosynthesis is used for root and rhizome development. In addition, very few upright stems are formed the first year and thus its short stature makes it very susceptible to shading. It may take up to 2-3 years to get a vigorous stand.

Kura clover is susceptible to potato leafhopper injury and can induce bloat in ruminants. Because of these two characteristics and its low fiber, high protein and high moisture content, kura clover should be planted in mixture with cool-season perennial grasses. Grasses will also help keep the semi-prostrate legume upright.

### Establishment

There are no "tricks" to establishing kura clover. The same steps recommended for the establishment of other legumes apply, but kura clover is less forgiving if these steps are not carefully followed.

Kura clover seed must be inoculated with strains of Rhizobia bacterium specific for the legume. Failure to put live Rhizobia in contact with young kura clover seedlings will result in certain failure of the stand.

Soil test a year before seeding so fertility and pH can be at the recommended levels. Perennial weeds, especially Canada thistle, need to be controlled a year prior to seeding.

In the spring, prepare a seedbed with appropriate tillage to provide a firm seedbed free of clods and weeds.

-more-

## **Establishment** *(continued)*

Kura clover has been successfully seeded into pastures with no-till strategies, provided the existing sod is killed with glyphosate (Roundup). It is best to apply glyphosate the previous fall and then no-till seed kura clover and the desired grass in the spring.

An option for no-till seeding is to use Gramoxone Extra (paraquat) to temporarily burn down existing grass in the spring and seed the kura clover immediately following. The existing grass will recover within 3 to 5 weeks and must then be controlled by grazing or clipping to minimize competition. This system will only work if summer rainfall is "normal" and if the grass regrowth is controlled.

Successful stands have been established with a seeding rate of 5 to 8 pounds per acre. If seedbed conditions are not ideal, use the higher rate. A shallow planting is important and the ideal depth is ¼ to 1 inch. Cultipacker seeders or drills with presswheels can be adjusted for proper sowing depth and packing to ensure good seed-to-soil contact.

University of Wisconsin researchers have successfully grown and maintained mixtures of kura clover with Kentucky bluegrass, smooth brome grass, orchardgrass, tall fescue, and reed canarygrass. The appropriate grass will depend upon soil conditions, the intended use of the mixture, and skill in managing some of the aggressive grasses.

Because of its relatively slow seedling development and sensitivity to competition from existing vegetation, frost seeding of kura clover is very risky and not suggested.

## **Management**

As a result of having rhizomes, individual plants can spread from 6 to 12 inches per year after successful establishment.

Once established, greatest yields occur in the spring, less in the summer and fall. Forage yields in University of Minnesota and University of Wisconsin trials ranged from 2 to 6 tons per acre, with an average of about 4 tons per acre. Yield from seeding and second year in University of Illinois trials was 2 and 4 tons of dry matter per acre, respectively.

A recent University of Wisconsin grazing study found that pounds of beef per acre and average daily gain were 911 and 2.66 for Kura clover-grass versus 714 and 2.27 for red clover-grass pastures, respectively. Stocking rate expressed as number of 600-pound steers per acre per day over the season was 2.3 for kura clover-grass and 2.0 for red clover-grass pastures. This translates into a 15% greater carrying capacity for the kura clover-grass pastures. In this study, the kura clover-grass mixture had average crude protein that ranged from 22 to 25%, average digestibility was 85%, and neutral detergent fiber ranged from 34 to 37%.

## **Summary**

Kura clover may be an option for producers in the upper Midwest who need a persistent, winter-hardy legume. Management is critical in the establishment of this grazing tolerant, high quality forage crop. Once established, kura clover will tolerate much abuse and has persisted greater than 15 years in Wisconsin and Minnesota.

## **Where to Get Help**

For more information about kura clover contact the local office of the Natural Resources Conservation Service or University of Illinois Extension.

## **Acknowledgements**

Information in this fact sheet was adapted from a number of sources, but primarily based upon work by Dr. Ken Albrecht, agronomist, University of Wisconsin-Madison.

December 2006



Species  
Perennial Forage Legume  
**Birdsfoot Trefoil**  
Illinois

**General Information**

Birdsfoot Trefoil is a non-bloating, perennial forage legume that originated in the Mediterranean basin region.

Birdsfoot Trefoil grows to a height of two to three feet, with many slender, leafy, branches coming from each crown. The flowers are typical five petaled legume flowers. They are yellow with orange or red tinges.

Leaves are compound and alternate, with five leaflets. The lower two leaflets are smaller and stipule-like at the base of the petiole. Leaves tend to close with darkness.

Three to five seed pods are attached at right angles to the end of the seed stalk. They are cylindrical and nearly black when mature.

The arrangement resembles a bird's foot, which gives the plant its common name.

Most varieties have a tap root. However a rhizomatous strain has been discovered, and the trait is being bred into new varieties.

**Adaptability**

Birdsfoot Trefoil is tolerant to a wide range of sites, and is most productive on moderately-well to well-drained soils. Birdsfoot Trefoil will persist in wet, shallow, fragipan and heavy clay soils too wet for alfalfa, and is more drought tolerant than ladino clover. Trefoil is quite tolerant to acid soil, and does well in the 5.5 - 6.5 pH range.

**Establishment**

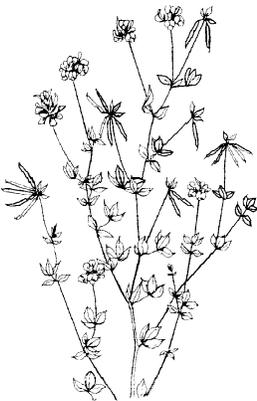
Soil amendments should be added at seeding time, and incorporated during seedbed preparation. Lime should be added to bring the pH up to at least 6.0 at planting time. Place seed about one-fourth inch deep, and firm the soil around it using seeding equipment with packer wheels or cultipack the field after seeding.

Check with the Natural Resources Conservation Service or University Extension for proper seeding rates.

Inoculate seed with a birdsfoot Trefoil specific rhizobium bacteria. Seed lots containing high percentages of hard seed should be scarified.

Birdsfoot Trefoil is often seeded in mixtures with grasses and other legumes. The seeding rate should be reduced to the percentage wished for in the established stand.

Birdsfoot Trefoil is somewhat slow to establish, and does not tolerate shading well. Therefore, competitive plants must be controlled during the establishment period.



-more-

## **Establishment** (Continued)

The best suited varieties for the northern part of Illinois are Norcen and Dawn. For the southern portion, AU Dewey may be a better choice.

When available, the new rhizomatous varieties should be a valuable addition to the list of suited varieties.

## **Management**

Birdsfoot Trefoil starts growth in April with peak growth in June. But growth persists throughout the summer if moisture is available.

