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A fresh look at some new and alternative forages

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Iowa producers grow and manage 40 to 50 different species of plants for forage, cover crops in row crop fields and as components of soil erosion control and buffer strip practices. The most commonly used are:

- alfalfa
- red clover
- alsike clover
- white clover
- birdsfoot trefoil
- smooth bromegrass
- orchardgrass
- tall fescue
- reed canarygrass
- Kentucky bluegrass
- timothy
- corn
- switchgrass
- oats
- cereal rye

Collectively, they make up 90+% of the forage produced and used for pasture, hay and silage in the state. Among these commonly used species, new varieties become available as genetic improvements are brought to the market place.

Additionally, there are several forage species, which are promoted and sold in Iowa that are not widely used, and some that are essentially 'new-to-Iowa'. Information on adaptation and production management of these uncommon and new-to-Iowa species is often limited. Some new species and a few of the new varieties of the 'old traditional' forages are tested in Iowa State University Variety Trials and as entries in some of the forage breeding programs being conducted. Unfortunately, some have essentially no 3rd party, objective adaptation or production data for Iowa growing conditions.

Following are brief descriptions of the traits and likely adaptation some of the 'old traditional' species with new varieties and some not-so-familiar forage species that Iowa producers have been asking about in the last few years. In some cases specific adaptation observations and use suggestions are made.

**Legumes**

Alfalfa (*Medicago sativa* L.) is probably the most planted and used legume in Iowa. Its stand life is normally 3 to 5 years under harvest management, with stand density often limited by root and crown diseases. Alfalfa is not suited to poorly drained or low fertility or pH sites. It is versatile, being used for hay, silage or grazing. Many varieties are suited to Iowa growing conditions. Among the traits introduced in alfalfa varieties over the past 10 years or so are: grazing tolerance, wheel traffic tolerance, higher nutritive quality, heterosis, and a tolerance to the feeding of the insect pest, potato leafhopper. There is great interest within the alfalfa industry to pursue more hybridization, resistance to other races of *Aphanomyces* root rot. Glyphosate-tolerant varieties have been on the market and are currently in 'legal limbo'. There is continued work on other transgenic traits for alfalfa. Information about alfalfa varieties is available from many sources, including the ISU Alfalfa Variety Test web site noted at the end of this article.
White Clover - (Trifolium repens L.) - is a shallow-rooted clover that spreads by stolons and shattered seed. It can suffer some dormancy during hot, dry summer conditions and can winterkill in cold, open winters. White clover is compatible with low-growing grasses, and is best suited for grazing, where it is tolerant of close and frequent grazing. Bloat is a potential risk when grazing white clover. ‘Ladino’ is a large-leaved type of white clover that may be more productive than the smaller leaved types, but is usually shorter-lived. Newer varieties of the medium-leaved white clovers are being marketed from Europe and New Zealand (examples ‘Will’ & ‘Alice’). ‘White Dutch’ clover is the ever-present, common, small-leaved white clover that dominates in most permanent pastures.

Red Clover - (Trifolium pretense L.) - is considered to be a short-lived (seeding year + 1 or 2 years), upright clover that tolerates lower pH and poorer drainage than does alfalfa. Red clover can be used for hay, silage or grazing. Stand life is limited by root and crown diseases. Red clover often produces blooms in the seeding year. Red clover plants can ‘volunteer’ readily from hard seed. Medium red clover is considered a multiple-cut clover (2-3 cuts in production years), and is most often used for hay and pasture. Newer varieties have somewhat better production (10-30%) over ‘common’ red clover. Some have slightly better yield in the 3rd growing season, compared with varieties of 10 years ago. Some improved varieties for the upper mid-west states include Marathon, Impact, Duration, Starfire, RedStart, RedlanGraze II, Amos, Cinnamon Plus, & Scarlet. Mammoth red clover is considered to be a ‘1-cut’ clover and has historically been used as a ‘plowdown’ legume.

Kura Clover - (Trifolium ambiguum Bieb.) is a deep rooted, rhizomatous, long-lived perennial legume for pasture mixtures. It has potential for hay, silage or pasture. There is interest in using Kura clover as a ‘living mulch’ cover crop. Seed production has been limited. Kura clover has very poor seedling vigor and establishes very slowly (2-3 years). Bloat potential is expected to be similar to that of red clover. Varieties suggested are: ‘Endura’, ‘Rhizo’ and ‘Cossack’

Birdsfoot trefoil - (Lotus corniculatus L.) a perennial legume; suitable for harvested forage but used mostly in mixture with grasses for pasture; non-bloating; lower yields than alfalfa; longevity of individual plants limited by crown and root disease, but ‘volunteer’ seedlings from shattered hard seed provides for a long-term stand. A trefoil capable of spreading with rhizomes was released in Missouri a few years ago. The variety is named ‘Steadfast’. There has been no seed supply in recent years, so is not likely to be a viable forage in the near future.

Cicer Milkvetch - (Astragalus cicer L.) is a very winter-hardy, long-lived, spreading, non-bloating, legume more common in the western plains states. It is similar in nutritive value, but lower yielding than alfalfa. Cicer milkvetch has grown satisfactorily in Iowa.

