

Rangeland Wildflowers:

Their Value to Livestock and Pollinators

Northern Great Plains Edition



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Acknowledgements: Thank you to Chris Helzer (The Nature Conservancy, Nebraska), Nadine Bishop (USDA-NRCS, Nebraska), Dr. Ken Olson (South Dakota State University), Dr. Krista Ehler (South Dakota State University), and Dr. Ken Spaeth (USDA-NRCS) for their guidance, expertise, and input about forage quality, livestock nutrition, livestock palatability, and more.

Thank you to Todd Schwagler, Mark Hayek, Curt Bradbury, Jon Fettig, and Richard Webb (USDA-NRCS, North Dakota), Emily Rohrer, Brandon Walter, and Jess Michalski (USDA-NRCS, South Dakota), Ritch Nelson and Jeff Nichols (USDA-NRCS, Nebraska), Kami Kilwine, Terry Heck, and Kevin Derzapf (USDA-NRCS, Montana), Jeff Duchene (USDA-NRCS, Minnesota) and Stephanie Frischie, Karin Jokela, Ray Moranz, and Deedee Soto (Xerces) for their expertise and input on rangeland wildflowers, review of this guide, and their efforts to collect plant samples. Plant data represented in this guide were also collected by Dave Dewald, Mark Hayek, Esben Kjaer, Erin Gaugler, Kadee Davidson, Hallie Harding, Jacob Maynard, Katrina Johnson, Kaci Anderson, Angel Vega, Leah Fischer, Natalie G'Schwind, Mackenzie Park, Rebecca Knapp, Koltin Christiaens, Danae Pinkerton, Haylee Barkley, Libby Olson, Brady Blasher, Sabrina Claeys, Jace Stallman, Ben Lardy, Matt Hubers, Lealand Schoon, Ryan Beer, Chelsea Forehead, Pat Welch, Emma Greenlee, Amy Schafer, and Tyson Brown.

We thank the private landowners for allowing us to collect plant samples. Thank you to the following organizations for also allowing collection of plant samples: U.S. Forest Service, Central Grasslands Research Extension Center, South Dakota Game, Fish, and Parks, South Dakota State University, Bureau of Indian Affairs, Turner Ranches, The Nature Conservancy, Nebraska Game and Parks Commission, Nine Mile Prairie (UNL Center for Grassland Studies), and Glacier Creek Preserve (University of Nebraska Omaha).

Thank you to these photographers for the use of their images: Chris Helzer (The Nature Conservancy), Drew Granville (botanist), Matt Lavin (Montana State University), Sarah Hamilton Buxton (Xerces), Jennifer Hopwood (Xerces), Ray Moranz (Xerces), Rae Powers (Xerces) and Katie Lamke (Xerces). *Rights remain with the photographer.* Thank you to Dianne Johnson (USDA FPAC-BC) for the design of this document.

This material is based upon work supported by USDA under agreements NR213A750008C008, NR213A750008C005, and a Cooperative Collaborative Agreement between NRCS and NDSU. The South Dakota Grassland Coalition (SDGC) and SDSU Extension also provided funding for this work.

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About This Guide

This guide is intended as a portable, accessible guide for recognizing common, and nutritionally important, wildflowers and shrubs found on rangelands of the Northern Great Plains. The boundary of the Northern Great Plains used in this guide was developed using Major Land Resource Areas (MLRAs) identified as grassland areas in North Dakota, South Dakota, Nebraska, Montana, Wyoming, and Minnesota. This guide shows the nutrition these plants can provide to livestock, and the ways these plants support pollinators.

This guide includes profiles of 19 rangeland wildflowers and shrubs, each containing:

- A species range map
- Photos and identification guidance
- Forage quality information
- Mineral content information
- How the plant supports pollinators
- Types of pollinators visiting flowers of the species

The forage quality and mineral content data of wildflowers and shrubs in this guide were collected as part of the Rangeland Wildflower Nutrition Project, a collaborative effort involving USDA NRCS, Xerces Society for Invertebrate Conservation, North Dakota State University Extension, University of Nebraska Lincoln Extension, South Dakota Grassland Coalition, and South Dakota State University Extension.

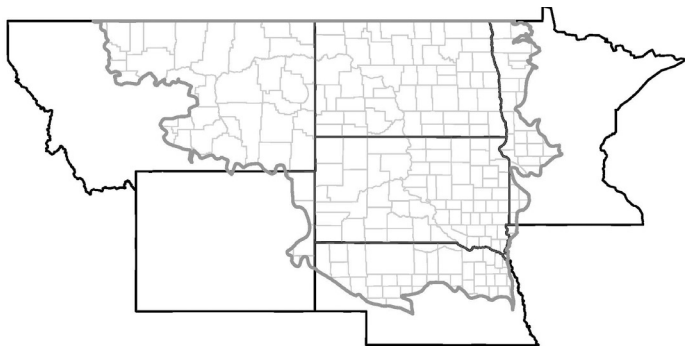


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*color bars to the right of the page numbers
reflect the flower color and page frame

Introduction

Rangelands of the Northern Great Plains are typically known and valued for their expansive waves of grass. However, native wildflowers and shrubs are also important and critical to providing a wide array of services that increase the resiliency of rangelands, provide pollinator habitat, and contribute to livestock nutrition.

Traditionally, some rangeland wildflowers have been viewed as undesirable, mistaken for invasive weeds, seen as competition for forage grasses, viewed as unpalatable for livestock, or potentially toxic. Consequently, thousands of rangeland acres receive aerial broadcast sprays of broadleaf herbicide to control non-grass plants, including invasive and problematic species. However, large scale broadcast sprays can have unintended consequences, such as eliminating non-target plants like wildflowers. Additionally, research has shown that broadleaf herbicide sprays have highly variable effects on grass biomass production and provide limited net benefit to livestock production. Wildflowers and shrubs are sources of protein, nutrients, and minerals for livestock, sometimes providing forage quality and minerals at levels greater than key forage grasses. Native wildflowers and shrubs also contribute to the overall health of rangelands by supporting soil health (e.g. via diverse rooting structures that facilitate water infiltration), increasing drought resiliency, and by providing wildlife and pollinator habitat.

Livestock eat native wildflowers and shrubs

Wildflowers and shrubs can comprise 20-47% of cattle diets throughout the year on rangelands. In North Dakota, research has shown that the amount of wildflowers grazed is influenced by grazing management and climatic conditions, with more cattle grazing wildflowers when stocked at higher rates or during drought years.

While research shows that livestock eat wildflowers, it is difficult to categorize a wildflower species as palatable or unpalatable because there are many factors that affect when livestock graze these plants and which parts of the plant they might choose to eat. Livestock diet selection is dynamic and dependent on many factors, including abundance and diversity of forage, grazing management practices, palatability, time of year, precipitation, topography, livestock species, breed, age class, and learned grazing behaviors. Additionally, livestock might readily consume all plant parts of some



wildflowers (e.g. purple prairie clover) and only eat certain plant parts of other species (e.g. thistle flowers). Wildflowers that are less readily consumed during ideal conditions may be a larger component of livestock diets in periods when grasses are low in quality or abundance, e.g. fall and winter or in drought years. Therefore, having a diverse community of wildflowers and grasses is beneficial to livestock, ranchers, and pollinators.

Native rangeland wildflowers provide nutrition to livestock

Native rangeland wildflowers are important sources of crude protein, total digestible nutrients, and key minerals for livestock performance and health. Crude protein (CP) is the measurement of nitrogen in a feedstuff and is important for vital organs and systems, including the reproductive and immune systems. Total digestible nutrients (TDN) is an estimate of the energy content of a feedstuff and is the sum of digestible fiber, lipid, carbohydrate, and protein components of a feed or forage. Minerals are important for cattle performance and health, influencing milk production in cows, health and reproduction rates in cows, and weight gain in calves. See Page 49 for more information on key minerals and their functions in livestock health.

Grasses and other graminoids are the primary forage for cattle, bison, and other livestock and have been thoroughly researched to understand their quality at different growth stages and locations. Although wildflowers and shrubs represent a considerable portion of the above ground biomass in rangelands, comparable comprehensive research on the forage quality and mineral content of native rangeland wildflowers has not been done until recently. This guide provides profiles of 19 common, native rangeland wildflowers and shrubs in the Northern Great Plains and their mineral content and forage value to livestock, tips for identifying these plants, and information on their value to pollinators.

When forage quality data are averaged across the growing season, all 19 of the wildflowers and shrubs included in this guide meet or exceed the minimum requirements of total digestible nutrients for a 1,200 pound lactating cow and 65% of plants meet or exceed the minimum requirements of crude protein for a 1,200 pound lactating cow. Additionally, many wildflowers provide important minerals, sometimes exceeding minimum requirements. Minerals such as phosphorus, calcium, potassium, copper, and zinc are often present in wildflowers

Forage that meets the needs of a lactating cow provides ample nutrition for the rest of the herd as nutritional needs peak during lactation. Therefore, minimum requirements hereafter refer to those of a 1,200 lb lactating cow.

and shrubs at higher levels than in the grass community. Mineral content in grasses and wildflowers is linked to soil type and will vary accordingly.

The forage quality and mineral content of native rangeland wildflowers and flowering shrubs show that a diverse plant community will provide more opportunities for livestock to meet their nutritional and mineral needs, while also providing forage and shelter to pollinators and other wildlife.

Without pollinators on rangelands, many native wildflowers and flowering shrubs couldn't persist on these landscapes, as they need pollinators to move pollen from flower to flower, allowing the plant to set seed and reproduce. Therefore, it's important to have healthy pollinator communities on rangelands to support diverse plant communities that support livestock performance and health.

A few native wildflowers are toxic to livestock; noxious or invasive weeds can also be problematic

Although most native wildflowers are not toxic to livestock, some species are toxic and may need to be controlled using targeted weed management techniques. Additionally, some flowering plants that have been introduced or have invaded rangelands are noxious weeds that are economically and ecologically harmful, and require control. However, before taking control measures, it's important to identify the plant to confirm it is a toxic species or a noxious weed that needs controlling. Because of the benefits many native wildflowers provide, care should be taken when chemically controlling invasive or undesirable plants on native rangelands with broadleaf, non-selective herbicides. Targeted application of herbicide (e.g. spot spraying) rather than broadcast application reduces impacts on non-target plants. (Please see Pages 47-48 for noxious weeds that resemble native wildflowers.)

Pollinators need rangelands and wildflowers

Native rangelands of the Great Plains are valuable, yet underappreciated, pollinator habitat. Rangelands provide vast areas of connected habitat with a diversity of wildflowers. Wildflower communities with overlapping bloom periods provide valuable food resources (pollen and nectar) for pollinators throughout the growing season.

Many pollinators and other beneficial insects (such as predators that provide pest control and decomposers that help keep soils healthy) nest, overwinter, and breed in rangeland soil and plant stems. Bumble bees and other pollinators use bunchgrasses for nesting sites. Woody debris and leaf litter provide excellent overwintering shelter and habitat for many invertebrates, including moths,

butterflies, beetles, flies, and wasps. Furthermore, diverse wildflower and grass communities offer larval host plants for many butterflies and moths.

Pollinator habitat is dynamic, flexible, and can be achieved in a variety of ways depending on the landscape and objectives. Guidance for balancing livestock production with pollinator habitat can be found in *Rangeland Management and Pollinators: A Guide for Producers in the Great Plains*. We encourage you to reach out to Xerces/NRCS partner biologists in the region for additional support at rangelands@xerces.org.

Diverse rangeland plant communities and rangeland wildflowers provide benefits for people, livestock, pollinators, and other wildlife

Beyond livestock production and wildlife habitat, diverse rangelands are important spaces for people. Rangelands provide vital ecosystem services to human communities near and far, including water filtration and storage, climate stabilization, carbon sequestration, and support of rural communities and cultural identities. Rangelands are iconic landscapes that capture people's attention and awe, and are celebrated in movies and literature.