Being moderately deep rooted, the ability to draw on moisture deep in the soil provides good summer production during most years.

As with other legumes, nitrogen fertilization should be limited to moderate fall applications to limit competition from the grass component of the mixture.

Birdsfoot Trefoil is thought to be best suited to the northern part of Illinois, but will grow throughout the state when properly managed.

Birdsfoot Trefoil does not store large amounts of carbohydrates; therefore, complete defoliation, such as haying or heavy grazing.

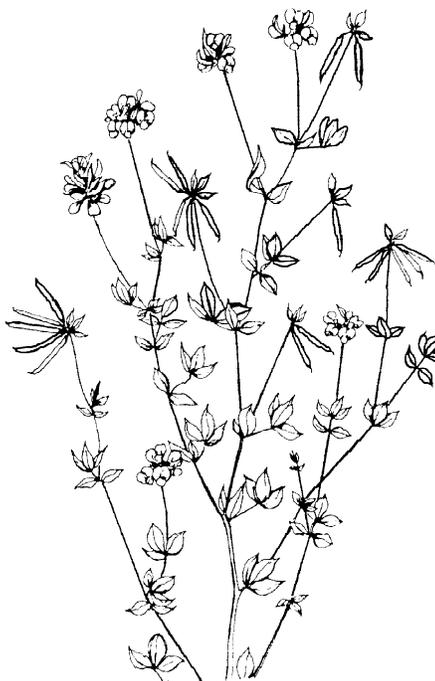
Being very palatable, forces trefoil to behave as a decreaser under heavy or continuous grazing. Like other legumes, birdsfoot Trefoil requires rest after grazing, should be avoided.

Birdsfoot Trefoil is susceptible to crown and root rot, reducing the life span of individual plants. With current varieties a 45-day rest should be provided, at least every other year during the flowering period, ensuring reseeding to replace plants lost to attrition.

The new rhizomatous varieties should be able to replace lost plants through vegetative reproduction.

## **Where To Get Help**

For more information about birdsfoot Trefoil, contact the local office of the Natural Resources Conservation Service listed in the telephone directory under "U.S. Government," or the University of Illinois Cooperative Extension Service.



November 2000



Species  
Perennial Legume  
**Alfalfa**  
Illinois

**General Information**

Alfalfa is a deep-rooted, perennial legume, and is considered the most nutritious and oldest-known crop grown for forage.

The first recorded occurrence of alfalfa in the United States was in Texas around 1700. From there, its use spread throughout the southeastern part of the country. Today, there are five types grown.

Alfalfa is an excellent plant for controlling soil erosion, improving soil, fertility and for providing nesting cover for wildlife.

**Adaptability**

Alfalfa is adapted to deep, fertile, well-drained soils. The soil should be high in calcium, and should have a pH between 6.5 and 7.0 to support the best production.

**Characteristics**

Alfalfa will grow two to three feet tall with five to 20 erect stems rising from a fleshy, crown. The flower is generally bluish purple and shaped like a pea flower. However, some varieties' flowers are yellow. Clusters of three leaflets are arranged alternately on the stem. The deep-rooted plant has an almost straight taproot with very few branches.

**Establishment**

A soil test should be obtained before seeding alfalfa. Lime and fertilizer should be applied as recommended. Lime should be applied at least six months prior to planting.

Once a clean, firm seedbed is prepared, a cultipacker should be used before and after planting to ensure stand survival.

A nurse crop of small grain may be planted at a rate of 20 pounds per acre to protect the new seedlings. The nurse crop must be controlled to reduce competition for moisture, nutrients and sunlight.

Check with the Natural Resources Conservation Service or University Extension for proper seeding rates.

Alfalfa does well when planted with brome or orchard grass, and is moderately compatible when planted with Timothy, Tall Fescue, and Reed Canary grasses. Alfalfa also does well when planted with legumes, such as Bird's-Foot Trefoil, Red Clover, and Alsike Clover.

The proper management of alfalfa requires intense labor and maintenance. Pests such as weevils and leaf hoppers need to be controlled.

**Management**

Alfalfa is very nutritious and highly palatable when used for hay or grazing.

When grown for hay, alfalfa should be cut at one-tenth bloom, or when new shoots begin to emerge from the crown.

-more-

## Management

(Continued)

Alfalfa will not cure well during cool, wet conditions. In these instances, a crimper should be used to improve the rate of curing.

Phosphorus, potassium and lime may be applied in the spring or fall, preferably in the fall. The last cutting should be timed to allow for one month of regrowth before the first killing frost. When managed properly, alfalfa will provide a protein content of 20 percent and a total digestive nutrient value of 60 percent or greater.

Alfalfa should not be grazed until plants reach a height of six to eight inches, and should not be grazed closer than three inches.

When alfalfa is grown in a mixture of grasses, the chances of bloat are reduced. Otherwise, bloat inhibiting additives are recommended.

Fields of alfalfa should be small enough for livestock to graze off the forage in three days. The grazing period should be followed by 20 to 25 days of rest.

It is advisable to alternate grazing periods with hay cutting to get uniform use of the field and to keep the regrowth lush and productive.

## Where To Get Help

For more information about alfalfa, contact the local office of the Natural Resources Conservation Service listed in the telephone directory under "U.S. Government," or the University of Illinois Cooperative Extension Service.



November 2000

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audio tape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.



Species  
Perennial Legume  
**Alsike Clover**  
Illinois

**General Information**

Alsike Clover is an upright, short lived, perennial legume that is often agriculturally treated as a biennial plant, and is often grown in combination with other grasses for hay or pasture.

Alsike lacks persistence, usually living for only two years. Alsike somewhat resembles red Clover with stems one to three feet long, but they are more slender and more prostrate.

Stems and leaves are smooth and the flower heads are pink or white. Alsike Clover tillers profusely from the crown.

The stem does not terminate in a flowering head but keeps on growing. Flowers bearing branches arise from each leaf axis so that the oldest flowers are nearer the base of the stem.

**Adaptability**

Alsike Clover is believed to have originated in Sweden, and has been cultivated in Europe for centuries. It was introduced into England and Scotland about 1830 and into the United States by 1840.

Alsike Clover is compatible to low wet areas with such grasses as Fescue, Reed Canary grass, Switch grass and Eastern Gama grass. Adapts better than Red Clover to sour, wet sites, and will tolerate flooding for long periods. Growth persists throughout hot weather as long as moisture is adequate. Alsike can be killed out if drought periods become prolonged. Susceptible to the same diseases as red Clover, Alsike is Clover considered resistant to anthracnose. Alsike Clover does well on soil that is too acid for Red Clover.