Annual Lespedeza - (Kummerowia stipulacea -- Korean lespedeza ; and Kummerowia striata -- striate lespedeza) are short, hardy legumes that tolerate lower pH and fertility than alfalfa or clovers. They are used successfully in pastures and produce best in mid- to late-summer. Most varieties produce and shatter some seed by autumn in Iowa. They may not produce enough shattered seed to produce full stands of ‘volunteer’ plants in later years. Though at least one variety was developed in Iowa in the 1940s, most production remains in southern Iowa, mid-south states. ‘Legend’ and ‘Marion’ are the newest Midwest varieties available.

Berseem Clover - (Trifolium alexandrinum L.) also called Egyptian clover; is a fast growing clover used as a winter annual in the southern US. It has been used as a summer annual legume in
Iowa, but grows as an annual and will winterkill. In good growing seasons, multiple harvests possible, but growth and yield is limited in dry seasons.

Field Pea is a short-season forage cover crop that does best when planted in very early spring. Field pea is usually grown with cereal grains intended for silage harvest. The pea improves the protein content of the forage. Harvest decisions should be made on the quality and yield of the associated cereal forage.

Forage Soybeans – Historically, ‘Southern type’ varieties that grow vegetative much of the season have been used in mixture with short, grain sorghums or corn to improve the protein content in silage of the mixed crop. USDA has released several tall varieties for forage (silage), the variety ‘Derry’ is best suited for Iowa. The extra yield comes the last 4-6 weeks of the growing season. Little or no seed develops.

Grasses - temperate/cool-season

Tall Fescue - (Festuca arundinacea Schreb.) is a perennial, cool-season, sod-forming grass; used for harvested forage, pasture and turf. It establishes relatively rapidly, and is the grass species of choice to ‘stockpile’ for autumn and winter grazing. A problem often encountered with established tall fescue stands is the presence of an endophyte fungus that adversely affects livestock performance. It is the presence of the endophyte that imparts some of the competitiveness to the plant. Careful management of early growth and seedstems is important to minimize livestock use problems. Low endophyte and endophyte free varieties have had persistence problems in the southern U.S. states, but perform nearly as well as infected varieties in Iowa. Tall fescue grows throughout Iowa but is most prevalent in the So. 1/2 of the state. The newest element in the fescue arena is the use of a ‘novel endophyte fungus’ that imparts the vigor to the fescue plant without the ‘bad effects’ of the endophyte alkaloids on the livestock. The variety sold with the novel endophyte is ‘Jessup-MAXQ’. The novel endophyte may not be needed in Iowa; we can grow fungus-free varieties.

Reed Canarygrass - (Phalaris arundinacea L.) is a perennial, cool-season, slowly-spreading bunchgrass that is adapted to a wide variety of soil conditions, and is quite tolerant of poorly drained sites. It is used for harvested forage, pasture and soil conservation. Once established, rapid spring growth and relatively low palatability make it difficult to manage in mixed stands. Once grazed or cut, summer regrowth is better accepted. Reed canarygrass probably has the best summer growth of the commonly used cool-season grasses. It is relatively slow to establish. Newer varieties have been developed with low levels of alkaloids to improve digestibility. Low alkaloid varieties include: ‘Venture’, ‘Palaton’, ‘Rival’, ‘Chiefon’ and ‘Marathon.

Annual Ryegrass - (Lolium multiflorum), with its sub-type ‘Italian’ ryegrass has very rapid seedling emergence and growth. It does not generally overwinter well in Iowa. Some varieties produce seedheads in seeding year. If allowed to mature and shatter seed, annual ryegrass can regrow as volunteer plants in later years. This trait has led to annual ryegrass becoming an annual grassy weed in small grains in some parts of the country.

Perennial Ryegrass - (Lolium perenne L.) is a very high quality cool-season grass with relatively rapid seedling emergence and vegetative growth. Most of the ‘forage-type’ varieties have been imported from Europe and Australia/New Zealand, and have had a history of winterkill the first winter. ‘Summer slump often occurs in hot, dry summers. The more promising new varieties frequently
have 15-40%+ plant survival. ‘Turf-type’ varieties have been developed in the US and show reasonably good winter survival but relatively low forage yield potential. Turf-type varieties often have a tall fescue-like ‘endophyte fungus’ problem. Many forage-type varieties are available. Use objective, 3rd party performance information when making variety selection decisions.

Meadow Bromegrass - (Bromus riparius Roem. Schult) is a perennial bromegrass with good seedling vigor and adaptation in Iowa. Research in Montana indicates that it has a better regrowth pattern than smooth bromegrass. The variety ‘Regar’ is a selected variety developed from a Turkish plant introduction. Iowa production data is very limited.

Intermediate Wheatgrass - (Thinopyrum intermedium Host; Barkworth & Dewey) is a vigorous, spreading, winterhardy grass. It has relatively rapid seedling development, and can yield more in early stand development than smooth bromegrass. It heads slightly later than smooth bromegrass, and may have better late-summer and autumn regrowth than that of smooth bromegrass. Iowa research is limited.