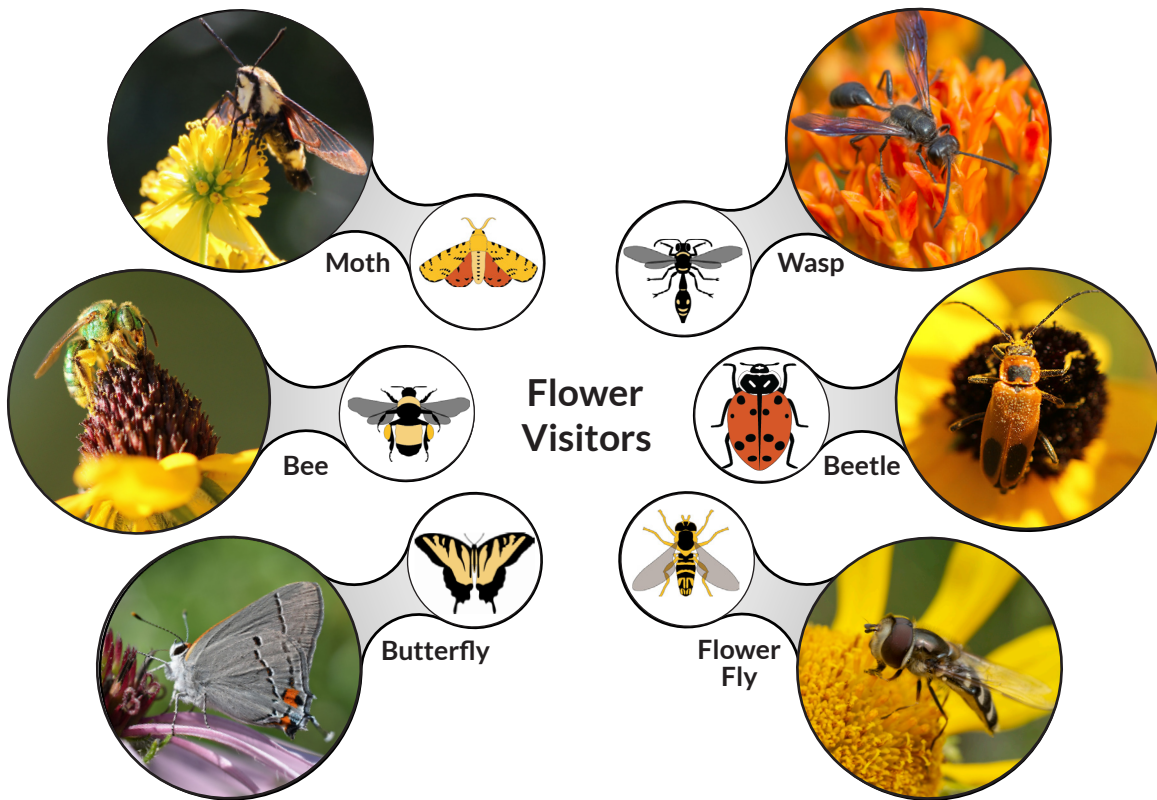
Some of America's most beloved wildlife species depend on healthy rangeland habitat. Wildlife species big and small need grasslands to survive and thrive, including songbirds like meadowlarks and grasshopper sparrows, game birds such as prairie chickens and sharp-tailed grouse, and large mammals such as white-tailed deer, pronghorn, and bison. Native grasses, wildflowers, and shrubs provide wildlife forage for grazing and browsing. Fruits and seeds, which are dependent on insect pollinators, are also vital wildlife food sources.

In addition to pollination, invertebrates on rangelands are critical food sources for many other species of wildlife, supporting a resilient food web. Invertebrates also provide other beneficial services such as pest control, decomposition, and improved soil health. Pollinators and other invertebrates support a diverse ecosystem that can, in turn, support livestock performance and health, wildlife, and provide valuable ecosystem services.

Pollinators on Rangelands

Many flowering plants on rangelands rely on animals, primarily insects, to move pollen between their flowers to reproduce and set seed. There are six main groups of insects that provide pollination: bees, beetles, butterflies, flies, moths, and wasps.

Some pollinator species have specialized relationships with certain plant species or groups of related plants. Plant diversity on rangelands can support a wide array of pollinators, including regal fritillary butterflies (*Speyeria idalia*) and sunflower mining bees (*Andrena helianthiformis*) that are highly reliant on native grasslands, as well as more widespread species like American bumble bees (*Bombus pensylvanicus*) and monarch butterflies (*Danaus plexippus*).



Pollinators on Rangelands

Each plant profile includes icons to indicate the way(s) in which the plant supports pollinators. There are four key resources that plants may provide for pollinators. These are:



Nectar/Pollen

Pollinators drink sugary nectar to power their activity. Pollen is an essential source of protein for developing larval bees and also for adults of some groups, such as beetles and flies.



Caterpillar Food

Caterpillars, the immature stage of butterflies and moths, consume plant parts as food. Some are selective eaters that feed on one to several closely related plant species, while others feed on multiple plant families.



Bee Nesting Material

Bees that nest above ground rely on plant materials, such as stems, for nest sites or may use leaves or petals in their nest construction.



Pollen for Specialist Bees

Some bees are very selective about the pollen they collect to feed their young. These specialist bees only collect pollen from one to several closely related plant species.

On the next two pages, you will find an example plant profile with details about the profile components.

EXAMPLE PROFILE

Common Name (*Scientific Name*)

7

A leaf or foliage photo

Captions may include identification tips or other information about the species

A photo of flower(s), seed pods/fruit

Captions may include identification tips or other information about the species

The **MAP** boundary of the Northern Great Plains used in this guide was developed using Major Land Resource Areas (MLRAs) identified as grassland areas in North Dakota, South Dakota, Nebraska, Montana, Wyoming, and Minnesota.

The ranges of species within our regional boundaries are indicated by counties that are shaded green. These ranges were developed using recorded occurrences in PLANTS database, Biota of North America Plants Atlas (BONAP), and this project. If a species is present (shaded green) in adjacent counties, it may be present - but unrecorded - in counties with no documented occurrences (shaded white). **Range of the plant species may extend beyond the given Northern Great Plains boundary.**

Each profile includes:

Bloom Time:

Height:

ID Tips:

Forage Quality:

Forage Quality

Graphs show crude protein (CP) and total digestible nutrients (TDN) (%) through time (May 18-Sept 20). Values were calculated on a dry weight basis. Each black dot is the average of CP or TDN of samples of a given wildflower species collected on a given date. The black line shows the trendline of all wildflower samples of a given species across the growing season. The gray area around the black line shows the standard error, an estimate of variation around the average.

Data from cool (blue line) and warm season (red line) grasses are included for comparison. See Page 50 for additional information on the grass data used in this guide. The minimum CP and TDN requirements for a 1,200 lb lactating cow are also shown as dotted lines for reference.

Frame color indicates flower color for quick reference

Common Name (Scientific Name)

A landscape photo of the plant in the broader landscape

Captions may include identification tips or other information about the species

This plant provides:



Nectar / Pollen



Caterpillar Food



Bee Nesting Material



Pollen for Specialist Bees

Flower visited by:



Moths



Bees



Butterflies



Wasps



Beetles



Flower Flies*

Profiles also include a summary of the macromineral and micromineral content of each plant.

Macrominerals:

Microminerals:

Mineral Data

Graphs show the average level across the growing season (May 18-Sept 20) of three macrominerals (potassium, calcium, and phosphorous [%]) and two microminerals (zinc and copper [ppm]) important to livestock performance and health. Values were calculated on a dry weight basis. Data from cool and warm season grasses are included for comparison. The black bars at the top of each column show the standard error, an estimate of variation around the average. The minimum requirement of each mineral for a 1,200 lb lactating cow is also shown as a dotted line for reference. See Page 49 for key roles of minerals in livestock health. Page 50 has additional information on the grass data used in this guide.

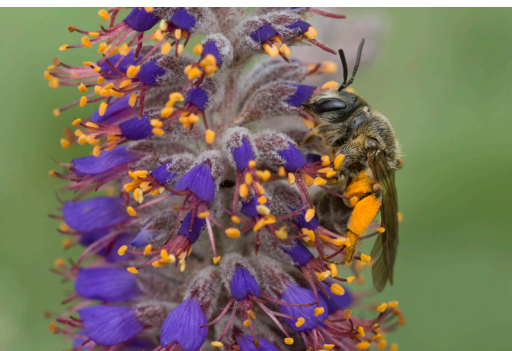
Frame color indicates flower color for quick reference

**Flower visiting flies are not blood feeders or dung breeders*

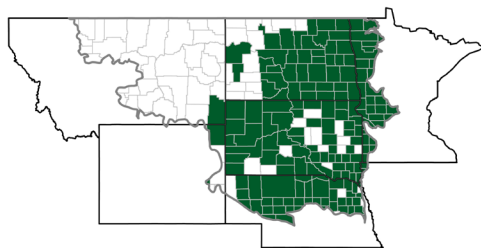
Leadplant (*Amorpha canescens*)



Leaves are alternate and have many leaflets. Leaves and stems have white, wooly hairs.



Small, purple, bell-shaped flowers with orange pollen are clustered in dense spikes.

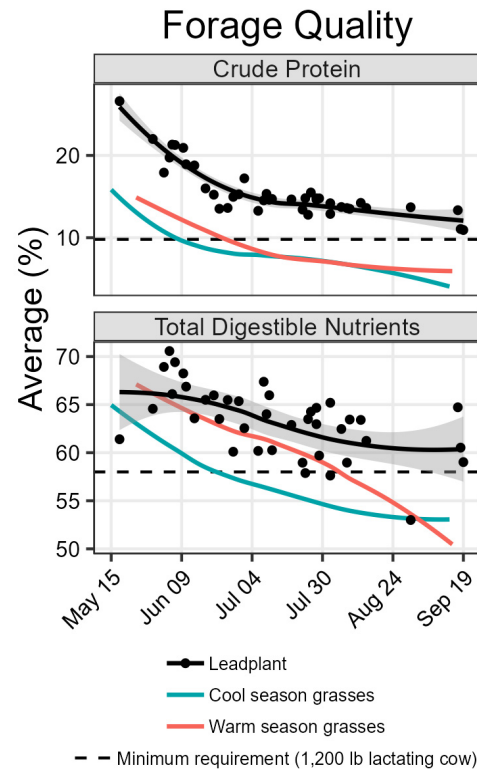


Bloom Time: June - August

Height: 1-3'

ID Tips: Plant has woody stems from previous years' growth while new stems are herbaceous.

Forage Quality: This legume exceeds the minimum requirements for crude protein and total digestible nutrients (TDN) throughout the growing season, and is particularly high in crude protein early in the growing season.



Leadplant (*Amorpha canescens*)



Leadplant is drought, shade, and fire tolerant.

This plant provides:



Nectar/Pollen



Caterpillar Food



Pollen for Specialist Bees

Flower visited by:



Moths



Bees



Butterflies



Wasps

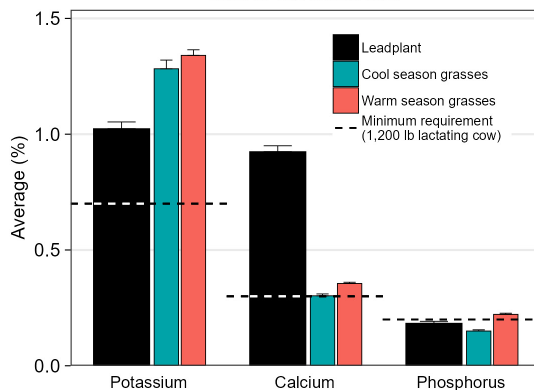


Beetles

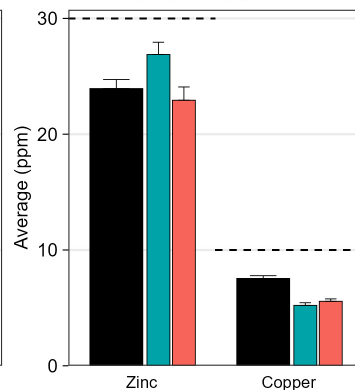


Flower Flies

Macrominerals



Microminerals



Macrominerals: Leadplant has potassium and calcium levels higher than cattle minimum requirements. Phosphorous is slightly below the minimum requirement level.

Microminerals: Zinc levels in leadplant are comparable to grasses and fall below the minimum requirement. Copper levels in leadplant occur below the minimum requirement, but are higher than levels in grasses.

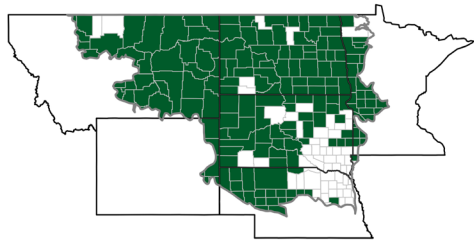
Showy Milkweed (*Asclepias speciosa*)



Leaves are opposite, oval-shaped, and hairy. Showy milkweed leaves are hairier than common milkweed.



Pink and cream star-shaped flowers grow in large, round clusters and are larger and spikier in appearance than common milkweed flowers.



Bloom Time: May - September

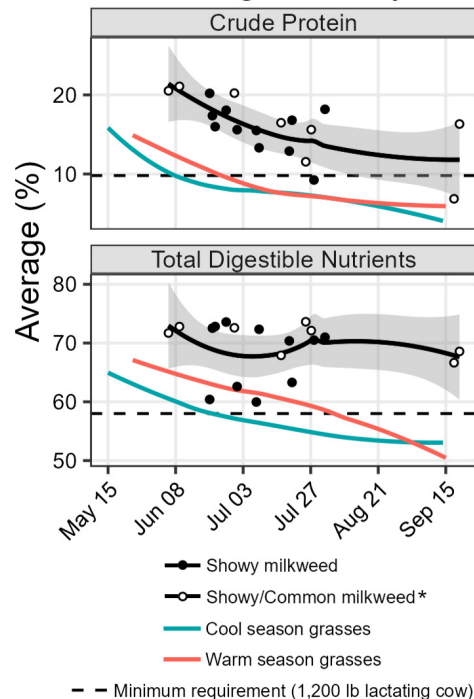
Height: 1.5-3'

ID Tips: Plant is not shade tolerant. Showy milkweed and common milkweed can be difficult to distinguish in the vegetative stage. Showy milkweed is more common in the western Great Plains and common milkweed is more common in the east, with significant overlap in the central Great Plains. See photo captions for distinctive characteristics.

Forage Quality: Showy milkweed exceeds the minimum requirements for crude protein and TDN throughout the growing season, and has higher forage quality levels than grasses across the growing season.