**Establishment**

Alsike Clover responds well to phosphate, potash and lime. Any needed fertility should be incorporated during seedbed preparation whenever possible. Soil pH should be brought up to at least 6.0 when a new stand is established. Seeds should be planted about one-fourth-inch deep and have the soil firmed around them by using a drill with packer wheels or by cultipacking after seeding.

Check with the Natural Resources Conservation Service or University Extension for proper seeding rates.

Seed needs to be treated with the proper inoculant within 12 hours of planting.

Weedy competition needs to be controlled until the stand is established.

Varieties best suited to Illinois include Aurora and Dawn.



-more-

## Management

Alsike Clover is very palatable to all grazing animals, protein, and energy content is a little greater than red Clover.

Although not a lot of quantity is added, overall quality of pastures is improved when established into predominantly grass fields, and preferred by rabbits, geese, and other wildlife.

Alsike Clover provides excellent nesting cover when planted in grass mixtures. The tendency to lodge is also reduced when grown with tall, upright growing grasses.

Mixtures with grasses will reduce the incident of bloat.

Alsike Clover usually produces only one cutting of hay per season. Harvest the hay when in full bloom.

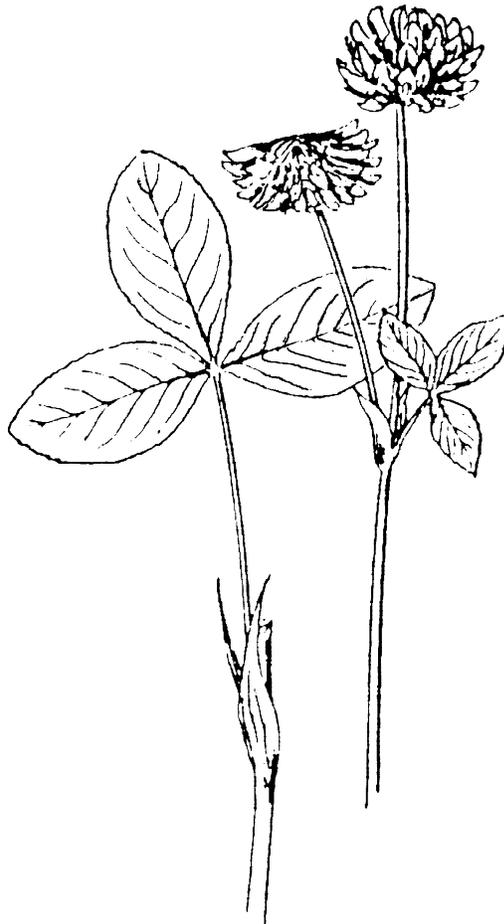
Limited grazing is sometimes OK during late fall on fields cut for hay. Like other palatable forage species, rest is necessary for the plant to recover from grazing.

The grazing period should not exceed seven days followed by a rest of at least 21 days. Rest periods will need to be longer when the growth rate is slower.

As with other legumes and palatable forage species, rotations are necessary to maintain vigor.

## Where To Get Help

For more information about alsike Clover, contact the local office of the Natural Resources Conservation Service listed in the telephone directory under "U.S. Government," or the University of Illinois Cooperative Extension Service.



November 2000

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audio tape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.



# Species Perennial Legume **Annual Lespedeza** Illinois

## **General Information**

There are two Annual Lespedezas used for pasture and hay in Illinois: Striate (or Common) and Korean. Common originated in Japan, and was introduced into the United States in 1846. Korean was introduced from Korea in 1919.

A good way to distinguish the two from each other is by their stem hairs. The hairs on Korean slant up, while those on Common slant down.

The leaves of Korean turn upward after flowering to protect the seed pods. Leaves do not protect the seed pod on Common.

The plant will vary in height from four to 24 inches, depending on growing conditions. The flowers range from purple to pink in all varieties.

## **Adaptability**

Annual lespedeza will grow in most types of soil that are well drained. Lespedezas tolerate low fertility, yet respond to lime and phosphorus. Annual lespedeza is best suited to a pH of 5.5 - 6.0, but can produce good yields with pH levels as low as 5.0.

Lespedeza is very drought resistant, likes hot weather, and produces well throughout the warm season. Being an annual, year-to-year production is more dependent on the current weather conditions.

Annual lespedeza was more widely used in the 1940s and 1950s. Several factors contributed to its decline: the drought of 1953 and 1954; susceptibility to bacterial wilt and tar spot; and the increased use of fertilizer on fescue. Legumes find it difficult to compete with fertilized, aggressive grasses.

## **Establishment**

Annual lespedeza should be planted in the spring, into a well prepared, firm seedbed, to which any needed fertilizer has been incorporated. An alternate method is to broadcast over pastures in late winter, allowing normal freezing and thawing to work the seed into the soil. Frost seeding is often done during fertilizer application, and can be quite successful if the nitrogen level is limited.

Check with the Natural Resources Conservation Service or University Extension for proper seeding rates.

Once established, enough seed should be produced to perpetuate the stand.

The Korean varieties best adapted to Illinois are Korean and Summit. Kobe and Marion are the best adapted Striate or Common types for Illinois.



-more-

## Management

Lespedeza is a non-bloating legume that is palatable to all kinds of grazing livestock, and does a good job of supplying high quality forage during the warm season when cool-season grasses become dormant.

Established with endophyte infected fescue, the effect is diluted by supplying a non-contaminated component to the ration.

When mature, an anti-lactation factor in the seed can cause a reduction in milk production in dairy cows.

Hay yields, though not high, are good quality with few curing problems because of the late harvesting date.

Annual lespedeza is compatible with most of the cool-season grasses as long as nitrogen levels are not too high.

Lespedeza may be one of the best legumes to use with warm-season grasses because of matches in growth cycle. Probably one of the best at surviving close, continuous grazing. When closely grazed, Lespedeza tends to grow low to the ground and escapes utilization allowing seed production.

The seed provides a high quality food for quail and other seed-eating wildlife. The forage is used as browse by deer, turkey and rabbits. The ability to provide good production with lower levels of management, annual lespedeza works well in low input forage systems.

## Where To Get Help

For more information about annual lespedeza, contact the local office of the Natural Resources Conservation Service listed in the telephone directory under "U.S. Government," or the University of Illinois Cooperative Extension Service.



November 2000

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audio tape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.



## Species

## Warm-Season Grass

# Caucasian Bluestem

## Illinois

### General Use

Caucasian Bluestem is a warm-season, perennial bunchgrass, part of the group known as Old World Bluestems, and is not related to native bluestems.

Caucasian Bluestem is ideally suited for marginal cropland areas where farming of annual crops is unprofitable and causes excessive wind and water erosion. The grass also has been used successfully to reclaim disturbed lands. Caucasian Bluestem generally is less desirable for wildlife than most native warm-season grasses.

