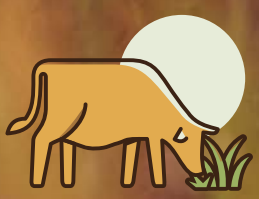
Hamilton Native Outpost

Native Grass & Wildflower Seed
PURCHASING & RESOURCE GUIDE

NATIVES FOR


FORAGE


HABITAT


RESTORATION


LANDSCAPING

PASTURE WALKS

Check out our schedule for upcoming pasture walks on our website and get them on your calendar!

https://hamiltonnativeoutpost.com/field-days/

NEW WEBSITE!

SCAN TO VISIT WEBSITE

TOOLS TO MAKE PLANNING *quick & easy*

PLANTING **TIMELINE** SELECTOR TOOL

PLANTING **METHOD** SELECTOR TOOL

GETTING STARTED *and* **HOW TO GUIDES**

Explore the **PLANTS**

SEE PHOTOS & SORT PLANT SPECIES BY:

- SOIL
- LIGHT
- SPECIALTY USE
- BLOOM TIME

VIDEOS

WE HAVE A HUGE LIBRARY OF HELPFUL VIDEOS & ADD MORE ALL THE TIME

Bobwhite Quail Nesting and Brood Rearing

·MOST POPULAR·

Diverse Native Grassland for Cattle - Overview

·LEARNING·

How to Girdle Trees

·HOW-TO·

Double the Hay with None of the Fertilizer...

·POPULAR IN FORAGE·

Subscribe to our YouTube channel https://bit.ly/3vMXW3C

TABLE of CONTENTS

Watch for tab colors in catalog on page edges

QR CODES

You'll see QR codes like these throughout the guide and they will allow you to quickly find the online resource using your phone. Test the one at left with your phone to visit our homepage.

Guide to using QR Codes:

- On **iPhone**, open the camera and point it at the QR code. Tap the link above the code to open it.
- On **Android**, open the camera. Tap the cog icon and toggle on "Scan QR codes". Point the camera at the code and click the link that pops up.

Meet the WHITE BISON

Surprise! On May 13th,2023, one of our bison gave birth to an extremely rare white albino calf. We've been told that this only occurs every 1 in 10,000,000 births! Many First Nations hold the white bison in great regard... and we are encouraged by this symbol of hope!

The Hamilton Native Outpost bison herd in the yellow blooms of Tickseed Coreopsis. We are experimenting with using bison as weed control.

FOLLOW THE BISON HERD ON OUR BLOG

The Bison are Back

The Rut Through the Eyes of the White Bison

Birth Announcement: It's a Girl! Albino White Bison Calf

The History of Bison

Summer Through the Eyes of the White Bison

VIEW BISON VIDEOS

https://hamiltonnativeoutpost.com/tag/bison/

SPECIES GUIDE

MIXES

Specialty Use	Height	Blooms	Light	Soils	SEED MIXES
W	8"-48"	May-Oct			Buck's Hangout
W	8"-48"	May-Oct			Butterfly & Hummingbird Mix
W	16"-36"	Jul-Oct			Companion Grass Mix - Dry
W	16"-36"	Jul-Sep			Companion Grass Mix - Mesic
W	16"-36"	Jun-Sep			Companion Grass Mix - Wet
W	16"-48"	Jun-Sep			Companion Grass Mix - Shade
W	8"-42"	May-Oct			Dry'n Rocky Mix
W	8"-48"	May-Jul			Firebreak Mix
W	36"-72"	Jul-Sep			Hide & Sneak
W	12"-42"	May-Oct			Prairie Patchwork Mix
W	8"-30"	May-Oct			Shadows & Sunbeams Mix
W	12"-60"	May-Oct			Wet Meadow Mix
W	12"-42"	May-Sep			Wildlife Chuckwagon Mix

We have grazing and haying mixes for diverse native grasslands, native warm season grasses, and overseeding.

CURRENT PRICING

GET A COPY OF CURRENT PRICES BY CALLING OR GOING ONLINE:

PHONE: 417-967-2190
ORDERS ONLY:1-888-967-2190
www.HamiltonNativeOutpost.com

QUANTITY DISCOUNTS & PLS PRICES AVAILABLE

CHECK OUT OUR INTERACTIVE *plant list* ONLINE:

- Check current prices
- See plant photos
- Sort by light requirements, soil preferences, specialty use & more
- Place an order

www.HamiltonNativeOutpost.com

BOOKS

BOOKS	COMMENTS
Edible Wild Plants of the Prairie (Kelly Kindscher)	Ethnobotanical guide to edible prairie plants including how the Native Americans used the plants, illustrations, and more
Forgotten Fires (Omer Stewart)	The anthropologist's insights into Native Americans' use of fire to manage plant communities and associated animals
Growing a Revolution (David Montgomery)	Bringing our soil back to life; discussion of farming practices that are good for farmers *and* the environment
Guide to Seed & Seedling Identification (Dave Williams)	The Tallgrass Prairie Center's guide for the Upper Midwest to identify seedlings and seeds of 72 species
Holistic Management (Savory & Butterfield)	A systems-thinking approach to restore grasslands and their soils; using livestock to mimic the wildlife impacts of the past
How Soils Work (Paul Syltie)	An easy-to-understand book on the complex topic of mutualism between soils and plants
Medicinal Wild Plants of the Prairie (Kelly Kindscher)	Ethnobotanical guide to medicinal prairie plants including use by Native Americans & settlers as well as medical research
Native Grass Forages for the Eastern U.S. (Patrick Keyser)	In depth exploration of the use of native warm season grasses as forage, establishment, and grazing management
Prairie Wildflowers (Don Kurz)	Field guide to 350 species of flowering plants from the Midwest to the Great Plains; pictures & descriptions of each plant
The Green Revolution Delusion (Davis & Winslett)	A story depicting problems in agriculture including ecological, financial, & sociological; discusses proven alternatives
The Time of the Buffalo (Tom McHugh)	An account of the history of bison in North America and their interaction with people

COST-SHARE MIXES *available*

POLLINATOR • MONARCH • QUAIL • FORAGE & OTHERS

Call for mix contents and current prices

FREE MEMBERSHIP

Get a free membership to the Missouri Prairie Foundation or Missouri Forage and Grassland Council with an order of $1,000 or more. If your order qualifies, indicate your interest when you order online or when you place your order on the phone.