### Warm-season perennial grasses

Switchgrass - (Panicum virgatum L.) is a tall-grass prairie perennial (3-6 ft), characterized as a slow-spreading bunchgrass. It is a popular tall prairie grasses because of seed characteristics. It is relatively unpalatable compared to big bluestem. Switchgrass heads in early to mid-July. Improved forage varieties; ‘Trailblazer’, ‘Sunburst’. Also adapted; ‘Cave-in-Rock’, ‘Blackwell’, ‘Pathfinder’.

There is interest in switchgrass as a perennial biomass crop for energy production.

Big Bluestem - (Andropogon gerardii Vitman) is a 3 to 6 foot perennial grass, native to the Midwest U.S. It is a slow-spreading bunchgrass and was an important component of the native, tall-grass prairie. Big bluestem is very palatable. Its fluffy seed makes it difficult to plant. Heading dates are late-July/Aug. Suggested varieties: ‘Rountree’, ‘Kaw’, ‘Bonanza’, and ‘Gold Mine’.

Indiangrass - (Sorghastrum nutans L., Nash) is a perennial (3-6 ft) bunchgrass, and a component of the native, tall-grass prairie. Fluffy seed makes it difficult to plant. It is palatable, and remains vegetative in the summer, heading in late-Aug/Sept. Varieties include ‘Rumsey’, and ‘Cheynne’.

Eastern Gamagrass - (Tripsacum dactyloides L.) is a tall, warm-season, perennial, bunchgrass that was a very minor component of the native, tall-grass prairie. It has vegetative and regrowth characteristics similar to sorghumXsudangrass hybrids. Eastern Gamagrass is very palatable. Researchers and producers are learning together how to best establish it, and how much defoliation it will tolerate without losing vigor. Seed lots are now available that have been ‘pre-chilled’ to enhance more uniform establishment. Currently available varieties; ‘Pete’, ‘Iuka’, a brand, PMK-24.

### Warm-season, summer annual grasses

Foxtail Millet - (Setaria italica L., Beauv.) also called German, Siberian, or hay millet is an annual, warm-season grass; used as harvested or grazed forage. It produces one summer growth (vegetative 1-2 ft, with seedhead 2-3 ft). It is the best of the ‘millets’ for an emergency hay crop. Foxtail miller can become a weedy grass if allowed to produce mature seed.

Japanese Millet - (Echinochloa crusgalli var. frumentacea Link, Wight) is a relatively coarse (stemmy) summer annual forage that can be used as fresh cut forage, hay, silage, or pasture.
There is very little regrowth if first growth is allowed to reach maturity, but, if cut at vegetative growth stage, good regrowth yields are more likely. Japanese millet is closely related to the grassy weed barnyard grass, so avoid allowing seed formation.

Hybrid Pearl Millet - *(Pennisetum americanum)* is a multiple-cut, warm-season annual; used for fresh cut forage, silage, or pasture (rotation grazing is recommended if grazed). It resembles sorghum and sudangrass hybrids in plant structure, but has somewhat slower regrowth than sorghum and sudangrass hybrids. It does not produce well in cool summer seasons. There is no risk of hydrocyanic acid (Prussic acid) poisoning with hybrid pearl millet.

Forage Chicory - *(Cichorium intybus)* is considered a perennial weed in many areas. It is a palatable ‘herb’ in pastures and will contribute to multiple grazings per year. Chicory is widely adapted, and establishes relatively rapidly. It may remain vegetative in the seeding year or produce seed stems. The second year and later growth will produce seed stems which must be grazed or clipped to maintain leafy regrowth for grazing. The variety ‘Puna’ was developed in and is being imported from New Zealand. Other varieties from Uruguay and France – ‘Lecerta’ and ‘Forage Feast’ are available with varying flowering and winterhardiness traits. Chicory can persist on a site if allowed to produce viable seed and volunteer seedling establishment.

Bermudagrass *(Cynodon dactylon)* is a warm-season perennial grass used extensively in the south central and south eastern U.S. states. Most varieties are established, vegetatively, using ‘sprigs. Bermudagrass spreads quickly, and has good summer production where adapted. It is not considered to an adapted, long-term perennial in the northern states, and is not generally considered to consistently over-winter in Iowa. There are a few instances of scattered Bermudagrass plants surviving in very mild winters, and a few plants may persist for several years. Surviving plants begin recovering well in June under average Iowa conditions. There are some Bermudagrass varieties and blends that can grow form seed, at about 1/10 the cost of sprigs. Seeded varieties can be very productive in the seeding year, but often winterkill.

Teff *(Eragrostis teff)* Teff is an annual grass used as a grain crop in some parts of the world. It has been used as forage in the U.S. for about the past 20 years. Its seed is very small, so recommendations are for a seeding rate of 5 to 6 lbs/A, and a planting depth of 1/8 to 1/4 in. Planting should be delayed until mid- to late-May through July. One to 3 cuts of hay can be obtained. Several commercial varieties are available. Experience with it in Iowa is limited.

References

The ISU forage variety testing results from recently completed trials are available on the Iowa Crop Improvement Association www site. http://www.croptesting.iastate.edu/alfalfa/results/.

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