### Characteristics



Caucasian Bluestem is an erect, fine-stemmed, leafy grass. Forage yields usually exceed other adapted Old World Bluestems. In southern Illinois, yields of Caucasian Bluestem equal or surpass most native warm-season grasses.

In general, Caucasian Bluestem exhibits good establishment characteristics, seed spreading, forage yield, forage quality and stand persistence if adapted to the site and managed properly. Caucasian Bluestem starts spring growth a few days later than switch grass, but earlier than big Bluestem and Indian grass. The ability of Caucasian Bluestem to produce considerable forage in the summer, and has contributed to its popularity in southern Illinois. Caucasian Bluestem may be superior to native warm-season grasses in producing regrowth in August and September, with adequate rain. No serious disease problems have been reported with Caucasian Bluestem.

### Adaptability

Caucasian Bluestem will produce on a wide range of soils, and prefers the finer texture soils, such as loams, clay, and silt loams, but will grow acceptably well on good, sandy-loam soils.

Caucasian Bluestem is not well adapted to extremely sandy soils (sugar sand and blow sand) that do not have a close, finer subsoil. Failure or poor production can be expected on soils that are extremely sandy, on wetland soils with long-term supersaturation, on soils classified as having perched water tables, on saline soils, and on soils inclined to produce severe iron chlorosis.

Caucasian Bluestem is best adapted to southern Illinois, and compares less favorably to native warm-season grasses when grown in northern Illinois, where stands have died because they lacked winter hardiness.

### Establishment

Spring seedings (April and May) of Caucasian Bluestem are preferred. Seedings made later may be successful if moisture is available. Seed into a clean, firm, weed-free seedbed.

Seedbeds should be firmed with a roller prior to drilling or broadcasting seed. If the seed is planted using the broadcast method, it also should be rolled afterward to ensure

-more-

## **Establishment** (Continued)

good seed to soil contact. Seed should be covered with about one-fourth inch of soil. Contact your local NRCS or University Extension office for specific seeding recommendations. Some success has been obtained with no-till seedings in closely-grazed or herbicide-treated sod, reducing weeds and soil erosion.

Controlling weeds at seeding time is important because grass establishment and survival can be suppressed by weed competition for moisture and sunlight. Weed control must be provided by tillage during seedbed preparation, and later by mowing approved herbicides or proper utilization.

Although Caucasian Bluestem has shown tolerance to residual herbicides, none have been cleared for weed control.

## **Management**

The best time to graze Caucasian Bluestem is June through September. Caucasian Bluestem should not be grazed closer than three to four inches to keep in a vegetative stage; thereby maintaining forage quality and palatability in first year stands. Accumulations of large amounts of forage can hinder stand development and production. If excess forage is present, haying may be necessary.

Allow a height of 8 inches before initiating grazing.

The best use of Caucasian Bluestem is in a grazing system that includes cool-season grasses, mixtures of cool-season grasses and legumes, and one or more species of native warm-season grasses.

An annual fertilizer application of 50 to 60 pounds of nitrogen is, usually adequate for optimum yields. Phosphorus and Potassium should be applied according to soil test results.

Weeds in established stands of Caucasian Bluestem can be minimized by maintaining plant vigor and density. Occasional use of approved herbicides will reduce competition, and help restore plant vigor to an overgrazed stand. Prescribed burning of plant residues at initiation of spring growth helps control insects, decreases competition, and stimulates growth.

A fall height of six to eight inches should be attained 30 days before frost, allowing for replenishment of root reserves, and provides additional insulation through winter months. Caucasian Bluestem may be grazed again after frost.



## **Where To Get Help**

For more information about Caucasian Bluestem, contact your local office of the USDA Natural Resources Conservation Service. It is listed in the telephone directory under "U.S. Government."

November 2000

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audio tape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.



# Species

## Warm-Season Grass

# Big Bluestem

# Illinois

### General Use

Big Bluestem is one of the native, warm-season bunchgrasses noted for rapid growth during mid-to-late summer when high temperatures slow the growth of cool-season grasses. The primary use of big bluestem is as a livestock forage seeded in pure stands or in mixtures. Big Bluestem produces excellent hay and cover for soil erosion control and is not rated as highly as switch grass or Indian grass for wildlife cover. Snow on mature Big Bluestem can cause severe lodging and loss of winter protective cover.

### Characteristics

Big Bluestem produces a deep, extensive, fibrous root system and short rhizomes, and begins growth somewhat later than switch grass, usually in late April or early May. Big Bluestem's growth increases rapidly with higher temperatures, and produces about 70 percent of its annual growth after June 15. The average date of seed maturity is September 9. If undisturbed, Big Bluestem attains a height of four to six feet, and establishes a very deep root system. Big Bluestem plants can be distinguished from other warm-season grasses, even when plants are young, by the long white hairs on the stem and upper leaf near the base of the leaf. The stem is round and the base has a reddish tint. The seed head normally has three, fingerlike branches shaped like a turkey's foot.

### Adaptability

Big Bluestem is winter hardy, will grow in all areas of Illinois, and is suited to all soils, except those saturated for an extended period. Deep, well-drained soils are preferred. One variety of Big Bluestem recommended for use in Illinois is "Rountree," released for public use by the Natural Resources Conservation Service's Elsberry (Mo.) Plant Materials Center.

### Establishment

Spring seedings - during April and May - of big bluestem are preferred, and should be seeded into firm seedbeds free of competition. Seedbeds should be finished with a roller prior to drilling or broadcasting seed. If the seed is planted using the broadcast method, roll afterward to ensure good seed soil contact. Seed that is drilled should be planted one-fourth inch deep. Check with Natural Resources Conservation Service or University Extension for current seeding recommendations.



No-till seedings in closely grazed sod have also been successful where control of sod is accomplished with proper herbicides. In addition, early spring plantings (March and April) and fall dormant plantings (November and December) have been successful, and can provide weed and soil erosion control.

Special rangeland drills capable of seeding light, fluffy seed must be used to plant unprocessed big bluestem seed. Seed processed by removing the appendages with a "debearder" may be planted with a wide variety of commonly used grass seeding equipment.

-more-

## Establishment (Continued)



Controlling weeds at seeding time is important because grass establishment and survival can be suppressed by weed competition for moisture and sunlight.

Fertilizer applied during the seeding year usually does not increase stand density, but will increase plant vigor. To limit weed growth, nitrogen should not be applied until mid-July, and then only on stands with limited seed competition. Not more than 30 pounds of nitrogen per acre should be applied.

Stand densities of 1.5 to 2 established plants per square foot in the spring of the second year is adequate for hay yields or pasture.