SYMBOL KEY	LIGHT: Full Sun; Full Sun to Part Shade; Full to Part Shade SOILS: Dry; Average; Moist; Wet	SPECIALTY USES: Butterfly; Hummingbird; Cut Flower; Edible; Medicinal; Tea; Wildlife; Landscaping

WILDFLOWERS

Specialty Use	Height	Blooms	Light	Soils	WILDFLOWERS	Color	Comments
m	36"-60"	Jul-Aug			Agrimony, Many-Flowered (Agrimonia parviflora)		This plant loves very moist soils and is also called Swamp Agrimony; it has a host of medicinal uses
m	24"	Apr-Jun			Alum Root (Heuchera richardsonii)		The alum root bee (*Colletes aestivalis*) uses this genus of plants exclusively
	24"-30"	Sep-Oct			Aster, Aromatic (Aster oblongifolius)		Blooms late in year even after frost; shrub-like dotted with many flowers; easy to grow in dry places
	30"-48"	Aug-Sep			Aster, False (Boltonia asteroides)		Prolific flowers are great pollen & nectar source for many pollinators; ray petals range from white to pink
w	36"-60"	Sep-Oct			Aster, Frost (Aster pilosus)		The mass of flowers on this aster draws many pollinators, especially bees; palatable to cattle & deer
	18"-30"	Sep-Oct			Aster, Lavender (Aster turbinellus)		A beautiful late-blooming wildflower for areas with part shade; large aster-like flowers
m	48"-60"	Sep-Oct			Aster, New England (Aster novae-angliae)		Great nectar source for migrating monarchs; for compact plants, cut back before July 4th
m	24"-36"	Sep-Oct			Aster, Sky Blue (Aster oolentangiensis)		Beautiful sky blue blooms; turkeys relish the blooms; very drought tolerant
m w	18"-32"	Sep-Oct			Aster, Smooth Blue (Aster laevis)		Loved by birds for the seeds & leaves, mammalian herbivores for the young leaves and bees for the flowers
w	24"-60"	Jun-Sep			Bean, Small Fuzzy (Strophostyles leiosperma)		Annual vine often in sandy or other dry sites; quail & doves love the seeds; deer & cattle love the foliage
	24"-30"	Jun-Jul			Beardtongue, White (Penstemon digitalis)		Grow almost anywhere & establish quickly; penstemon bee (*Osmia distincta*) relies on beardtongue for food
m	30"-48"	Jun-Jul			Bergamot, Wild (Monarda fistulosa)		Attracts a variety of pollinators; fibrous, shallow root system is great for erosion control
m	12"-18"	May-Jun			Bergamot, Woodland (Monarda bradburiana)		Early bloomer with attractive bronze foliage; not invasive like some horticultural monardas
m	9"-18"	May			Betony, Wood (Pedicularis canadensis)		One of spring's earliest grassland wildflowers; partially parasitic on other plants' roots & makes them shorter
	18"-24"	Jun-Aug			Black-eyed Susan, Common (Rudbeckia hirta)		Blooms 1st or 2nd year; reseeds itself; black-eyed susans are primary pollen source for 2 bee species
	48"-60"	Aug-Sep			Black-eyed Susan, Sweet (Rudbeckia subtomentosa)		Big black-eyed susan with beautiful form and lots of flowers; great for rain gardens
m	30"-36"	Aug-Sep			Blazing Star, Button (Liatris aspera)		Miniature purple and green cabbage-like buds; great nectar source for butterflies
m	18"-24"	Aug-Sep			Blazing Star, Glade (Liatris mucronata)		Thin, narrow leaves give the appearance of a graceful, young pine tree before it blooms
m	36"-42"	Jul-Aug			Blazing Star, Prairie (Liatris pycnostachya)		Delightful purple spikes are an icon of the prairie; palatable to herbivores; nectar & pollen for pollinators
m	36"-42"	Aug-Sep			Boneset, Common (Eupatorium perfoliatum)		Common in moist prairies; Native Americans considered it a cure for many aches, pains, and illnesses
	36'-54"	Aug-Sep			Brown-eyed Susan (Rudbeckia triloba)		Petals have ultraviolet patterns that are visual cues to pollinators; seeds heads smell like citrus
	36"-48"	Jun-Jul			Bunchflower (Melanthium virginicum)		Beautiful creamy flowers on elongate candelabra-like spikes; one of our favorites
	72"-120"	Jun-Aug			Buttonbush (Cephalanthus occidentallis)		Great shrub for wet soils or raingardens; distinctive aromatic, ball-shaped flower attracts butterflies
m	30"-36"	Aug-Sep			Cardinal Flower (Lobelia cardinalis)		Great for grabbing attention and hummingbirds; find a home for this short-lived perennial
m w	24"-36"	May-Jul			Cinquefoil, Prairie (Potentilla arguta)		Flowers have special ultraviolet reflecting patterns that are visible to most pollinators
	12"-18"	May			Columbine (Aquilegia canadensis)		Striking crimson flowers with yellow markings; likes some shade, but doesn't do well in too much