*Showy and common milkweed data were combined when species could not be distinguished during field sampling.

Forage Quality



Showy Milkweed (*Asclepias speciosa*)



Showy milkweed exudes milky latex/sap from damaged leaves or stems.

This plant provides:



Nectar / Pollen



Caterpillar Food



Bee Nesting Material

Flower visited by:



Moths



Bees



Butterflies



Wasps

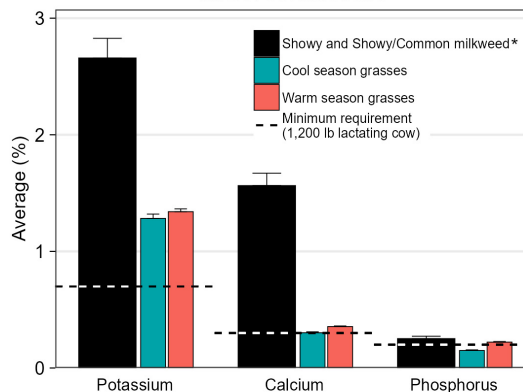


Beetles

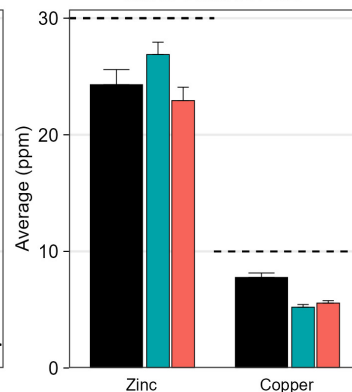


Flower Flies

Macrominerals



Microminerals



Macrominerals: Showy milkweed has significantly higher potassium and calcium levels than grasses, and exceeds the cattle minimum requirement. Phosphorus is slightly above the minimum requirement.

Microminerals: Zinc levels in showy milkweed are comparable to grasses and fall below the minimum requirement. Though copper is below the minimum requirement, it is higher than levels in grasses.

Milkweeds have a reputation as a toxic genus of plants for livestock. However, many milkweed species do not contain enough cardenolides (a secondary compound found in most milkweeds) to be toxic to cattle. Recent Great Plains research indicates that widespread species like common and showy milkweed are low in cardenolides and are highly preferred forage for cattle.

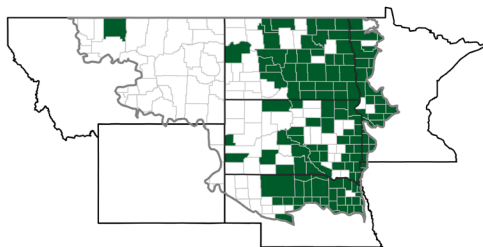
Common Milkweed (*Asclepias syriaca*)



Leaves are opposite, oval-shaped, and have fine hairs underneath. Common milkweed leaves are less hairy than showy milkweed.



Rose pink to white star-shaped flowers grow in large, round clusters. Common milkweed flowers are smaller and more rounded than showy milkweed.



Bloom Time: June - August

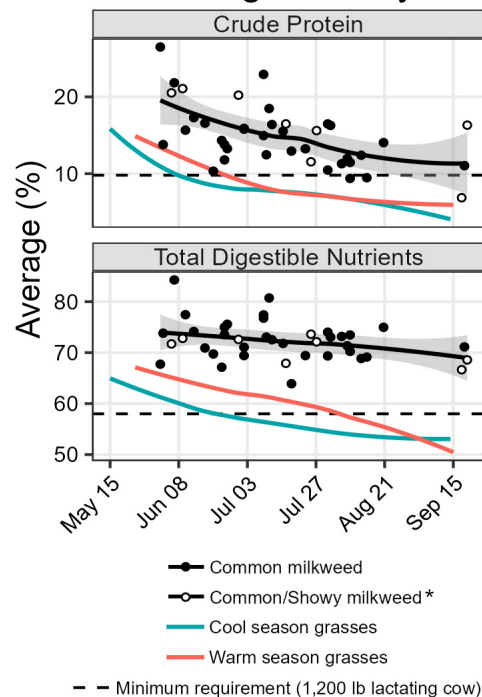
Height: 2-3'

ID Tips: Plant is common in many landscapes and soil types; tolerates part shade. Showy and common milkweed are difficult to distinguish, especially when the flower is not present. Showy milkweed is more common in the western Great Plains and common milkweed is more common in the east, with significant overlap in the central Great Plains.

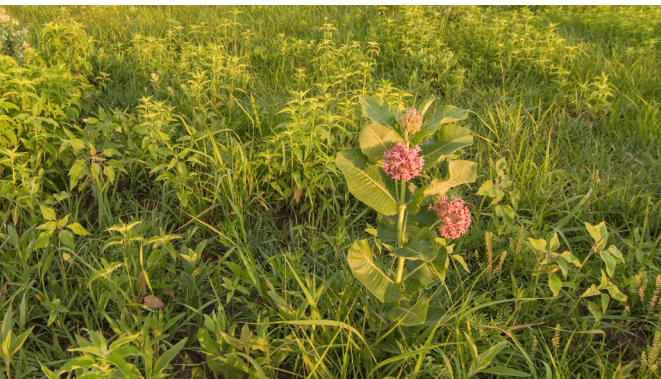
Forage Quality: Common milkweed has higher forage quality levels than grasses and exceeds minimum requirements throughout the growing season. TDN is higher and more stable later in the growing season than grasses.

*Common and showy milkweed data were combined when species could not be distinguished during field sampling.

Forage Quality



Common Milkweed (*Asclepias syriaca*)



Common milkweed exudes milky latex/sap from damaged leaves or stems.

This plant provides:



Nectar / Pollen



Caterpillar Food



Bee Nesting Material

Flower visited by:



Moths



Bees



Butterflies



Wasps

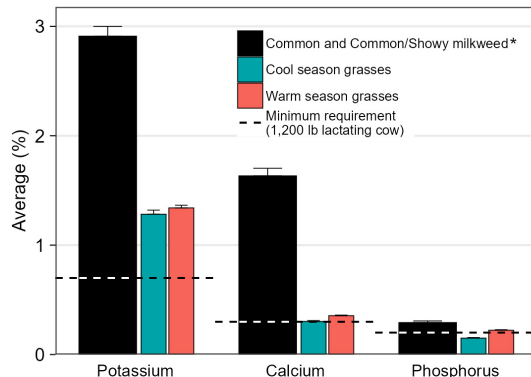


Beetles

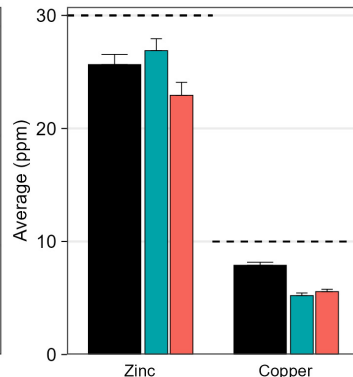


Flower Flies

Macrominerals



Microminerals



Macrominerals: Common milkweed has higher potassium and calcium levels than grasses and exceeds cattle minimum requirements. Phosphorous levels are above the minimum requirements.

Microminerals: Zinc levels in common milkweed are comparable to grasses and fall below the minimum requirement. Though copper is below the minimum requirement, it is higher than levels in grasses.

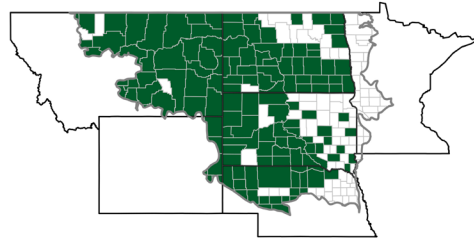
Milkweeds have a reputation as a toxic genus of plants for livestock. However, many milkweed species do not contain enough cardenolides (a secondary compound found in most milkweeds) to be toxic to cattle. Recent Great Plains research indicates that widespread species like common and showy milkweed are low in cardenolides and are highly preferred forage for cattle.



Leaves are alternate and have wavy edges and yellow spines with dense, pale, felt-like hair underneath.



Large, pale purple flowers grow at the ends of the stems and attract many pollinators.



Bloom Time: June - August

Height: 1-3'

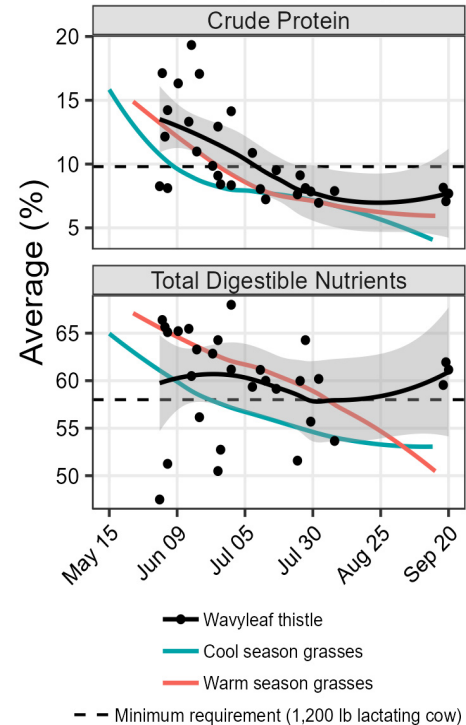
ID Tips: Plant is usually solitary and doesn't grow in large patches.

Forage Quality: Wavyleaf thistle exceeds minimum requirements for crude protein and TDN early in the growing season. TDN remains above requirements late in the growing season.

See Page 47-48 for noxious weeds that resemble wavyleaf thistle.



Forage Quality



Wavyleaf Thistle (*Cirsium undulatum*)



Songbirds eat wavyleaf thistle seeds and may use the fibers attached to the seed for nesting material.

This plant provides:



Nectar / Pollen



Pollen for Specialist Bees

Flower visited by:



Moths



Bees



Butterflies



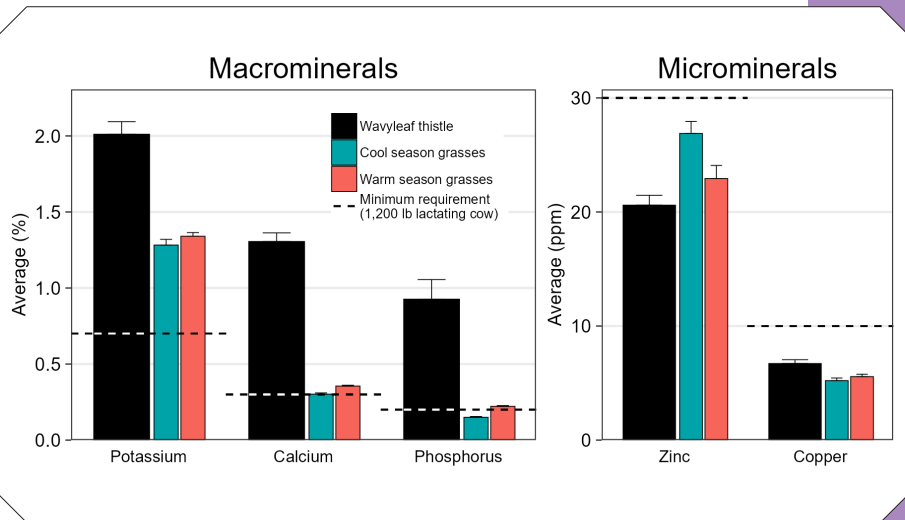
Wasps



Beetles



Flower Flies



Macrominerals: Levels of potassium, calcium, and phosphorus in wavyleaf thistle exceed cattle minimum requirements, and levels are higher than those found in grasses.

Microminerals: Zinc levels are lower in wavyleaf thistle than grasses. Copper levels are under the minimum requirement but are higher than grasses.

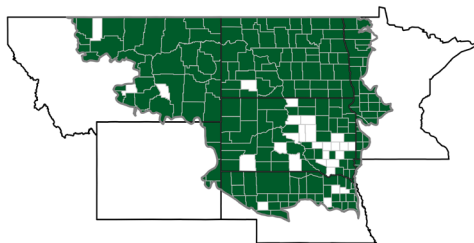
Purple Prairie Clover (*Dalea purpurea*)



Leaves are alternate and typically have 3-5 narrow leaflets.



Small, bright purple flowers are densely grouped in a cylinder that bloom from bottom to top.



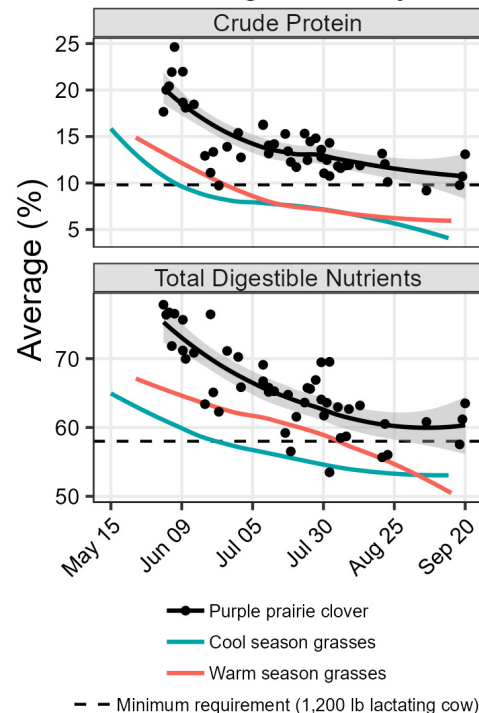
Bloom Time: July - August

Height: 1-3'

ID Tips: Leaves have a fragrant, citrus smell when crushed.