## Management



Annual fertilizer application of 60 pounds nitrogen and 30 pounds each of phosphorus and potassium per acre usually is adequate for maximum yields. Rates should be adjusted in accordance with soil tests.

Weeds in established stands of Big Bluestem can be minimized by maintaining plant vigor relative to an overgrazed stand. Burning plant residues at initiation of spring growth decreases competition and stimulates Big Bluestem growth.

Big Bluestem may be grazed when it reaches a height of 14 to 16 inches and can be grazed continuously as long as a minimum height of eight to 12 inches is maintained. In management intensive systems, grazing in the first paddock can begin when plants reach 10" in height, to prevent over maturity of the last paddocks grazed. A minimum of 6" of residual should remain at the end of the grazing period. The subsequent rest period should be long enough to allow for the accumulation of 14-16" of regrowth before being grazed again.

Of the three most common warm-season grasses, Big Bluestem matures later than Switch grass and earlier than Indian grass, and is an excellent forage from mid to late summer. A fall height of 12 inches should be attained before frost. Big Bluestem may be grazed to a height of six to eight inches after frost. The winter stubble is necessary to provide insulation.

To obtain maximum hay quality and quantity, hay cuttings should be made when big bluestem is at boot stage, in mid-to-late July.

## Where To Get Help

For more information about big bluestem, contact the local Natural Resources Conservation Service listed in the telephone directory under "U.S. Government," or the University of Illinois Cooperative Extension Service.



November 2000

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audio tape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.



## Species

# Warm-Season Grass

# Bermuda Grass

# Illinois

## General Information

Bermuda grass is a warm-season grass widely grown in the South and has not been grown extensively in Illinois except in some of the state's southernmost counties.

Bermuda grass has been controversial because of the persistence and possible intrusion into row crop fields.

Bermuda grass' quality drops considerably from summer to fall, and there seems to be little difference in quality between Bermuda grass and tall fescue during late summer. Animals requiring high quality forage during late summer probably should graze some other species.

Three varieties of Bermuda grass - Midland, Hardie and Greenfield - are suggested most often for Illinois. Greenfield is less winter hardy than Midland, and in Oklahoma tests, yield was lower. Some wild strains are also present. One observation that often leads to confusion is that wild Bermuda grass grows as far north as the Illinois River. These common strains of Bermuda grass are comparatively low yielding and unpalatable to livestock. Hardie has shown the best winter hardiness and has out produced other varieties in trials in South Illinois. Guymon is a strain of improved common Bermuda grass that shows good winter survival. Guymon is generally less productive than the hybrid varieties.

## Adaptability

Bermuda grass will grow in south Illinois, although the exact line where winter hardiness becomes a problem is not well defined. The line probably is somewhere between Springfield and Clinton.

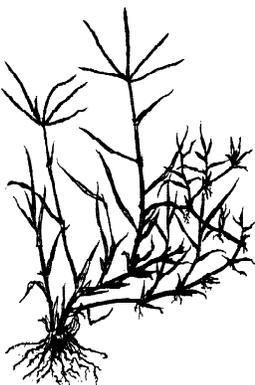
Even within the apparent area of adaptation, there is much variation in winter survival from year to year. Some fields have survived farther north in Illinois, but the performance has been erratic. The grass seems to do well for five or six years, and then seems to produce below normal for several years. Fertility may be to blame.

Bermuda grass is best adapted to deep, sandy loam and medium-textured soils, and can be grown on shallow soils, but management and fertilization become more critical. Bermuda grass, like most grasses, does best at a pH of 5.5 or above. Bermuda grass requires considerably more moisture than native warm-season grasses.

Bermuda grass is more drought resistant than Dallis grass, carpet grass or Bahia grass, but will not grow very well in arid conditions. Bermuda grows well on well-drained soils, but not on waterlogged or tight soils. In extreme south Illinois, there is a strong possibility that Bermuda grass will respond to irrigation more than any other grass species.

Guymon Bermuda grass is the only selection that can be seeded in Illinois. All other varieties should be sprigged between March 1 and June 1. Early plantings on a clean, firm seedbed usually will have adequate moisture for starting early growth in the spring.

-more-



## Establishment

Sprig Bermuda grass in 20 to 40-inch rows. Roots should be placed in firm, moist soil and covered no more than one to two inches. To have one end of the sprigs slightly exposed is desirable.

Mechanical sprigging machines are usually used, except for small areas. Close rows and high sprigging rates are important for getting quick cover, especially on pond embankments, waterways, gully slopes and other highly-erodible areas.

New plantings should be top dressed with 30 to 50 pounds-of actual nitrogen when Bermuda grass has grown six to ten inch runners.

Herbicides probably should be used in the year of establishment to control germinating grass and broadleaved weeds. Contact your local NRCS or University Extension office for specific seeding, sprigging and weed control recommendations.

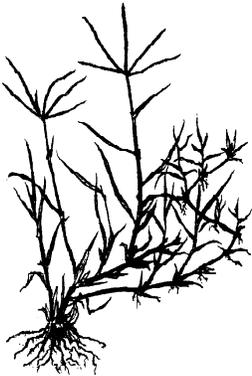
## Management

New Bermuda grass plantings should not be grazed until runners have lapped between sprigged rows. When good ground cover is established, the grass may be grazed to a three to four inch stubble. Grazing can begin on well-established Bermuda grass when the grass is four to six inches tall.

Best results have been noted when pastures have been rotated, with usually no more than 14 days on any one pasture. As with all grasses, cattle tend to spot graze. Pastures may be cut to ensure uniform quality and palatability. Bermuda grass quality declines after about 30 days growth. Accumulated Bermuda grass can be grazed during the fall and winter, but low in protein.

Bermuda grass may be used for hay, but the quality depends on its stage of growth at harvest time. Initial cut should be when plants are 14 to 18 inches and every 29 to 32 days. Cuttings should be made 20 to 30 days after nitrogen is applied. Bermuda grass needs 50 to 60 pounds of nitrogen per acre for each ton of hay production expected.

Phosphorus and potash may be applied in one application in the spring, but nitrogen should be applied in increments of 50 to 60 pounds per acre about every 30 days. Fertilizer should not be applied before May 15. Earlier applications stimulate cool-season plant growth, which competes with Bermuda grass.



## Where To Get Help

For more information about Bermuda grass, contact the local office of the USDA Natural Resources Conservation Service listed in the telephone directory under "U.S. Government," or the University of Illinois Cooperative Extension Service.

November 2000

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audio tape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.



## Species

## Warm-Season Grass

# Eastern Gamagrass

# Illinois

### Introduction

The interest in Eastern Gamagrass (*Tripsacum dactyloides*) increased significantly during the late 1980s and early 1990s. Interest increased because of the native grass's ability to produce large quantities of quality forage during the summer months.