m w	48"-72"	Jul-Aug			Compass Plant (Silphium laciniatum)		Indian children chewed the dried sap as gum; dissected leaves are oriented north/south
	30"-42"	Jun-Jul			Coneflower, Gray-headed (Ratibida pinnata)		Yellow flower petals of this easy to grow plant dance in summer breezes
m	24"-30"	May-Jun			Coneflower, Pale Purple (Echinacea pallida)		Emblem of the prairie; a primary pollen source for coneflower bee (*Andrena helianthiformis*)
m	24"-36"	Jun-Sep			Coneflower, Purple (Echinacea purpurea)		A butterfly favorite; goldfinches love the seeds; blooms mid-summer and again in early fall
	18"-30"	Jun-Aug			Coneflower, Upright Prairie (Ratibida columnifera)		Similar to the taller Gray-headed Coneflower; this species establishes quickly but is often short lived
m w	16"-20"	Jun			Coreopsis, Grand (Coreopsis grandiflora)		Wildlife eat seeds; better on mesic sites than Tickseed C; pollen source for coreopsis bee (*Andrena beameri*)
m	24"-48"	Jun-Sep			Coreopsis, Plains (Coreopsis tinctoria)		Annual with many bright flowers and inconspicuous leaves; blooms 1st year in plantings
	36'-72"	Jul-Aug			Coreopsis, Tall (Coreopsis tripteris)		Flower and seed heads have anise or dill scent; good in tall raingardens
m	18"-24"	May-Jun			Coreopsis, Tickseed (Coreopsis lanceolata)		Blooms 2nd year; ground cover on dry sites; primary pollen source for coreopsis bee (*Andrena beameri*)
m	48"-60"	Jul-Sep			Culver's Root (Veronicastrum virginicum)		Unique candelabra-shaped spikes and attractive foliage; a good rain garden plant
m w	72"-96"	Aug			Cup Plant (Silphium perfoliatum)		Square stems with cupping leaves lend a verticality to this raingarden and wildlife plant
	18"-24"	May-Jun			Flag, Copper (Iris fulva)		Unusual copper-colored blooms make this pretty in combination with southern blue flag
	24"-30"	May-Jul			Flag, Southern Blue (Iris virginica)		Attractive sword-like leaves and blue flowers; great plant for pond edges and pools
m w	48"-84"	Sep-Oct			Gaura, Large-Flowered (Gaura longiflora)		Seeds eaten by wildlife; leaves eaten by herbivores & turn red in fall; also called Butterfly Flower
m w	8"-12"	Jun			Goat's Rue (Tephrosia virginiana)		Legume; silvery foliage with pink & cream flowers; Tephrosia is pollen source for *Megachile addenda* bees
m	18"-24"	May-Jun			Golden Alexanders (Zizia aurea)		Host plant for MO woodland swallowtail butterfly; long bloom time; a favorite of the ziziae bee (*Andrena ziziae*)
m	18"-24"	Sep-Oct			Goldenrod, Gray (Solidago nemoralis)		Late bloomers with dense yellow flowers; great nectar source for migrating butterflies
m w	24"-40"	Sep-Oct			Goldenrod, Rigid (Solidago rigida)		Bright yellow flowers are delightful with blue sage; a favorite finch food
m	20"-40"	Sep-Oct			Goldenrod, Showy (Solidago speciosa)		This brave plant blooms in the hot, late-summer lull, and the flowers are loved by migrating Monarch butterflies
	9"-12"	Apr-May			Hyacinth, Wild (Camassia scilloides)		Dry-loving, beautiful hyacinth remains short and blooms very early
m w	24"-36"	Jul			Illinois Bundleflower (Desmanthus illinoensis)		Uniquely shaped seed pods of this legume are great wildlife food
	12"-18"	May			Indian Paintbrush (Castilleja coccinea)		Spring wetness, summer dryness, and late-summer mowing favor this hard-to-grow species
w	60"-100'	May-Jun			Indigo Bush (Amorpha fruticosa)		Quail use as covey headquarters; silver spotted skipper host plant; 2 bee species depend on *Amorpha* species
	24"-36"	May			Indigo, Blue (Baptisia australis)		Ball-shaped plant can be used as a shrub; indigos host the wild indigo dusky wing butterflies
	18"-30"	Apr-Jun			Indigo, Creamy (Baptisia bracteata)		Spring favorite of queen bumblebees; seeds dispersed by rolling plants; also called *Baptisia leucophaea*
	48"-60"	Jun-Jul			Indigo, White (Baptisia alba)		The two foot spike blooms white then black seed pods add interest to winter landscape
m	48"-72"	Aug-Sep			Ironweed, Arkansas (Vernonia arkansana)		The attractive purple flowers are a favorite for butterflies; ironweeds are being researched for use in modern medicine
m	48"-84"	Aug-Sep			Ironweed, Giant (Vernonia gigantea)		Very tall plant with showy blooms that attract a variety of bees and butterflies; also called *Vernonia altissima*
m	30"-54"	Jul-Sep			Ironweed, Western (Vernonia baldwinii)		The bright purple flowers attract butterflies, bumblebees, and other native bees; one of the shorter ironweeds