Forage Quality: This legume provides crude protein and TDN above the minimum requirements throughout the growing season. Although forage quality declines similarly in purple prairie clover and grasses, purple prairie clover consistently has higher forage quality than grasses throughout the growing season.

Forage Quality



Purple Prairie Clover (*Dalea purpurea*)



The taproot of purple prairie clover may extend up to 6.5' deep.

This plant provides:



Nectar / Pollen



Caterpillar Food



Pollen for Specialist Bees

Flower visited by:



Moths



Bees



Butterflies



Wasps

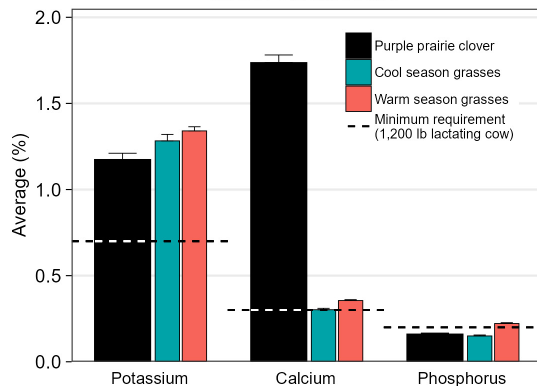


Beetles

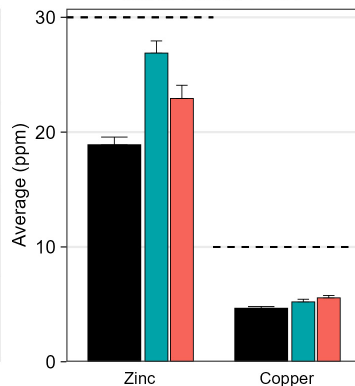


Flower Flies

Macrominerals



Microminerals



Macrominerals: Levels of potassium and calcium in purple prairie clover exceed cattle minimum requirements. Calcium levels in purple prairie clover far exceed calcium levels found in grasses.

Microminerals: Zinc levels in purple prairie clover are lower than levels found in grasses, while copper is found at levels similar to grasses.

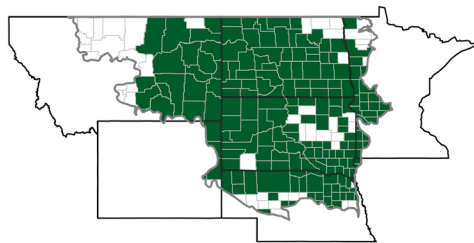
Narrowleaf Purple Coneflower (*Echinacea angustifolia*)



Leaves are alternate, oblong, and grow mostly at the base of the plant. Leaves are rough and have distinctive parallel veins.



Pinkish-purple flowers have petals drooping from a central, dome-shaped disk covered with sharp bristles.

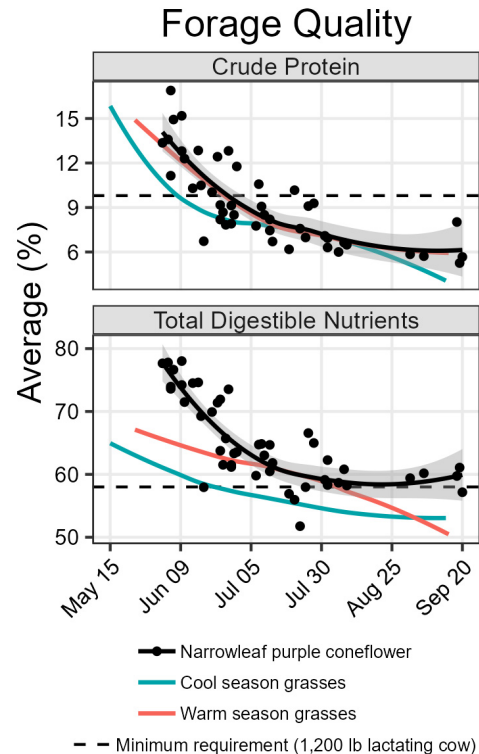


Bloom Time: May - July

Height: 6 - 24"

ID Tips: Plant has one to several stems covered in rough hairs. After blooming, the central disk blackens and remains very visible.

Forage Quality: Levels of crude protein and TDN in narrowleaf purple coneflower are highest early in the growing season and decrease over time, as do grasses. TDN meets minimum requirements throughout the growing season, while crude protein drops below minimum requirements mid season.



Narrowleaf Purple Coneflower (*Echinacea angustifolia*)



Narrowleaf purple coneflower is an important plant for skipper butterflies.

This plant provides:



Nectar / Pollen



Pollen for Specialist Bees

Flower visited by:



Moths



Bees



Butterflies



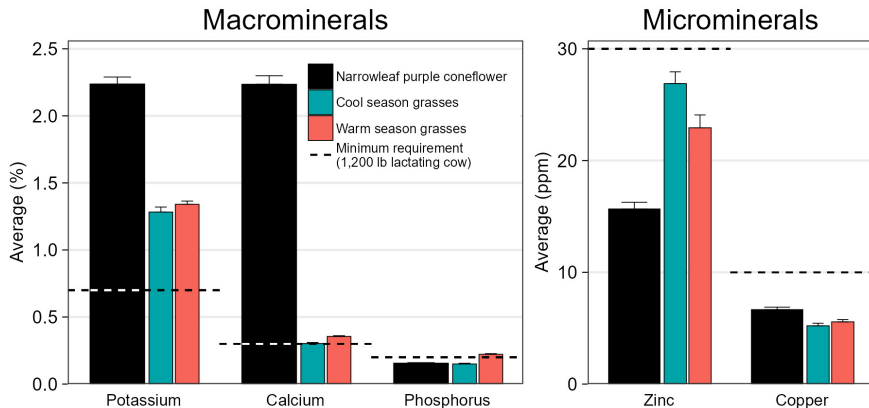
Wasps



Beetles



Flower Flies



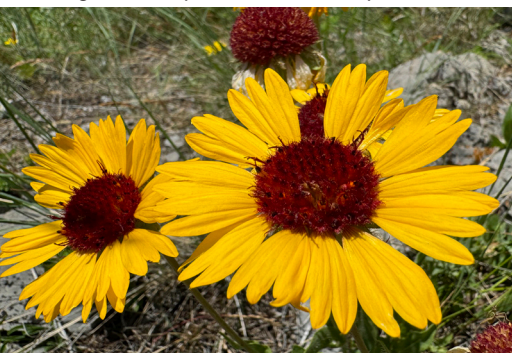
Macrominerals: Levels of potassium and calcium in narrowleaf purple coneflower exceed cattle minimum requirements and are higher than in grasses. Phosphorus levels are below the minimum requirement.

Microminerals: Narrowleaf purple coneflower has lower levels of zinc than grasses and slightly higher levels of copper than grasses.

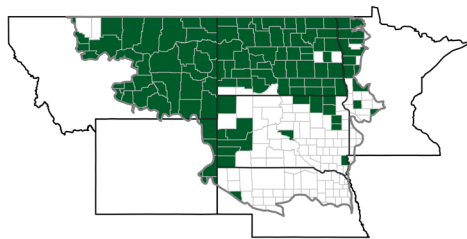
Blanketflower (*Gaillardia aristata*)



Leaves are alternate, 3-6" long, and have coarsely toothed, lobed, or smooth edges. Leaves are hairy and grow mostly at the base of the plant.



Large, yellow flowers have a reddish-brown central disk.

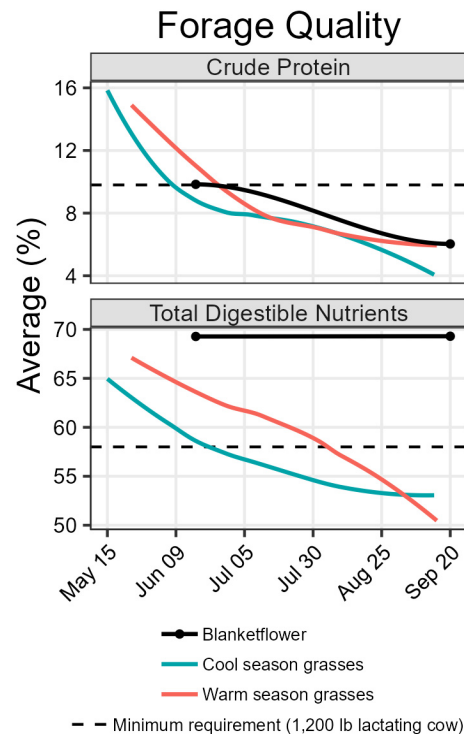


Bloom Time: June - July

Height: 1-2'

ID Tips: Plant has upright to spreading stems that grow singly or in clusters; stems are hairy.

Forage Quality: TDN meets minimum requirements for cattle, though crude protein levels fall below minimum requirements. Data are limited for this species.



Blanketflower (*Gaillardia aristata*)



Blanketflower petals may have variable amounts of red and yellow.

This plant provides:



Nectar / Pollen



Caterpillar Food

Flower visited by:



Moths



Bees



Butterflies



Wasps

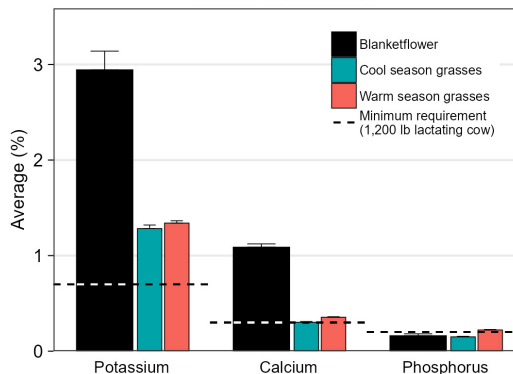


Beetles

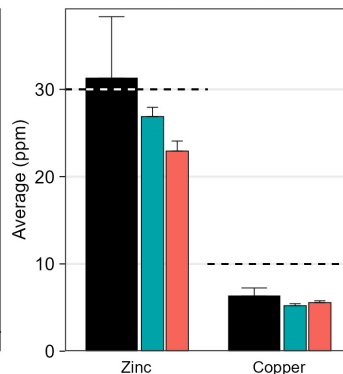


Flower Flies

Macrominerals



Microminerals



Macrominerals: Potassium and calcium levels in blanketflower are higher than cattle minimum requirements and are much higher than levels found in grasses. Phosphorous is slightly below the minimum requirement.

Microminerals: Zinc levels in blanketflower are higher than levels in grasses and exceed minimum requirements. Copper levels are similar to grasses.

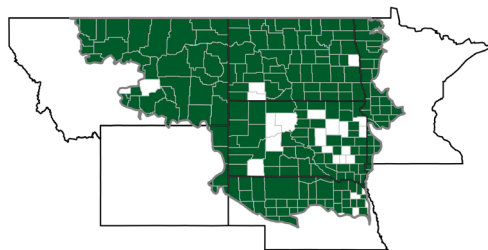
American Licorice (*Glycyrrhiza lepidota*)



Leaves are opposite and made up of many smooth leaflets.



Small, white flowers grow in clusters on the top of short stalks. Seed pods are brown burs with hooked spines.

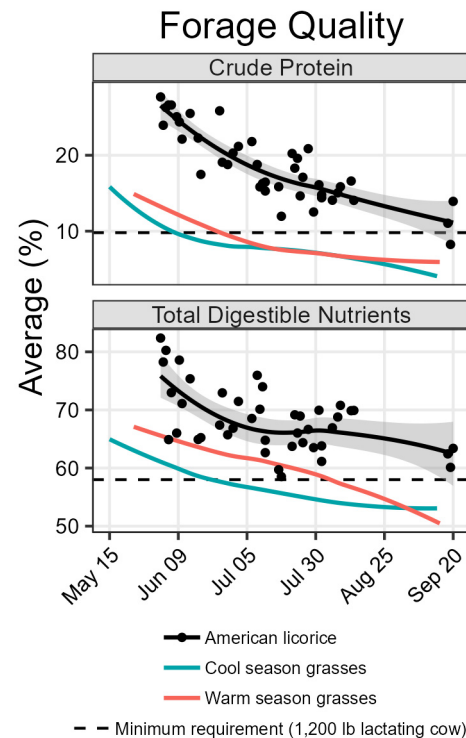


Bloom Time: May - July

Height: 1.5 - 3'

ID Tips: Plant has smooth, branched stems.

Forage Quality: This legume has very high crude protein levels that are above the minimum requirement and grass levels throughout the growing season. TDN is high and exceeds the minimum requirement across the growing season.



American Licorice (*Glycyrrhiza lepidota*)



American licorice has extensive root systems, up to 12' deep.