With the formal release of selections such as 'Pete' (Manhattan, KS, Plant Materials Center, 1988) and common selections, commercial seed sources are available.

Eastern Gamagrass has a long history. Early settlers coming to the tall grass prairie regions described "seas of grass so tall that you could lose cattle in it." Some of that grass was Eastern Gamagrass.

### General Information

Eastern Gamagrass is a native, perennial, tall, warm-season bunch grass, and has short, thick, rhizomes. Known as an "ice cream" grass because of the high nutrition and palatability. Eastern Gamagrass is readily eaten by all livestock, especially cattle.

Eastern Gamagrass produces seed from June through September. The seed heads are six to ten inches long, consisting of one to several spikes. Similar to corn, the female part is below the male part. When mature, the seed-bearing parts break at the joints so that each part contains one seed.

### Adaptability

The grass is native to the eastern half of the United States. Eastern Gamagrass has "cousins" (*Tripsacum* spp.) in the southwestern U.S., Mexico and Florida. Eastern Gamagrass has been planted in the far southwest and in Iowa. The range of adaptation still is being explored.

Soil adaptability is another area where additional information is needed. It grows on a variety of soils, but prefers a loamy soil with moisture conditions favorable to good plant growth. Several selections available on the commercial market come from plants grown on uplands under dry conditions. Eastern Gamagrass is not necessarily a bottomland grass, but production on such a site would be expected to do better.

### Establishment

Eastern Gamagrass can be planted using dormant seedlings or stratified "treated" seed seedlings.

To plant dormant seedlings, use a firm seedbed prepared in the fall, or no-till the plant into clean crop residue or killed sod. Plant between December 1 and March 1, and use a corn planter or grain drill to plant the seeds one-half inch to one-inch deep, and 10 to 36 inch rows. Maintain good soil contact.

Rows of Eastern Gamagrass should be planted no farther than 40 inches apart. Row width should be decreased - as slope increases - to a minimum of 10 inches. Obtain a soil test, and amend the soil fertility in accordance with the recommendations for native, warm-season grass.

An alternative method of establishing Eastern Gamagrass that provides erosion control, weed control and provides income during the establishment year is to seed Eastern Gamagrass directly into a reduced seeding of corn, grain sorghum, or sorghum/sudan grass hybrid. The Eastern Gamagrass can be seeded in alternate rows with the nurse crop, in the middles or in a separate planting operation at a 25°-45° angle to the nurse crop. The nurse crop should be planted at the rate of 50%-75% normal rates. During the establishment year, fertilize, control weeds and manage based on the management recommendations of the nurse crop. The



-more-

## Establishment (Continued)

nurse crop can be harvested for hay, grain or silage. Do not cut below six inches. During the second growing season, follow standard Eastern Gamagrass management recommendations.

Use only approved chemicals at recommended rates to control weeds. Do not use surfactant for first year plantings. Eastern Gamagrass should not be clipped lower than four inches. When grazing use enough livestock to remove weedy vegetation in three days. Grazing should be when weeds are succulent and the field is not wet.

To establish Eastern Gamagrass using stratified seed, place the seed in a poly or burlap sack, and soak it in a 1 percent solution of fungicide (Captan or equivalent) and water. Use 2.5 pounds of fungicide to 35 gallons of water. Soak the seeds for eight to ten hours, then drain, seal, and keep the seed in cold storage for six to eight weeks. Check the seed for heating, and stir if necessary.

The seeds should be drilled within 24 hours of their removal from cold storage. Seeding should be between May 1 and June 15, when the soil temperature is at least 65 degrees F.

As with the dormant seeding method, plant one-half inch to one inch deep, and space rows 10 to 40 inches apart. Fertilizer and weed control also is the same as with dormant seedings.

Several commercial seed producers can provide treated seed. For specific seeding rates and management contact your local NRCS office.

## Management



Eastern Gamagrass starts its spring growth earlier than most common, native, warm-season grasses. That, and the high palatability, makes gamagrass hard to manage in mixtures, and is best managed as a pure stand under a planned grazing system.

Grazing should begin before the new spring growth reaches 16 inches. Leave a minimum of six inches of leaf area to maintain plant health. Soils should be tested and amended to meet the demand of planned production. In single applications, up to 100 pounds of actual nitrogen per acre produces the most grass.

Eastern Gamagrass has excellent potential for hay production. Hay can be harvested more than once during the growing season at about six-week intervals, depending on weather conditions and fertility levels.

The best quality hay is cut in the boot stage. Crude protein of up to 17 percent has been found. Waiting until flowering (May 15 to June 1) can reduce crude protein to less than 10 percent. Do not cut hay shorter than six to eight inches. Row spacing during initial establishment of a hay meadow may need to be wider. "Crowns" of this grass can make a field rough.

Seed production remains one of the areas that need additional research. Fertility levels must be maintained according to soil test recommendations. Fertilizing with more than 50 pounds per acre of nitrogen will increase leaf production, cause possible lodging problems and lower seed yields. Seed harvest usually is between June 15 and July 15. Row spacing of 30-40 inches have worked well for seed-producing fields.

Burning helps remove excess residue in the spring, stimulates growth and improves forage quality. Fields may be burned when new spring growth has reached about one inch. Opening the canopy cover can cause erosion on steeper slopes and release a flush of weeds.

Before burning obtain a prescribed burn plan that follows all local and state requirements.

## Where To Get Help

Contact your local Natural Resources Conservation Service office listed in the telephone directory under "U.S. Government," or the University of Illinois Cooperative Extension Service for more information about Eastern Gamagrass.

November 2000

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audio tape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.



Species  
Warm-Season Grass  
**Indian Grass**  
Illinois

**General Use**

Indian grass is a perennial, warm-season bunchgrass noted for rapid growth during mid to late summer when high temperatures slow the growth of cool-season grasses. Indian grass is used mainly for livestock forage in rangeland and pastures, and as a hay crop. Wildlife biologists rate Indian grass as excellent for nesting and rearing areas. Undisturbed nesting and hatching are possible because grazing and haying operations are done after the prime nesting season for most wildlife species.

**Characteristics**

Indian grass produces a deep, extensive root system and short rhizomes. Indian grass can be distinguished from other native grasses, even when plants are young, by a fuzzy stem and a claw-like extension of the sheath. When mature, Indian grass has a single, narrow, plume-like, golden seed head. Growth begins in late April or early May, increasing gradually with higher temperatures. A production of about 70 percent annual growth after July 1st can be expected. If undisturbed, a height of five to eight feet can be attained with good stem strength. Mature, unharvested stems will remain standing well into winter for increased protective cover for wildlife.