(WILDFLOWERS CONTINUED NEXT PAGE)

SYMBOL KEY

LIGHT Full Sun | Full Sun to Part Shade | Full to Part Shade

SOILS Dry | Average | Moist | Wet

SPECIALTY USES Butterfly | Hummingbird | Cut Flower | Edible | Medicinal | Tea | Wildlife | Landscaping

WILDFLOWERS (CONTINUED)

Specialty Use	Height	Blooms	Light	Soils	GRASSES & GRASS-LIKE	Winter Color	Comments
	9"-12"	Apr-May			Jacob's Ladder (Polemonium reptans)		Shade-loving, early bloomer; spreads easily by seed
	40"-75"	Aug-Sep			Joe Pye Weed, Spotted (Eutrochium maculatum)		Flowers attract native bees, honey bees, & butterflies; tolerates waterlogged soils; formerly *Eupatorium maculatum*
	60"-84"	Jul-Sep			Joe Pye Weed, Sweet (Eutrochium purpureum)		Sweet-smelling flowers are scented of vanilla and loved by bees & butterflies; formerly *Eupatorium purpureum*
	18"-24"	Jun-Jul			Leadplant (Amorpha canescens)		Purple flower spikes with bright orange stamens atop silvery foliage; 2 bee species depend on *Amorpha* species
m w	24"-36"	Aug-Sep			Lespedeza, Roundhead (Lespedeza capitata)		Great wildlife plant; dark brown seed heads remain showy into winter and are good dried flowers
w	18"-24"	Aug-Sep			Lespedeza, Slender (Lespedeza virginica)		This legume retains its seed above snow making it a good wildlife survival food
m	30"-36"	Aug-Oct			Lobelia, Blue (Lobelia siphilitica)		Blue cousin to cardinal flower, they look good together; used by an Indian tribe as love medicine
	12"-18"	Jun-Aug			Meadow Beauty (Rhexia interior)		Exotic pink flowers with large yellow stamens; occurs on seepy sites; bee pollinated
m w	36"-60"	Jun-Jul			Milk Vetch, Canada (Astragalus canadensis)		Bumblebees are the primary pollinator; foliage is highly palatable to deer, rabbits, livestock & other mammals
m	18"-24"	Jun-Jul			Milkweed, Butterfly (Asclepias tuberosa)		Host plant for monarch and other caterpillars; pretty partner with rattlesnake master
m	48"-60"	Jun-Aug			Milkweed, Common (Asclepias syriaca)		Easy-to-establish milkweed; host plant for monarch caterpillars; fragrant blooms are pollinator magnets
	18"-30"	May-Jun			Milkweed, Spider (Asclepias viridis)		Early blooming milkweed; foliage consumed by monarch caterpillars; stem with pods used for dried bouquets
m	48"-60"	Aug-Sep			Milkweed, Swamp (Asclepias incarnata)		A favorite host plant for monarch caterpillars; great nectar source; a widespread milkweed in wet soils
	18"-36"	Jun-Jul			Milkweed, Tall Green (Asclepia hirtella)		A host plant for monarch caterpillars and a couple moth species; a favorite with bees
	24"-36"	May-Jun			Mint, Lemon (Monarda citriodora)		Plant has a lemon or oregano fragrance and is a natural insect repellant
	16"-30"	May-Jul			Mint, Ohio (Blephilia ciliata)		Interesting pagoda-like seed structures; blooms attract many pollinators including honey & bumble bees
m	20"-30"	Jun-Jul			Mint, Spotted (Monarda punctata)		The leaf-like bracts in the flower head are showy, but to bees and butterflies the small flowers are attractive
	24"-40"	Jul-Sep			Monkey Flower, Allegheny (Mimulus ringens)		The name comes from the lilac-colored flowers that resemble a monkey's face, and this plant loves wet soils
	12"-36"	Jul-Sep			Monkey Flower, Winged (Mimulus alatus)		The name comes from the pale violet or pink-colored flowers that resemble a monkey's face, and this plant loves wet soils
m	24"-48"	Jul-Sep			Mountain Mint, Hairy (Pycnanthemum pilosum)		Delightful minty smell; flowers loved by butterflies, honeybees, and native bees
m	24"-30"	Jul-Aug			Mountain Mint, Slender (Pycnanthemum tenuifolium)		Pleasant mint smell; good in tea; slow spreading
m	24"-36"	Jul-Aug			Mountain Mint, Virginia (Pycnanthemum virginianum)		The flowers are loved by pollinators including honeybees, and the leaves have a minty fragrance
m w	18"-24"	Jun			New Jersey Tea (Ceanothus americanus)		After Boston Tea Party, colonists used leaves for tea; deer & turkey eat leaves; plant "fixes" nitrogen
m w	36"-48"	Apr-May			New Jersey Tea, Red Root (Ceanothus herbaceus)		Also called Inland or Narrow-Leaved New Jersey Tea, the flowers attract pollinators & the leaves can be made into a tea
	18"-24"	Aug-Sep			Obedient Plant, Fall (Physostegia virginiana)		The flowers are "obedient" to the wind making it an easier pollinator perch
	20"-26"	May-Jun			Parsley, Prairie (Polytaenia nuttallii)		Conservative species that blooms early with Indian Paintbrush & Sampson's Snakeroot
w	8"-18"	Aug			Partridge Pea (Chamaecrista fasciculata)		Blooms the 1st year in plantings; great wildlife food; host for sulphur butterflies; fixes nitrogen
	36"-48"	Jun-Aug			Poppy Mallow, Fringed (Callirhoe digitata)		Magenta flowers appear to float in the air because the leaves are basal
m	12"-24"	Jun-Jul			Poppy Mallow, Purple (Callirhoe involucrata)		Plant in bunches for best effect; deadhead tickseed coreopsis for a striking combination