This plant provides:



Nectar / Pollen



Caterpillar Food

Flower visited by:



Moths



Bees



Butterflies



Wasps

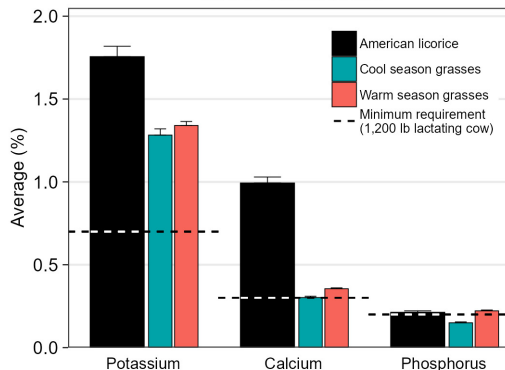


Beetles

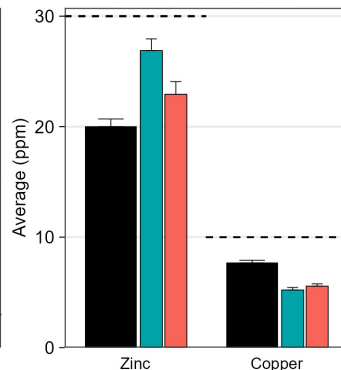


Flower Flies

Macrominerals



Microminerals



Macrominerals: Potassium and calcium levels in American licorice are higher than cattle minimum requirements and are much higher than in grasses. Phosphorous is slightly above the minimum requirement.

Microminerals: American licorice has lower levels of zinc than grasses. Though copper levels are below the minimum requirement, American licorice has higher levels of copper than grasses.

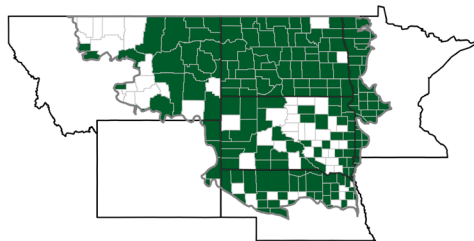
Stiff Sunflower (*Helianthus pauciflorus*)



Leaves are opposite and have a stiff, sandpaper texture. Stems are stiff and rough.



Yellow flowers are 2.5" wide and have a brown to purplish central disk.

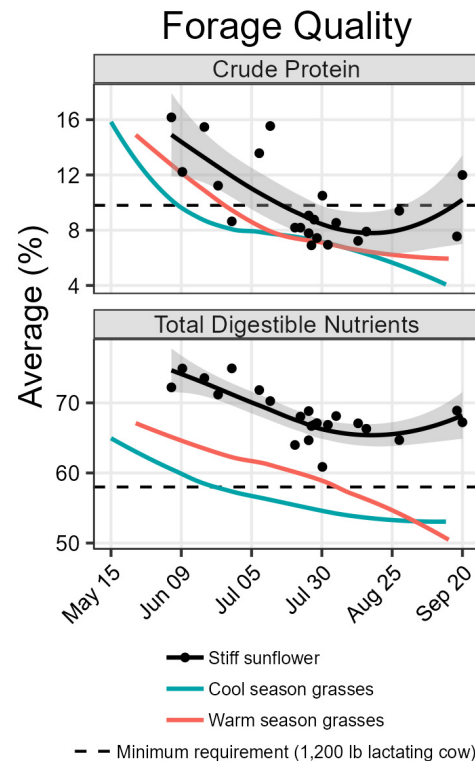


Bloom Time: July - August

Height: 1-5'

ID Tips: Plant is rhizomatous and can grow in colonies.

Forage Quality: Crude protein in stiff sunflower is highest early in the growing season and is slightly higher than grasses, while TDN is much higher than grasses and exceeds the minimum requirement throughout the growing season.



Stiff Sunflower (*Helianthus pauciflorus*)



Stiff sunflower thrives in dry soils.

This plant provides:



Nectar / Pollen



Caterpillar Food



Pollen for Specialist Bees

Flower visited by:



Moths



Bees



Butterflies



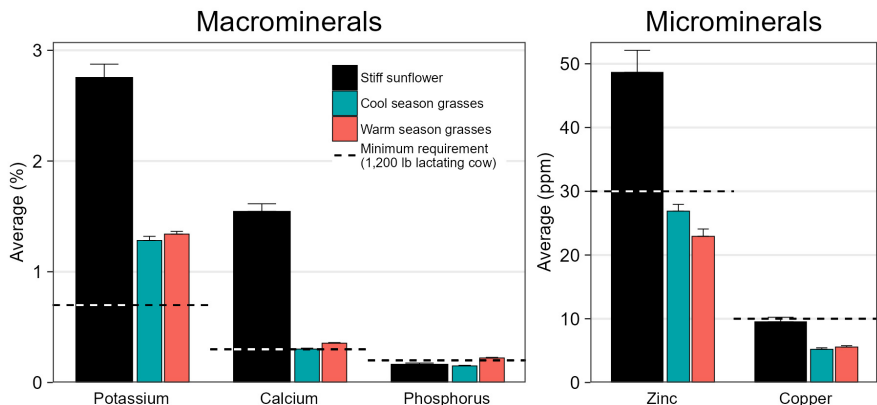
Wasps



Beetles



Flower Flies



Macrominerals: Potassium and calcium levels in stiff sunflower far exceed cattle minimum requirements and are much higher than in grasses. Phosphorus nearly meets the minimum requirement.

Microminerals: Zinc levels in stiff sunflower exceed cattle minimum requirements and are higher than grasses. Copper levels nearly meet the minimum requirement and are higher than grasses.

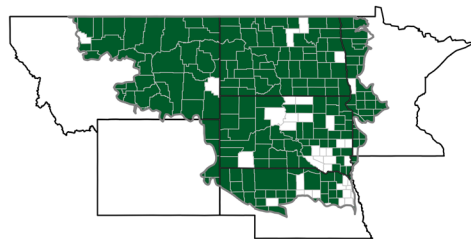
Dotted Gayfeather (*Liatris punctata*)



Leaves are alternate, narrow, and have hairs along the edges. Leaves are covered with light dots and are up to 6" long.



Small, purple flowers are clustered in blooming spikes on the upper stem.

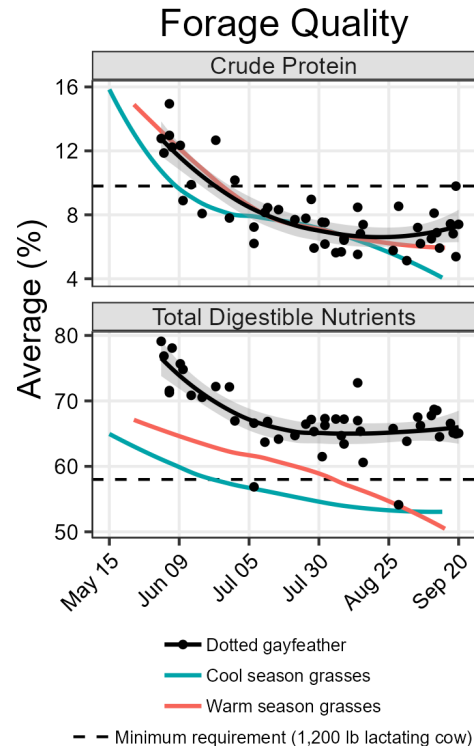


Bloom Time: July - September

Height: 1 - 2.5'

ID Tips: Plant has one to many unbranched stems.

Forage Quality: Crude protein in dotted gayfeather falls below minimum requirements mid season and is comparable to grasses, while TDN is above minimum requirements throughout the growing season and levels off mid season.



Dotted Gayfeather (*Liatris punctata*)



Dotted gayfeather is extremely drought tolerant and tolerates alkaline and calcareous soils. Fluffy seed heads emerge in late summer.

This plant provides:



Nectar / Pollen



Caterpillar Food



Pollen for Specialist Bees

Flower visited by:



Moths

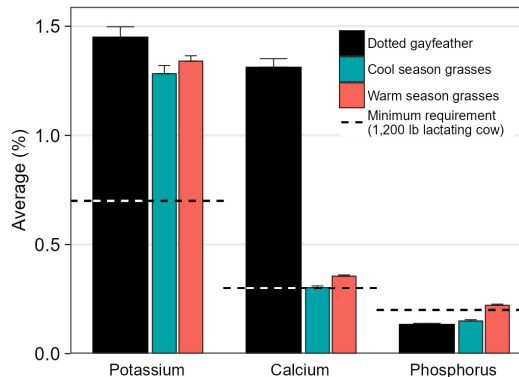


Bees

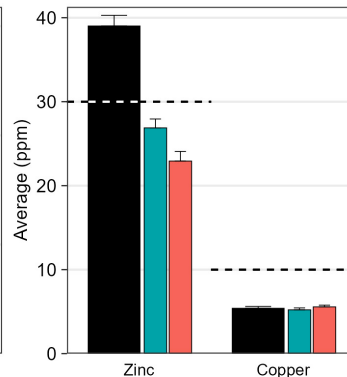


Butterflies

Macrominerals



Microminerals



Macrominerals: Dotted gayfeather has potassium and calcium levels that far exceed cattle minimum requirements, with calcium levels much higher than in grasses. Phosphorus levels are below the minimum requirement.

Microminerals: Zinc levels exceed minimum requirements for cattle. Copper is below the minimum requirement, with levels similar to grasses.

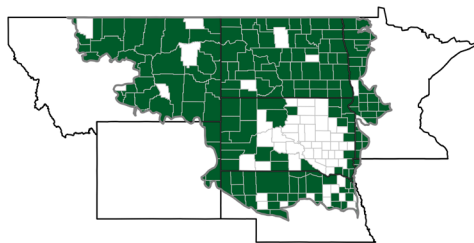
Wild Bergamot (*Monarda fistulosa*)



Leaves are opposite and have slightly toothed edges.



Small, light purple, tubular flowers grow in showy clusters at the end of stems.

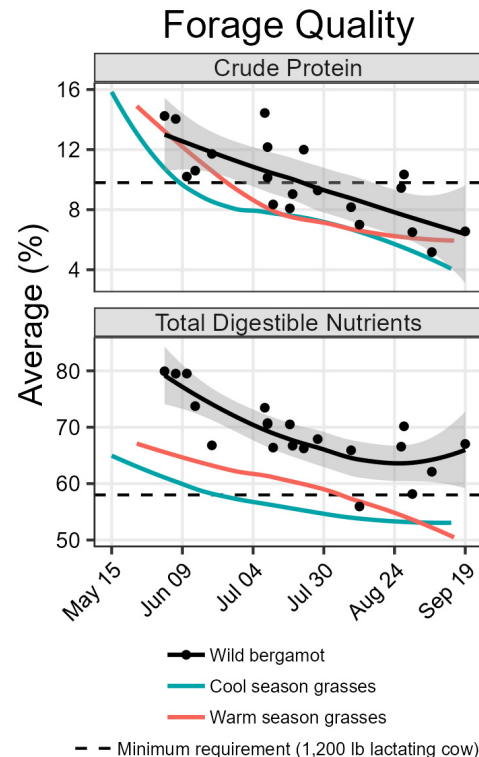


Bloom Time: May - September

Height: 2 - 4'

ID Tips: Plant has hairy, square stems; leaves have a mint-like fragrance when crushed.

Forage Quality: Crude protein levels are comparable to grass levels and similarly decrease with time, while TDN is above the minimum requirements throughout the growing season.



Wild Bergamot (*Monarda fistulosa*)



Wild bergamot is rhizomatous and can form small, dense patches.

This plant provides:



Nectar / Pollen



Caterpillar Food



Bee Nesting Material



Pollen for Specialist Bees

Flower visited by:



Moths



Bees



Butterflies

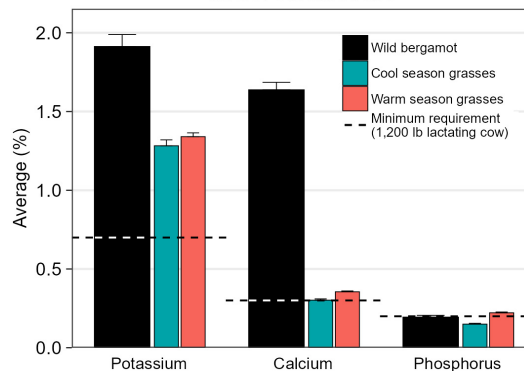


Wasps

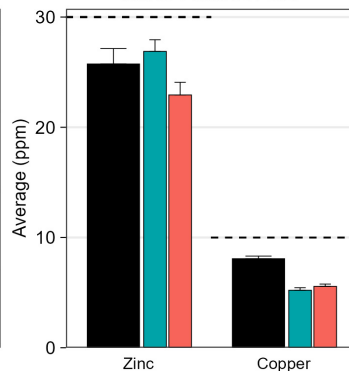


Flower Flies

Macrominerals



Microminerals



Macrominerals: Levels of potassium and calcium in wild bergamot exceed cattle minimum requirements and are higher than grasses. Phosphorus levels meet the minimum requirement.

Microminerals: Zinc levels in wild bergamot are similar to grasses. Copper levels in wild bergamot are under the minimum requirement but are higher than grasses.

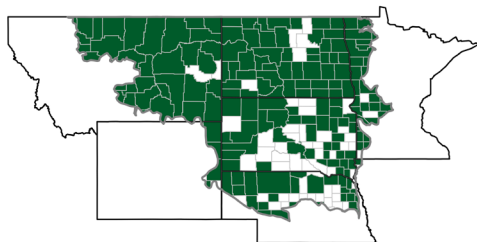
Stiff Goldenrod (*Oligoneuron rigidum*)



Leaves are alternate and have a stiff, leathery texture.



Many small, yellow flowers form domed or flat-topped clusters at the end of stems.