**Adaptability**

Indian grass has been shown to be adaptable throughout Missouri, Iowa, Illinois, Indiana and the western halves of Kentucky and Ohio, and native to states east of the Rocky Mountains. Indian grass is suited to all soils, except those saturated for an extended period. Deep, well-drained soils are preferred. One variety of Indian grass recommended for use in Illinois is "Rumsey." Rumsey was released for public use by the Natural Resources Conservation Service's Elsberry (Mo.) Plant Materials Center.

**Establishment**

Spring seedings of Indian grass - in April and May - are recommended into fine, firm seedbeds free of competition. Seedbeds should be firmed with a roller prior to drilling or broadcasting seed. If the seed is planted with the broadcast method, it also should be rolled afterward ensure good seed to soil contact. Seed that is drilled should be planted one-fourth inch deep. Check with Natural Resources Conservation Service or University Extension for current recommended seeding rates.



No-till seedings in closely-grazed sod also have been successful where control of sod is accomplished with proper herbicides. In addition, early spring plantings (March and April) and fall dormant seedings (November and December) have been successful. They also provide weed and soil erosion control.

Special rangeland drills capable of seeding light, fluffy seed must be used to plant unprocessed Indian grass seed. Seed processed by removing the appendages with a debearder may be planted with a wide variety of commonly-used, grass-seeding equipment.

-more-

## Establishment

(Continued)



Controlling weeds at seeding time is important because grass establishment and survival can be suppressed by weed competition for moisture and sunlight. Weed control must be provided by tillage during seedbed preparation and by mowing.

Fertilizer applied during the seeding year usually does not increase stand density, but will increase plant vigor. To limit weed growth, nitrogen should not be applied until mid-July, and then only on stands with limited weed competition. Not more than 30 pounds of nitrogen per acre should be applied.

Stand densities of 1.5 to 2 established plants per square foot in the spring of the second year is adequate for hay yields or pasture.

## Management



Annual fertilizer applications of 60 pounds nitrogen and 30 pounds each of phosphorus and potassium per acre usually are adequate for maximum yields. Rates should be adjusted in accordance with soil tests.

Weeds on established stands of Indian grass can be minimized by maintaining the Indian grass stand's vigor and density. Occasional use of approved herbicides will reduce competition and help restore plant vigor to an overgrazed stand. Burning plant residues at initiation of spring growth decreases competition and stimulates growth. Fields should be burned every three to five years. Indian grass used for wildlife cover should be burned once every three or four years to reduce excessive mulch accumulations that restrict movement of new hatchlings and attract nest predators.

Indian grass may be grazed when a height of 14 to 16 inches is reached, and can be grazed continuously as long as a minimum height of eight to twelve inches is maintained. In management intensive systems, grazing in the first paddock can begin when plants reach a height of 10 inches, preventing them from becoming over mature before the rotation reaches the last paddock. A minimum of six inches of residue should remain at the end of each grazing period. The following rest period should be long enough to allow an accumulation of 14-16 inches of growth before being regrazed. Indian grass is the latest maturing of the three most common warm-season grasses (switch grass and big bluestem are the others) and provides excellent late-season forage. A height of 12 inches should be attained before frost, and may be grazed to a height of six to eight inches after frost. The winter stubble is necessary to provide insulation.

Indian Grass Seed

For optimum hay quality and quantity, Indian grass should be cut when it is at boot stage, usually in early August.

## Where To Get Help

For more information about Indian grass, contact the local Natural Resources Conservation Service listed in the telephone directory under "U.S. Government," or the University of Illinois Cooperative Extension Service.

November 2000

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audio tape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.



Species  
Warm-Season Grass  
**Side-Oats Grama**  
Illinois

**General Information**

Side-Oats Grama is an important component of the mid-grass prairie, and grows on shallow soils in the tall-grass prairies.

The primary use is as a component mixture for reseeding cropland or native grazing lands.

Side-Oats Grama is used for grazing by all classes of livestock, as nesting cover for wildlife and for seed harvest. The seeds are known to be eaten by wild turkeys, and maybe eaten by other wildlife species as well. There are no known forage quality problems with Side-Oats Grama.

**Characteristics**

Side-Oats Grama is a perennial, warm-season, weakly rhizomanous grass that grows 12 to 24 inches tall.

The leaf blades are flat with hairs along the outer margins. There are 30 to 50 spikelets that hang off one side of a slender, zigzag rachis much like the feathers hanging off an Indian war lance - thus earning the name side-oats.

Growth begins early in the spring with seeds forming in mid-summer. Rhizomes can be as long as four inches, and the plant has an extensive root system. Rooting depth can be as much as six feet in deep soil.

**Adaptation**

Side-Oats Grama grows naturally from south Texas to Canada, throughout the Great Plains and as far east as Virginia.

Side-Oats Grama grows on all but wet, very sandy or saline soils, but grows best on calcareous soils, and is less productive as soil pH decreases.

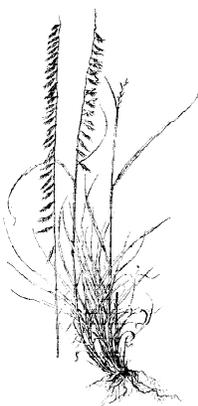
**Establishment**

Side-Oats Grama can be planted any time between December and June with a very high success rate.

Seeds should be planted into a well-prepared, firm seedbed that is free of competition. In areas where wind erosion is a concern, seeding into a dead litter cover is needed.

Check with the Natural Resources Conservation Service or University Extension for proper seeding rates.

The stand should not be used until well established, usually after one or two years. To enhance stand establishment, weeds must be controlled if there are three or more per square foot, or when there is a 50 percent weed canopy.



-more-

**Management** Side-Oats Grama is a grass that is palatable both green and while dormant.

For optimum production, grazing should be managed to harvest no more than half the growing leaf material.

Since plant reproduction can occur from rhizomes, maintaining a healthy root system is important.

Healthy Side-Oats Grama plants will make rhizomes in the winter and early spring if managed properly during the prior year. Side-Oats Grama responds well to planned grazing system management.

Crude protein will peak at about 10 percent in mid spring just before seed production. Quality is dependent on growth stage, decreasing as the plant goes into seed ripening. Dormant season crude protein will be around 4 percent, depending upon weathering. Total digestible nutrients will peak at about 60 percent, decreasing to about 30 percent in mid-winter.

Prescribed burning does not alter production, but can stimulate seed production.