Specialty Use	Height	Blooms	Light	Soils	GRASSES & GRASS-LIKE	Winter Color	Comments
m	18"-24"	Jun			Prairie Clover, Purple (Dalea purpureum)		Legume with attractive, fern-like foliage topped with unique purple flowers
m	18"-24"	Jun-Jul			Prairie Clover, White (Dalea candidum)		White flowers, larger leaves, and taller plants distinguish this from purple prairie clover
	48"-72"	Aug-Sep			Prairie Dock (Silphium terebinthinaceum)		Enormous leaves can be used to shade garden transplants
m w	36"-72"	Jun-Sep			Primrose, Common Evening (Oenothera biennis)		Biennial plant with lemon colored & scented flowers pollinated mostly at night by moths, especially sphinx moths
	9"	May-Jul			Primrose, Missouri (Oenothera macrocarpa)		Flower opens at dusk & is pollinated by sphinx moths; primroses are only pollen source for 2 bee species
m w	18"-24"	Jun-Jul			Quinine, Wild (Parthenium integrifolium)		With a long bloom time, it is good paired with other June and July bloomers
	8-12"	Jul-Aug			Rattlebox (Crotaleria sagittalis)		Summer annual legume with yellow flowers that produce an inflated pod that rattles; doesn't like tall competition
m	24"-36"	Jul-Aug			Rattlesnake Master (Eryngium yuccifolium)		Yucca-like leaves are reminiscent of the Southwest and can be used to make cordage
w	30"-42"	Jul-Aug			Rosin Weed (Silphium integrifolium)		Sunflower-like flowers; one of nature's natural bird seed producers
	24"-30"	Jul-Aug			Royal Catchfly (Silene regia)		Plant this hummingbird magnet where you can watch the ruby-throated hummingbirds
	12"-16"	May-Jun			Sampson's Snakeroot (Orbexilum pendunculatum)		Legume; tolerates variety of shade & soils; psoraleae bee collects pollen only from this genus & *Psoralidium*
	12"-36"	Jun-Aug			Seed Box (Ludwigia alternifolia)		Unique squarish seed pods, reddish foliage and four-petaled yellow flowers
m	36"-48"	Jul-Aug			Senna, Wild (Senna marilandica)		Eaten by caterpillars of sleepy orange and silver-spotted skipper butterflies; seeds eaten by wildlife
w	12"-16"	Jun-Jul			Sensitive Brier (Mimosa quadrivalvis)		A great kid plant because the leaves fold-up when touched; good quail and turkey food
	12"-16"	May			Shooting Star (Dodecatheon meadia)		Blooms in spring and fades from the scene
w	24"-60"	May-Oct			Smartweed, Penn (Polygonum pensylvanicum)		Waterfowl, quail, songbirds, woodcocks, and doves eat seeds; deer eat plants
m	36"-48"	Aug-Oct			Sneezeweeed (Helenium autumnale)		The yellow daisy-looking flowers don't cause sneezing rather the name comes from medicinal use as a snuff
	24"-36"	Jun-Jul			Spiderwort, Ohio (Tradescantia ohiensis)		Delightful addition to plantings; prolific in flower beds
m w	24"-36"	Jun-Aug			Spurge, Flowering (Euphorbia corollata)		Small, white blooms throughout most of the summer
w	30"-36"	Aug			Sunflower, Ashy (Helianthus mollis)		Spreads by underground stems making it good for erosion control; bird seed
w	60"-108"	Aug-Sep			Sunflower, Maximillian (Helianthus maximilianii)		Great wildlife plant with large, nutritious seeds
w	36"-48"	Jun-Sep			Sunflower, Ox-eye (Heliopsis helianthoides)		Long bloom time; the yellow flowers are pretty with purple flowers; not as aggressive as true sunflowers
w	40"-140"	Aug-Oct			Sunflower, Sawtooth (Helianthus grosseserratus)		Pollen & nectar are a favorite of pollinators, birds eat the seeds, and foliage is palatable to herbivores
w	36"-48"	Aug-Sep			Sunflower, Tickseed (Bidens aristosa)		Flowers as bright as the sun; moist habitats; quail, ducks, and songbirds eat seeds; rabbits eat plants
w	48"-72"	Aug-Sep			Sunflower, Willowleaf (Helianthus salicifolius)		Graceful, willowy foliage looks best when planted on dry sites; bird seed
w	48"-72"	Jul-Aug			Tick Trefoil, Showy (Desmodium canadense)		Foliage eaten by herbivores, seeds by small animals, and pollen & nectar by many pollinators
w	36"-60"	Aug			Tick Trefoil, Smooth (Desmodium glabellum)		Seeds of this legume provide for birds like quail & turkey; mammals, including deer, rabbits, & livestock, dine on leaves
	6"-12"	Apr-Sep			Verbena, Rose (Glandularia canadensis)		Fragrant blooms in spring & fall attract butterflies; quickly covers a large area but is a short-lived perennial
m	60"-72"	Jul-Sep			Vervain, Blue (Verbena hastata)		Tall plant suited best to moist sites in meadow plantings
w	24"-36"	Jul-Sep			Vervain, Hoary (Verbena stricta)		Birds eat seeds of this plant; mammals including livestock generally don't consume foliage because it is bitter
m	4"-6"	Apr-May			Violet, Birdsfoot (Viola pedata)		Loves gravelly, dry soils; host plant for many of the fritillary butterflies
w	36"-54"	May-Sep			Wingstem, Yellow (Verbesina helianthoides)		Quail, songbirds, and small mammals eat seeds; pretty in plantings
m w	20"-30"	Jun-Aug			Yarrow (Achillea millefolium)		Ferny foliage; white flowers attract butterflies; considered to be highly medicinal