Bloom Time: August - September

Height: 3 - 4'

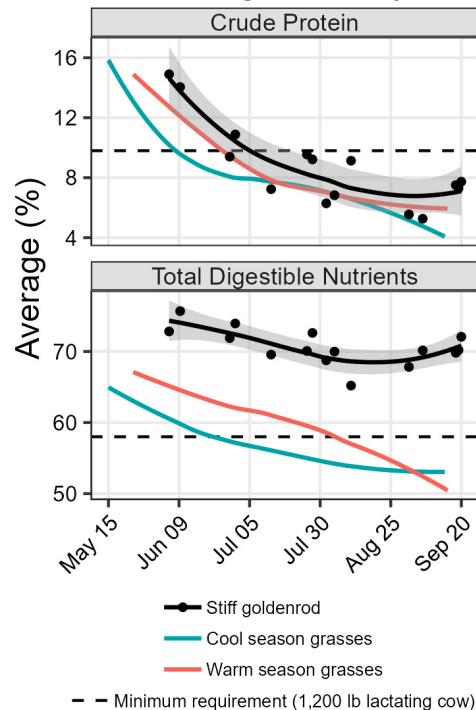
ID Tips: Plant has one to several straight, stiff stems that only branch at the top.

Forage Quality: Crude protein is highest early in the growing season and is comparable to grasses, while TDN exceeds minimum requirements and is higher than grasses throughout the growing season.

See Page 48 for information on leafy spurge, a noxious weed that resembles stiff goldenrod.



Forage Quality



Stiff Goldenrod (*Oligoneuron rigidum*)



Stiff goldenrod is adaptable and can thrive in a wide range of soil moisture conditions.

This plant provides:



Nectar / Pollen



Caterpillar Food



Bee Nesting Material



Pollen for Specialist Bees

Flower visited by:



Moths



Bees



Butterflies



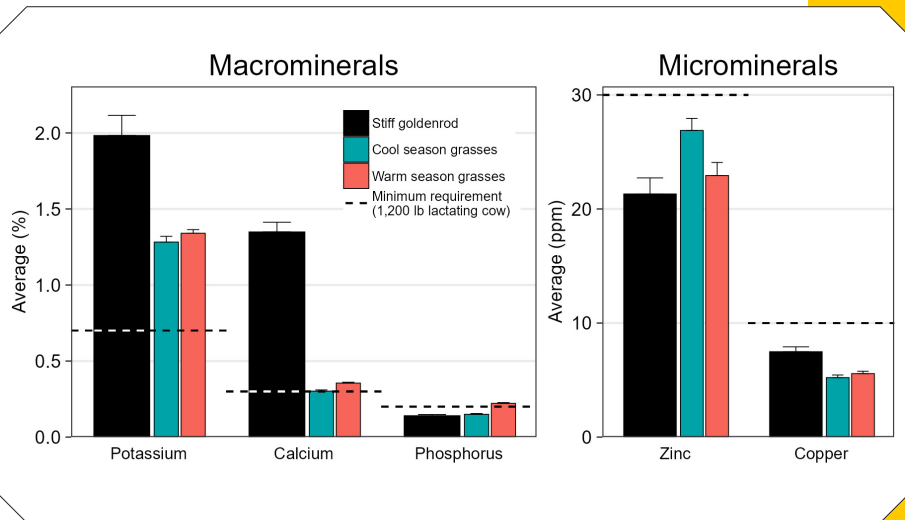
Wasps



Beetles



Flower Flies



Macrominerals: Potassium and calcium levels in stiff goldenrod exceed cattle minimum requirements. Calcium levels in stiff goldenrod far exceed calcium levels found in grasses.

Microminerals: Zinc levels are slightly lower in stiff goldenrod than in grasses. Copper levels in stiff goldenrod are below the minimum requirement, but higher than in grasses.

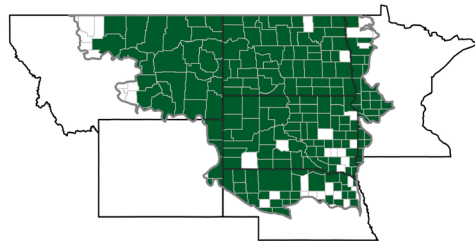
Silverleaf Indian Breadroot or Silverleaf Scurfpea (*Pediomelum argophyllum*)



Leaves are alternate, made up of 3 to 5 palmately arranged leaflets, and covered with silver-white hairs.



Small, bluish-purple flowers grow in clusters.

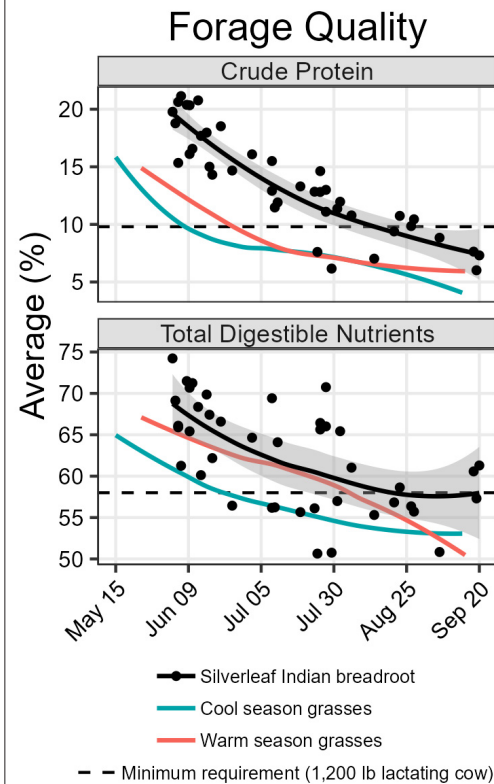


Bloom Time: June - September

Height: 1-2'

ID Tips: Plant has hairy, branched stems that are silvery white in color.

Forage Quality: This legume provides high crude protein levels that exceed grasses throughout the growing season. Crude protein and TDN levels exceed cattle minimum requirements in early and mid season.



Silverleaf Indian Breadroot or Silverleaf Scurfpea (*Pediomelum argophyllum*)



Silverleaf Indian breadroot colonies are easily spotted by the silver foliage.

This plant provides:

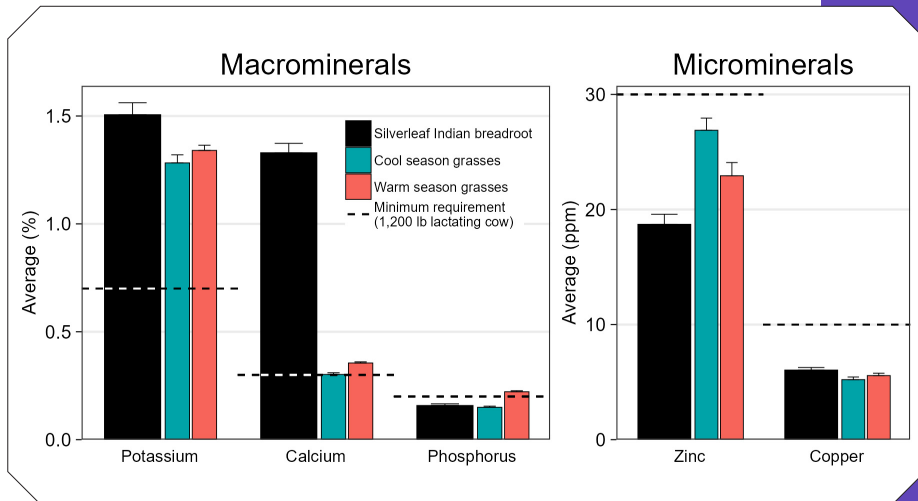


Nectar / Pollen

Flower visited by:



Bees



Macrominerals: Potassium and calcium levels in silverleaf Indian breadroot exceed cattle minimum requirements. Calcium is much higher than levels found in grasses.

Microminerals: Levels of zinc and copper in silverleaf Indian breadroot fall short of the minimum requirement, but copper is slightly higher than in grasses.

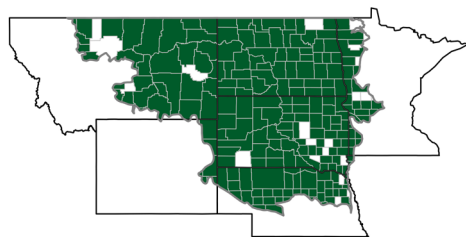
Upright Prairie Coneflower or Prairie Coneflower (*Ratibida columnifera*)



Leaves are alternate and deeply lobed into linear segments.



Yellow flowers have petals that droop below the brown, column-shaped center.

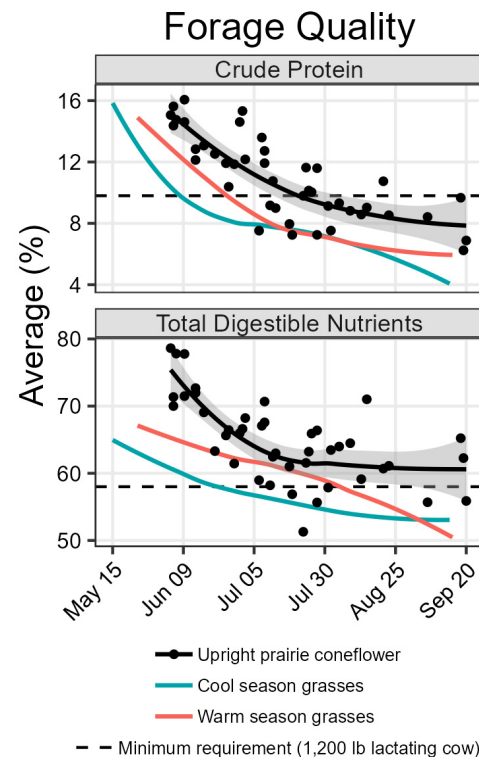


Bloom Time: May - October

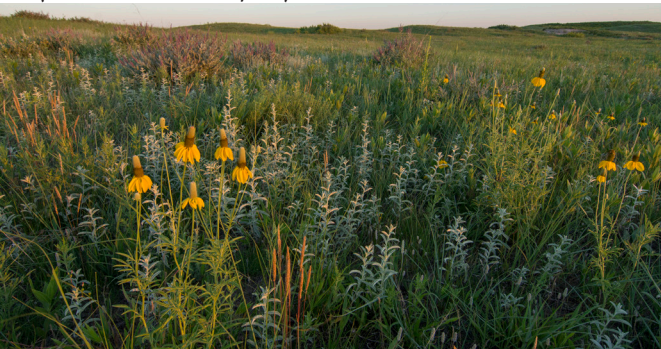
Height: 1-2'

ID Tips: Plant grows from a stout taproot and woody base.

Forage Quality: Crude protein in upright prairie conflower is highest early in the growing season and falls below minimum requirements mid season. TDN exceeds minimum requirements and is higher than grasses throughout the growing season.



Upright Prairie Coneflower or Prairie Coneflower (*Ratibida columnifera*)



Upright prairie coneflower has a deep taproot and is drought resistant.

This plant provides:



Nectar / Pollen



Caterpillar Food



Pollen for Specialist Bees

Flower visited by:



Bees



Butterflies



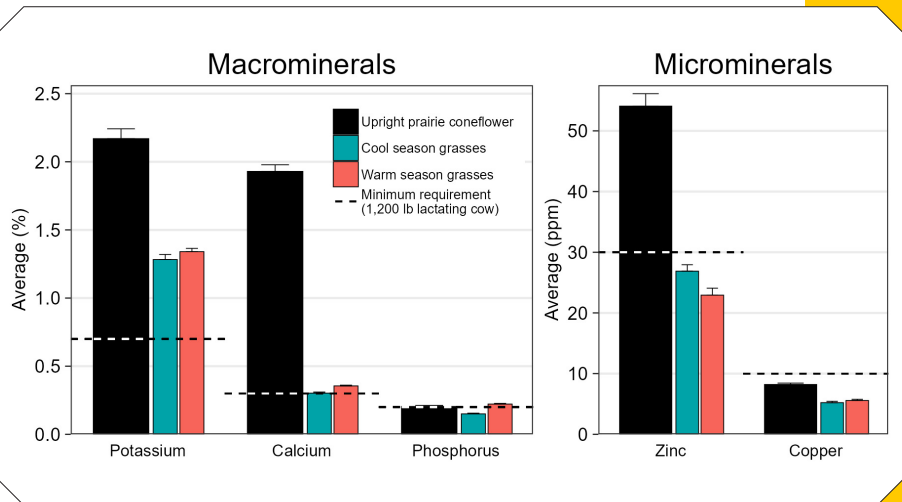
Wasps



Beetles



Flower Flies



Macrominerals: Potassium and calcium levels in upright prairie coneflower exceed cattle minimum requirements, with levels higher than grasses. Phosphorus meets the minimum requirement.

Microminerals: Zinc levels in upright prairie coneflower exceed cattle minimum requirements, with levels higher than grasses. Copper levels in upright prairie coneflower are below the minimum requirement but are higher than grasses.

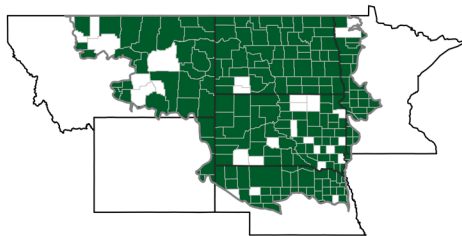
Prairie Rose (*Rosa arkansana*)



Leaves are alternate and have 9 to 11 leaflets.