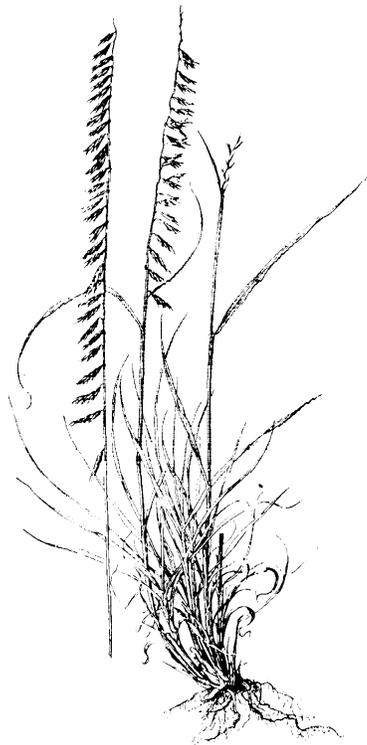
Generally, when Side-Oats Grama is planted as a component of a mixture, fertilizer is not recommended.

As a monoculture, about 35 pounds of forage is produced for each pound of nitrogen applied.

Seed production has been reported in the range of 150 to 400 pounds per acre, depending on moisture conditions.

**Where To Get Help**

For more information about Side-Oats Grama, contact the local office of the Natural Resources Conservation Service listed in the telephone directory under "U.S. Government," or the University of Illinois Cooperative Extension Service.



November 2000

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audio tape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.



Species  
Warm-Season Grass  
**Switch Grass**  
Illinois

**General Use**

Like other warm-season grasses, Switch grass is noted for heavy growth during late Spring and early Summer, making excellent pasture, and can be baled for hay. The stiff-stemmed, upright growth is rated excellent for wildlife nesting, brood rearing, and winter cover. The extensive root systems provide excellent stabilizing cover for soil erosion control. The stiff straw makes Switch grass valuable for field borders and wind barriers.

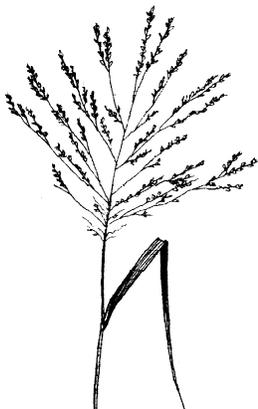
**Characteristics**

Switch grass is a perennial bunchgrass that grows three to five feet tall, and can be distinguished from other warm-season grasses, even when plants are young, by the white patch of hair at the point where the leaf attaches to the stem. The stem is round and usually has a reddish tint. The seed head is spreading and open.

**Establishment**

Switch grass should be seeded in a pure stand when used for pasture or hay due to manageability is better alone than in a mixture. The shiny, slick, clean, free-flowing seed can be planted with a drill or with a broadcast spreader.

Seedings should be made in fine, firm seedbeds free of competition. Seedbeds should be firmed with a roller prior to the drilling or broadcasting of seed. If the seed is planted using the broadcast method, roll afterward to ensure good seed to soil contact. When drilled, seeds should be planted one-fourth inch deep. No-tillage seedings in closely-grazed or burned sod have been successful where control of sod is accomplished with clipping, grazing or proper herbicides. Another option is to seed Switch grass into a low population corn crop. Allow the Switch grass to become established while the corn is growing. Then after corn harvest, manage the Switch grass for pasture the next year. The preferred method is to use a drill to plant the Switch grass, and follow with a no-till planting of corn. Atrazine may be used for weed control in the corn crop. Late spring or early summer plantings of Switch grass should not be made with a companion crop because of potential moisture stress.



See your local NRCS or Extension office for proper seeding rates and dates. Weed control with all plantings of Switch grass is important the first year. Switch grass is atrazine resistant, and when planted with corn, can be used to help control weeds.

Phosphorus and potassium should be applied according to soil tests before or at seeding. Nitrogen, however, should not be used at seeding time due to stimulating weed growth. Fertilizer applied during the seeding year usually does not increase stand density, but will increase plant vigor. If nitrogen is to be used the first year, do not apply until mid-July, and then only on stands with limited weed competition. No more than 30 pounds of nitrogen per acre should be applied at that time and adjusted to meet soil analysis.

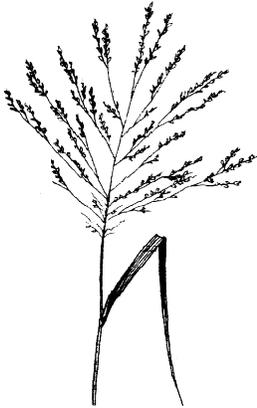
Stand densities of 1.5 to 2 established plants per square foot in the spring of the second year is adequate for hay fields or pasture.

-more-

## Management

If weeds are a problem during the seeding year, Switch grass may be mowed at a four-inch height in May or a six-inch height in June or July. Grazing is generally not recommended the first year, but a vigorous stand can be grazed late in the year if grazing periods are short with at least 30 days of rest provided between grazings. Switch grass begins growing late in the spring, making about 70 percent production after June 1. Switch grass is the earliest maturing of the common native warm-season grasses and ready to graze in early summer.

Established stands of Switch grass may be fertilized in accordance with soil tests. Generally, 60 pounds of nitrogen and 30 pounds each of phosphorus and potassium per acre are adequate for maximum yields. Phosphorus and Potassium will not be needed if the field is grazed since these elements will be recycled back to the soil by the grazing animal. Apply the nitrogen after the Switch grass has begun to produce using a single application in mid-to-late May or a split application in both May and early July. Avoid high rates of nitrogen because carry-over could spur cool-season grass growth or weed growth and harm young plants the following spring.



Switch grass may benefit from burning of plant residues at the initiation of spring growth. Burning fields once every three to five years decreases other plant competition, eliminates excessive residue and stimulates Switch grass growth. Switch grass used for wildlife food and cover should be burned once every three to four years to reduce mulch accumulations that inhibit movement of hatchlings and attract nest predators.

Under continuous grazing management, begin grazing Switch grass after reaching a height of 14 to 16 inches, usually in late May. Grazing should be stopped when plants are grazed to within four inches of the ground in May, eight inches in June, and 12 inches in late August. A rest before frost is needed to allow for carbohydrate storage in the stem, bases, and crown, to help produce vigorous plant growth the next year. Switch grass may be grazed to a height of six to eight inches after frost. The winter stubble is needed to provide insulation.

With management intensive systems, grazing can begin in the first paddocks when plants reach a 10 inch height and should not be grazed below a stubble height of 6 inches. Grazed paddocks need to be rested 30-60 days before being regrazed again, depending on regrowth.

## Where to Get Help

For more information about Switch grass, contact the local Natural Resources Conservation Service listed in the telephone directory under "U.S. Government," or the University of Illinois Cooperative Extension Service.

November 2000

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audio tape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.