SYMBOL KEY

LIGHT Full Sun | Full Sun to Part Shade | Full to Part Shade

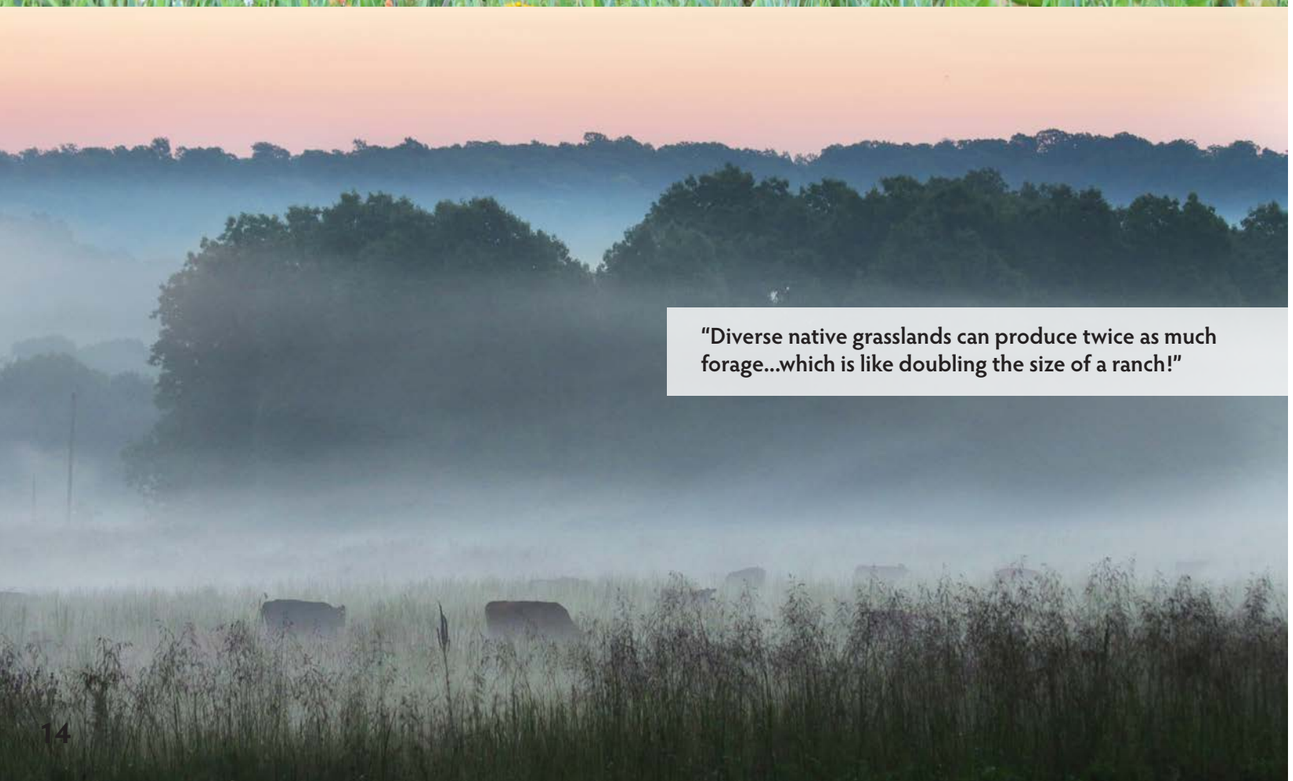
SOILS Dry | Average | Moist | Wet

SPECIALTY USES Butterfly | Hummingbird | Cut Flower | Edible | Medicinal | Tea | Wildlife | Landscaping