Pink flowers have 5 petals. Fleshy, red fruit develops after flowering.

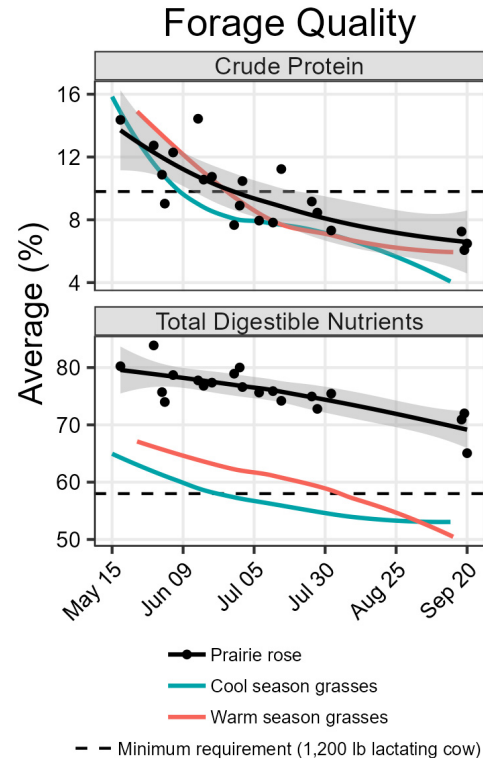


Bloom Time: June - August

Height: 1 - 1.5'

ID Tips: Woody plant with stems covered in small prickles.

Forage Quality: Prairie rose has crude protein levels similar to grasses and provides TDN at levels that far exceed grasses and minimum requirements for cattle.



Prairie Rose (*Rosa arkansana*)



Roots of prairie rose may be up to 12' deep.

This plant provides:



Nectar / Pollen



Caterpillar Food



Bee Nesting Material



Pollen for Specialist Bees

Flower visited by:



Moths



Bees



Butterflies



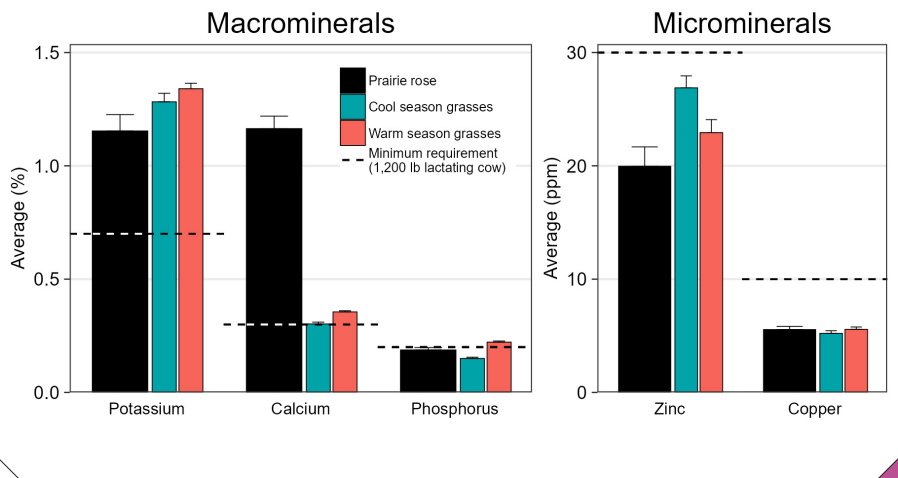
Wasps



Beetles



Flower Flies



Macrominerals: Potassium and calcium levels in prairie rose far exceed cattle minimum requirements. Calcium levels are much higher than in grasses. Levels of phosphorus nearly meet minimum requirements.

Microminerals: Zinc levels in prairie rose fall below minimum requirements and are lower than in grasses. Copper levels in prairie rose are similar to levels found in grasses and are below minimum requirements.

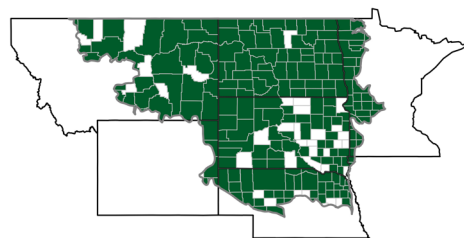
Missouri Goldenrod (*Solidago missouriensis*)



Leaves are alternate. Near the base of the plant, leaves grow up to 12" long and 1" wide, becoming shorter near the top of the stem.



Numerous small, yellow flowers form round or spike-shaped clusters at the top of branched stems.



Bloom Time: July - September

Height: 1-3'

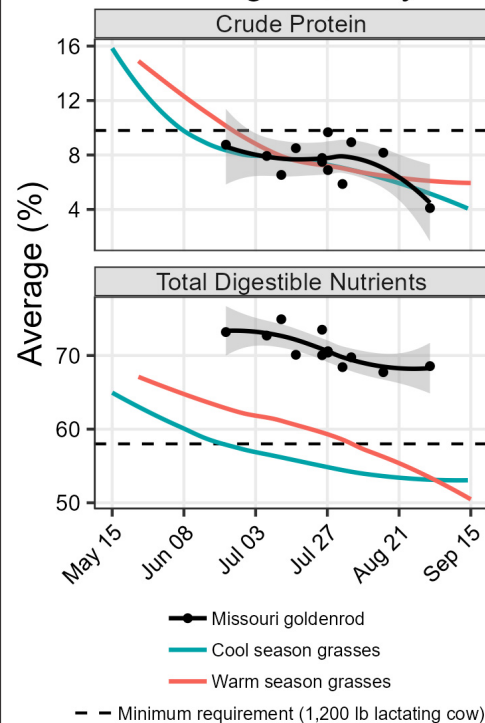
ID Tips: Plant has a smooth, reddish stem.

Forage Quality: Missouri goldenrod provides crude protein levels under the minimum requirements and at levels similar to grasses. TDN levels exceed grasses and cattle minimum requirements through the summer.

See Page 48 for information on leafy spurge, a noxious weed that resembles Missouri goldenrod.



Forage Quality



Missouri Goldenrod (*Solidago missouriensis*)



Missouri goldenrod can occur in colonies or single stems.

This plant provides:



Nectar / Pollen

Flower visited by:



Moths



Bees



Butterflies



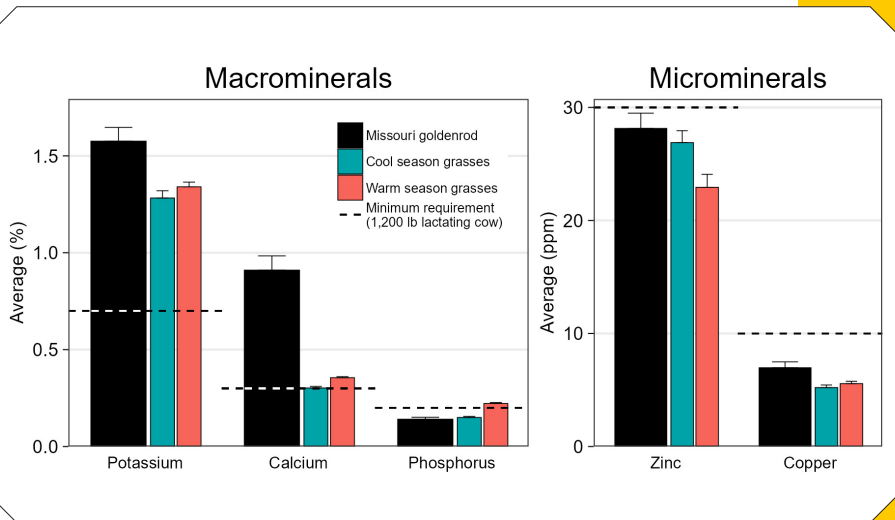
Wasps



Beetles



Flower Flies



Macrominerals: Missouri goldenrod has potassium and calcium levels that exceed cattle minimum requirements and are significantly higher than grasses.

Microminerals: Though zinc and copper levels in Missouri goldenrod occur below the minimum requirements, both are higher than levels found in grasses.

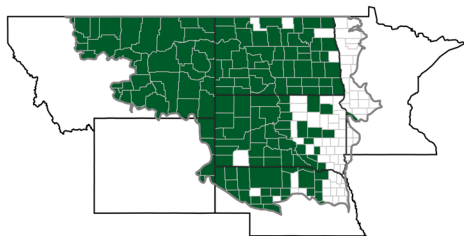
Scarlet Globemallow (*Sphaeralcea coccinea*)



Leaves are alternate, palmately lobed, and covered with silver hairs.



Deep orange to pink flowers have 5 petals and a bright yellow center.

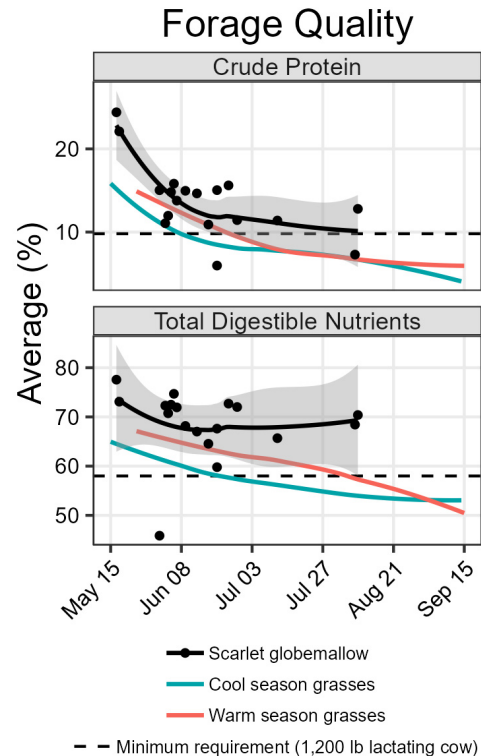


Bloom Time: May - July

Height: 4 - 16"

ID Tips: Low-growing plant with grayish-green leaves.

Forage Quality: Crude protein and TDN in scarlet globemallow are above the minimum requirements in the early and mid season.



Scarlet Globemallow (*Sphaeralcea coccinea*)



Scarlet globemallow can form sprawling, low colonies in dry, open areas.

This plant provides:



Nectar / Pollen



Caterpillar Food



Pollen for Specialist Bees

Flower visited by:



Bees



Butterflies



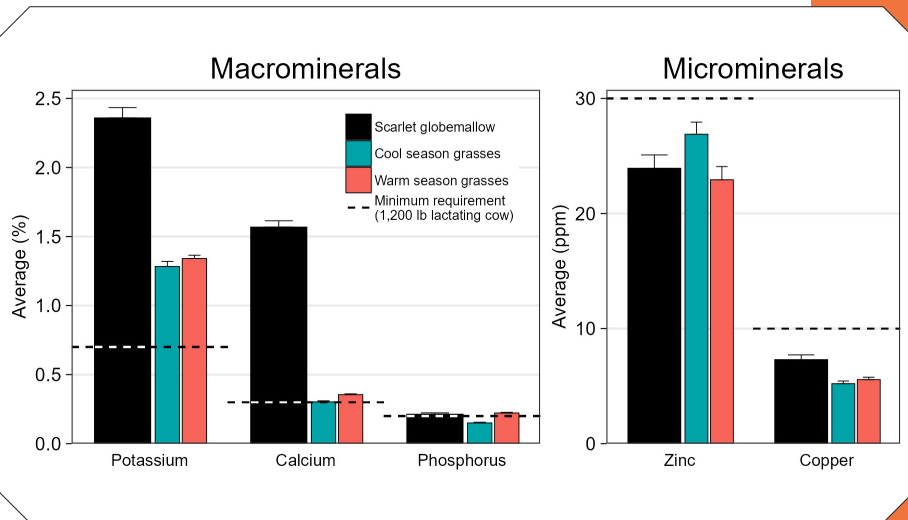
Wasps



Beetles



Flower Flies



Macrominerals: Potassium, calcium, and phosphorus levels in scarlet globemallow exceed cattle minimum requirements; potassium and calcium are much higher than levels found in grasses.

Microminerals: Levels of zinc and copper in scarlet globemallow occur below minimum requirements. Copper occurs at slightly higher levels than in grasses.

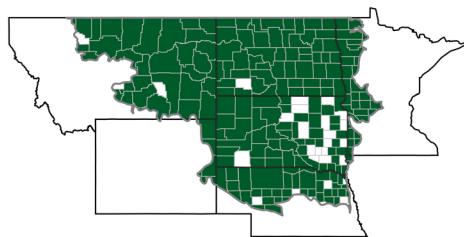
Western Snowberry or Buckbrush (*Symphoricarpos occidentalis*)



Leaves are opposite, oval shaped, and smooth.



Small, pinkish-white, bell-shaped flowers grow in clusters. White, round berries form after flowering and persist through winter.

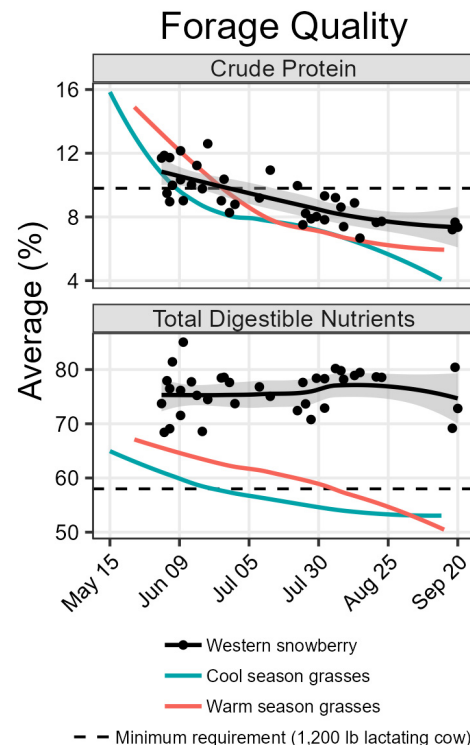


Bloom Time: June - August

Height: 1-3'

ID Tips: Woody plant with leaves that are approximately 1-4" long with whitened undersides.

Forage Quality: Crude protein of western snowberry is similar to grasses throughout the growing season. TDN of western snowberry far exceeds minimum requirements and is much higher than grasses throughout the growing season.



Western Snowberry or Buckbrush (*Symphoricarpos occidentalis*)



Western snowberry can form small, dense thickets.

This plant provides:



Nectar / Pollen



Caterpillar Food



Pollen for Specialist Bees

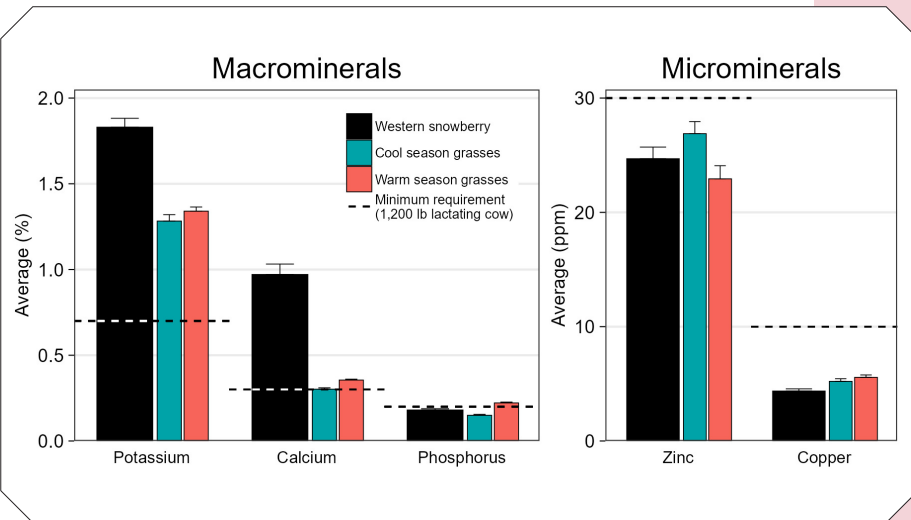
Flower visited by:



Bees



Butterflies



Macrominerals: Levels of potassium and calcium in western snowberry exceed cattle minimum requirements, and levels are higher than found in grasses. Phosphorus levels fall just below the minimum requirement.

Microminerals: Zinc and copper levels in western snowberry are comparable to levels in grasses.

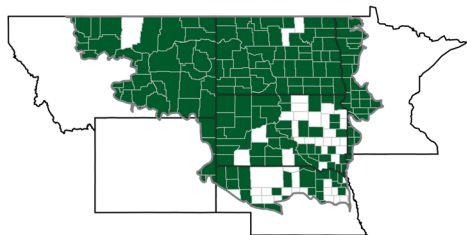
American Vetch (*Vicia americana*)



Leaves are alternate and have 8 - 18 oval or linear leaflets. Tendrils at the end of the leaves wind around other plants.



Bluish-purple, pea-like flowers grow in groups of 3 to 10.

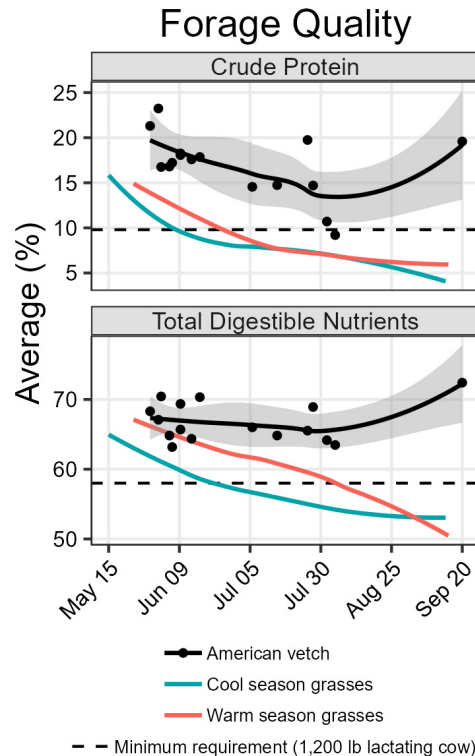


Bloom Time: May - June

Height: 1-2'

ID Tips: Climbing vine with a smooth to slightly hairy stem; single stem per plant.

Forage Quality: This legume has high forage quality throughout the growing season that exceeds minimum requirements. American vetch has much higher and persistent crude protein levels than grasses; TDN levels hold steady while grasses decrease.



American Vetch (*Vicia americana*)



American vetch fixes nitrogen and is drought tolerant.

This plant provides:



Nectar / Pollen



Caterpillar Food

Flower visited by:



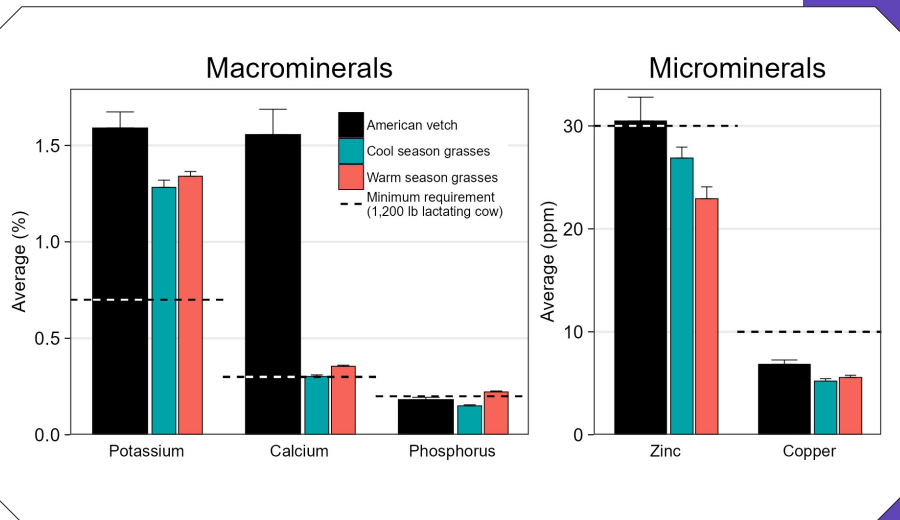
Moths



Bees



Butterflies



Macrominerals: American vetch has potassium and calcium levels higher than cattle minimum requirements and much higher than grass levels. Phosphorous is slightly below the minimum level and is comparable to grasses.

Microminerals: Zinc levels in American vetch meet minimum requirements and are higher than in grasses. Though copper occurs below the minimum requirement, it is higher than grasses.

Look Alikes: Introduced, Noxious Weeds in the Northern Great Plains that May Resemble Native Rangeland Wildflowers

See Page 15-16 for information on Wavyleaf Thistle, a native wildflower that may be mistaken for the thistles below. In general, native thistles in this region will have leaf undersides that are white, gray, and/or have hairs; these features make the leaf underside noticeably less bright green than the top side of the leaf. Non-native thistles are more similarly green in color on the top and underside of the leaf.



Canada Thistle (*Cirsium arvense*)

Height: 1 - 4'

Leaves: Deeply lobed, spiny; underside may be hairy or hairless

Bloom: June - Aug; pink or purple, 0.75" wide, much smaller than native thistles or other non-native thistles; numerous clusters of flower heads; flower head has pointed tips but not spiny



Musk Thistle (*Carduus nutans*)

Height: 1 - 6'

Leaves: Deeply segmented, spiny tips, relatively hairless

Bloom: May - Aug; rose purple, 1.5 - 3" wide; flower heads nodding, layered with large, triangular tips spreading outward



Bull Thistle (*Cirsium vulgare*)

Height: 3 - 6'

Leaves: Upperside coarse, underside soft; deeply lobed with a long, yellowish spine

Bloom: July - Sept; rose - purple, 1.5 - 2" wide; flower head very spiny, spines curl towards the base

See Pages 31-32 for information on Stiff Goldenrod and Pages 39-40 for information on Missouri Goldenrod, two native wildflowers that may be mistaken for Leafy Spurge.



Leafy Spurge (*Euphorbia esula*)

Height: 1 - 2.5'

Leaves: Alternately arranged, linear

Bloom: May - September, small yellow-green flowers

Typically forms dense patches. Stems and leaves produce a white, milky sap when broken or cut.

Key Minerals and Their Functions in Livestock Health

Minerals play important roles in cattle performance and health. Mineral deficiencies can result in lower weight gain in calves, lower milk production in cows, and reduced health and reproduction rates in cows. Conversely, excess levels of minerals can be toxic and/or negatively impact cattle performance and health.

Calcium is an important macromineral needed for livestock health and performance. It plays important roles in tooth and skeletal development and maintenance, nervous and muscular system function, and milk production.

Potassium is another critical macromineral that is essential for basic body functions, such as proper function of the muscular and nervous systems.

Phosphorous is a macromineral that supports skeletal development and maintenance, energy production and utilization, growth and reproduction, milk production, and basic body functions, such as nervous system functions. Specifically, phosphorous is a key mineral in most metabolic processes. Phosphorous is often deficient in rangeland plants around the world.

Copper is an important micromineral that plays essential roles in energy production and immune health. Deficient copper levels in cattle can result in less robust immunity that ultimately impacts a cow's health and reproductive success, and a rancher's profitability. Copper is almost always deficient in rangeland plants of the Northern Great Plains due to low copper levels in the region's soils.

Zinc is a micromineral that supports energy production and utilization, growth and reproduction, and basic body functions, such as nervous system functions. Specifically, zinc is critical to growth, reproductive health, and immune system development and function.



Additional Information on Grass Data Used in This Guide



Waves of needle and thread (*Hesperostipa comata*), a **cool season grass**, among sagebrush.



Big bluestem (*Andropogon gerardii*), a **warm season grass**, turns bluish purple as it matures.

The grass datasets that were used and depicted in the forage quality and mineral graphs of this guide are from Sedivec et al. 1999, Sedivec et al. 2000, Craig 2002, Sedivec et al. 2008, Sedivec et al. 2009, and Stephenson and Zander 2025.

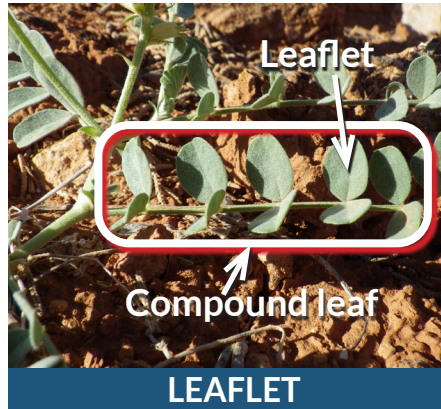
The cool season grass species included green needlegrass (*Nassella viridula*), needle and thread (*Hesperostipa comata*), prairie junegrass (*Koeleria macrantha*), slender wheatgrass (*Elymus trachycaulus*), western wheatgrass (*Pascopyrum smithii*), Altai wildrye (*Leymus angustus*), Basin wildrye (*Leymus cinereus*), bluebunch wheatgrass (*Pseudoroegneria spicata*), quackgrass (*Elymus repens*), cheatgrass (*Bromus tectorum*), crested wheatgrass (*Agropyron cristatum*), intermediate wheatgrass (*Thinopyrum intermedium*), Kentucky bluegrass (*Poa pratensis*), meadow brome (*Bromus biebersteinii*), pubescent wheatgrass (*Thinopyrum intermedium* ssp. *trichophorum*), Russian wildrye (*Psathyrostachys juncea*), Scribner's rosette grass (*Dichanthelium oligosanthes* var. *scribnerianum*), smooth brome (*Bromus inermis*), and tall wheatgrass (*Thinopyrum ponticum*).

The warm season grass species included big bluestem (*Andropogon gerardii*), blue grama (*Bouteloua gracilis*), Indiangrass (*Sorghastrum nutans*), little bluestem (*Schizachyrium scoparium*), prairie sandreed (*Calamovilfa longifolia*), sand bluestem (*Andropogon hallii*), sideoats grama (*Bouteloua curtipendula*), and switchgrass (*Panicum virgatum*).

Glossary

Leaflet

A single leaf-like component of a larger leaf. A leaf that has leaflets is called a compound leaf.



LEAFLET



PALMATE

Palmate

A leaflet arrangement where the leaflets are connected at a central point and arranged like an open hand.

Alternate Leaves

Leaf arrangement where leaves are attached to the stem singly at different heights on either side.



ALTERNATE LEAVES



OPPOSITE LEAVES

Opposite Leaves

Leaf arrangement where two leaves grow across the stem from each other.

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