GRASSES & GRASS-LIKE

Specialty Use	Height	Blooms	Light	Soils	GRASSES & GRASS-LIKE	Winter Color	Comments
w	30"-40"	Jun	●	Average, Moist	Beakgrain (Diarrhena obovata)		Likes more shade than most grasses with dark green leaf blades
	16"-22"	Apr-May	☀	Dry, Average, Moist	Bentgrass, Winter (Agrostis hyemalis)		Airy pink seed heads are most attractive in dense stands; seedheads break off & roll along the ground to spread seeds
m	60"-72"	Jul-Aug	◑	Dry, Average, Moist	Big Bluestem (Andropogon gerardii) PLS		Missouri's state grass; good wildlife habitat and food for 3 caterpillars & excellent warm season forage for livestock
	24"-36"	Jun-Jul	◑	Dry, Average	Bottlebrush grass (Elymus hystrix)		Cool season grass with unique, pale-green seed heads; perfect for savannas and edges of woods
w	30"-48"	May-Jun	◑	Dry, Average	Brome, Woodland (Bromus pubescens)		A savanna-loving cool season grass with blue green leaves and a beautiful, arching seedhead
	24"-36"	Aug-Sep	☀	Dry, Average	Broomsedge (Andropogon virginica) PLS		Beautiful orange winter color; short companion grass tolerating a wide variety of soils
	4"-8"	Jul-Aug	☀	Dry, Average	Buffalograss (Buchloe dactyloides)		Low-growing grass that loves dry sites and foot traffic; often planted in lawns
w	36"-48"	May-Jun	◑	Moist, Wet	Bulrush, Dark Green (Scirpus atrovirens)		Leaves are eaten by everything from trumpeter swans to livestock; seeds eaten by voles and birds
w	24"-48"	May-Jun	◑	Average, Moist	Bulrush, Nodding (Scirpus pendulus)		Elegant drooping seed heads; seeds & heads eaten by waterfowl & voles; culms & rootstocks eaten by muskrats
	12"-18"	Aug-Sep	◑	Dry, Average	Dropseed, Prairie (Sporobolus heterolepis)		Attractive, fine, fountain-like foliage; great plant for formal borders
	24"-36"	Aug	◑	Dry, Average, Moist	Dropseed, Tall (Sporobolus compositus)		Spike-like, erect plants with tan winter color; drought-resistant, warm-season grass
	48"-60"	Jun-Jul	☀	Average, Moist	Eastern Gamagrass (Tripsacum dactyloides) PLS		Large grass suitable for wildlife cover and forage; host of the golden byssus butterfly
	18"-30"	Jun-Jul	☀	Dry, Average	Fescue, Cluster (Festuca paradoxa)		Native, short, cool-season fescue is green when many other natives are dormant; biennial life cycle
m w	20"-30"	May-Jun	◑●	Average, Moist	Fescue, Nodding (Festuca subverticillata)		A native fescue for shadier sites; cool season grass with shiny, dark green leaves that shine in their shady habitat
	36"-60"	May	◑	Dry, Average	Fescue, Texas (Festuca versuta)		A tall, lanky native fescue with a perennial life cycle; little known but it may be more common than once realized
	24"-42"	May-Jun	◑	Average, Moist	Fowl Manna Grass (Glyceria striata)		Palatable to livestock and geese; this grass requires more moisture in sunnier areas
	48"-60"	Aug-Sep	◑	Dry, Average, Moist	Indiangrass (Sorghastrum nutans) PLS		Establishes quickly in plantings; golden plume-like seed head
m	24"-36"	Aug-Sep	◑	Dry, Average	Little Bluestem (Schizachyrium scoparium) PLS		Bronze-orange winter color with silvery seeds; great for wildlife plantings
w	16"-30"	May-Aug	◑	Average, Moist	Nutgrass, Tall (Schleria triglomerata)		Small, inconspicuous plant in sedge family; seeds are good quail food
	24"-36"	Jul	◑	Average, Moist	Panicgrass, Beaked (Panicum anceps)		Relatively short grass typically inhabiting moist areas
w	24"-40"	Jun; Sep	◑	Average, Moist	Panicgrass, Deertongue (Panicum clandestinum)		Seed is food for many birds and small mammals; foliage palatable to larger mammals, caterpillars, & other insects
w	24"-36"	May-Jun	☀	Dry, Average	Porcupine Grass (Stipa spartea)		A cool season grass with a most unique seed - it has a 3-8 inch "tail" that twists and drives the seed into the soil
	3"-6"	Jun	◑	Dry, Average	Poverty Grass (Danthonia spicata)		Short grass grows well on dry, rocky, poor soils; great in dry lawns with full sun or partial shade
w	30"-48"	Aug-Sep	◑	Dry, Average	Purple Top (Tridens flavus) PLS		Fine, purple seed heads; establishes quickly in plantings; seeds are wildlife food
w	18"-24"	Jul-Aug	◑	Average, Moist	River Oats (Chasmanthium latifolium)		Flattened, arching seed heads are pretty dried; seeds are wildlife food; good soil stabilizer
w	25"-36"	May-Jun	◑	Average, Moist	Sedge, Fox (Carex vulpinoidea)		Forms attractive tuft of narrow leaves; leaves eaten by herbivores & insects; seeds eaten by wetland birds
w	24"-36"	Jun-Jul	◑	Average, Moist	Sedge, Frank's (Carex frankii)		Provides food for waterfowl, songbirds & muskrats; wide-bladed leaves are palatable to livestock
w	24"-36"	May-Jun	◑	Dry, Average	Sedge, Fuzzy Wuzzy (Carex hirsutella)		Turkeys, cardinals, other birds, & squirrels eat seeds/seed heads; deer and others eat foliage; grows in spring & fall
w	24"-36"	May-Jun	◑	Moist, Wet	Sedge, Hop (Carex lupulina)		Ornamental, spikey seed heads; seeds eaten by many birds and foliage by insects, water turtles, and deer
w	12"-24"	May-Jun	◑	Average, Moist	Sedge, Meadow (Carex granularis)		Seeds eaten by birds; foliage eaten by livestock and the caterpillars of various butterflies
w	18"-30"	May-Jun	◑	Moist, Wet	Sedge, Porcupine (Carex hystericina)		Drooping seed heads and arching leaves; seeds eaten by many birds and foliage by livestock and muskrats
w	18"-30"	May-Jun	◑	Average, Moist	Sedge, Short's (Carex shortiana)		Dark brown seeds are showy in early summer then eaten by many birds; foliage palatable to livestock
w	15"-24"	Apr-May	◑	Average, Moist	Sedge, Wood Gray (Carex grisea)		In spite of the name, this sedge is not gray in color; birds & occasionally squirrels eat the seeds; livestock eat foliage
	18"-24"	Jul-Sep	☀	Dry, Average	Sideoats Grama (Bouteloua curtipendula) PLS		Establishes quickly in plantings and, being short, it shows off wildflowers
	24"-30"	Sep-Oct	☀	Dry, Average	Split Beard (Andropogon ternarius) PLS		Silvery-white seed heads impart superb fall and winter color; great in dried bouquets
	48"-60"	Jul-Aug	☀	Dry, Average, Moist	Switchgrass (Panicum virgatum) PLS		Rusty-red winter color and fine seed heads that attractively collect frost in winter
	24"-36"	May-Jun	◑	Dry, Average, Moist	Wedge Grass, Prairie (Sphenopholis obtusata)		Easily overlooked species except when it has a seed head; palatable to horses, cattle & other livestock
w	36"-48"	Jun-Jul	◑	Dry, Average, Moist	Wild Rye, Canada (Elymus canadensis) PLS		Nodding head with recurved awns persist into winter; leaves are good winter wildlife food
w	24"30"	May-Jun	☀●	Average, Moist	Wild Rye, Early (Elymus macgregorii)		Blooms about a month earlier than other wild ryes; often in bottomland soils; foliage eaten by livestock
w	36"-48"	Jun-Jul	◑	Dry, Average	Wild Rye, Southeast (E. virginicus var glabriflorus) PLS		Green leaves are a good winter wildlife food; establishes quickly in plantings
w	36"-48"	Jun-Jul	◑	Dry, Average, Moist	Wild Rye, Virginia (Elymus virginicus) PLS		Green leaves are a good winter wildlife food; establishes quickly in plantings
w	12"-36"	Aug-Oct	☀	Dry, Average	Witch Grass (Panicum capillare)		Annual grass forms tumbleweed in fall; upland gamebirds & songbirds eat seeds; herbivores eat foliage
	36"-60"	Aug	◑	Moist, Wet	Wood Reed, Sweet (Cinna arundinacea)		An excellent plant in a woodland with wet soils; it keeps the green color well in the dormant season

"Modern cattle and livestock love the nutrient-rich grasses that sustained the buffalo for centuries."



"Diverse native grasslands can produce twice as much forage...which is like doubling the size of a ranch!"

FORAGE & GRAZING

Native grasslands provide excellent benefits to the rancher, wildlife, and soil. Modern cattle and livestock love the nutrient-rich grasses that sustained the buffalo for centuries.

GRAZING DIVERSE NATIVES IS AS GOOD AS IT GETS

There are two approaches to planting natives for grazing. The **Diversity Option** consists of planting an assortment of native species including warm season grasses, cool season grasses, legumes, and other forbs. The **Conventional Option** involves planting one or two species of the native warm season grasses in a pasture.

We believe that the Diversity Option maximizes the benefits of native planting. However, a few added challenges in establishment and management of the diversity lead some to prefer the Conventional Option.

DIVERSITY OPTION:
HIGH-QUALITY FORAGE YEAR-ROUND

Diverse native grasslands offer many benefits to the rancher, wildlife, and soil health.

Benefits of diversity

FOR THE RANCHER

Diverse native grasslands can produce twice as much forage (Read the study published in Science Volume 314, 2006.) which is like doubling the size of a ranch! It can also offer high quality forage that is free of toxic endophytes, put good gains on grazing animals, and offer flexibility in grazing dates.

FOR THE WILDLIFE

Diverse native grasslands that are properly grazed provide the same habitat wildlife were accustomed to prior to colonization of the West. The native plants provide excellent food and shelter. Grazing keeps the plants vegetative for the wildlife and creates variation in the plant structure.

FOR SOIL HEALTH

A properly grazed diverse native grassland restores the soil health and productivity that was in our grassland soils before settlers plowed and overgrazed the grasslands. By planting with diversity, you can increase soil organic matter and healthy microbe populations, and create an armor on the soil with plant material.

WHAT TO PLANT

In a grassland, each plant species has a unique niche. For instance, each plant has a distinctive season of growth. Some are green and growing in the cool weather of spring and fall, while others prefer the hot weather of summer. So, you want to choose a mix of plants—some that grow in the cool seasons and others that grow in the warm season of the year. You want plants growing and collecting sunlight as much of the year as possible.

Not only do plants differ in their season of growth, but each also has a unique root system. Some plants are deep rooted while others are shallow rooted. Some have fibrous roots while others are tap rooted. Choosing plants with varied root systems means that the soil moisture can be utilized as efficiently as possible to produce forage whether or not the rains come.

% of Stand	Functional Diversity Group	Species	% of WSG Mix	% of Stand
60% *	Warm Season Grass (WSG)	Big Bluestem	25%	15.0%
		Indiangrass	25%	15.0%
		Switchgrass	10%	6.0%
		Little Bluestem**	12%	7.2%
		Eastern Gama Grass**	13%	7.8%
		Mid & Short Rooted WSG	15%	9.0%
			100%	60.0%

% of Stand	Functional Diversity Group	Species	% of CSG Mix	% of Stand
20% *	Cool Season Grass & Grass-like (CSG)	Virginia Wild Rye	47%	9.4%
		Canada Wild Rye	18%	3.6%
		River Oats	13%	2.6%
		Other CSG	12%	2.4%
		Sedges & Rushes	10%	2.0%
			100%	20.0%

% of Stand	Functional Diversity Group	Species
20%	Forbs & Legumes	At least 15 species Common species include: Tickseed and other Coreopsis, Grayheaded and other Coneflowers, Illinois Bundleflower, Purple & White Prairie Clover, White Beardtongue, Rattlesnake Master, and Sawtooth and other Sunflowers

*Site conditions in part shade sites favors a different suite of plants. For better adaptation, use 60% CSG and 20% WSG. Under lone trees or other shady areas with large amounts of disturbance, a mix with more annuals may be best.

**Soils that are wet or dry favor different plants. On dry sites, replace the Eastern Gama Grass with Sideoats Grama, Splitbeard, and/or Prairie Dropseed; on wet sites, replace Little Bluestem

There are other differences in plants that should also be considered and included. For instance, native legumes provide “free” nitrogen fertilizer to the pasture.

By including a mix of tall and short plants, those with fat leaves and skinny leaves, plants that stand upright and others that trail across the ground, and plants with other differences, you will capture more sunlight and water and grow more forage than with a fescue monoculture.

ESTABLISHMENT

There are generally 3 methods to establish a diverse native pasture. Choosing a method depends on the initial condition of the pasture and the desired mix composition in the planting.
Use our interactive tool to choose an establishment plan online (see link on page 37).

One challenge with managing natives is controlling undesirable plants. For this reason, diverse plantings often work best on areas coming out of crops where the weeds have been controlled well, areas that have never been planted to introduced plants such as Fescue, Serecia Lespedeza, Bermuda Grass, Smooth Brome, or Johnson Grass (e.g. a savanna restoration that has been forested in the recent history), or areas with multiple years of control of weed seeds in the seedbank.
Read our how-to guides for more details on planting, seeding, and maintenance (starting on page 34).

GRAZING DIVERSE NATIVE GRASSLANDS

Native grasslands must be grazed with care, but this does not mean that native pastures are unproductive. The difference between good grazing and bad grazing depends on three factors:

- **Timing** — the time of year that the plant is grazed. A diverse grassland should not be repeatedly grazed at the same time of year.
- **Frequency** — a measure of the length of time a plant has to regrow before the next graze. A diverse grassland needs to be allowed to fully recover after a grazing event before the next grazing episode.
- **Intensity** — the degree of utilization; the amount of the plant that was removed in a grazing event. The more intensely a plant was grazed, the less frequently it should be grazed. However, a grazing event in which the plants are grazed very lightly can be repeated more often.

CONVENTIONAL OPTION: HIGH-QUALITY FORAGE IN SUMMER

In areas such as the Fescue Belt, where most forage is fescue grass, summer means low forage production. However, warm season native grasses such as Big Bluestem, Indiangrass, Eastern Gama Grass, and Switchgrass produce large quantities of high-quality forage in the summer.

For farms and ranches that put up hay, the warm season grasses are ready to be baled while the weather is good for baling (warm and dry), as opposed to cool season grasses which need to be baled when the weather is typically rainy and cooler.

The native warm season grasses thrive under low fertility and do not require large fertility inputs compared to introduced grasses like Bermuda Grass or Caucasian Bluestem. Note: If you are removing significant amount of nutrients as happens when baling and removing hay from a field, the removed fertility should be replaced.

CATTLE GRAZING BIG BLUESTEM PASTURE IN AUGUST
Warm season grasses like Big Bluestem can supplement that summer slump left by cool season grasses mid-summer

What to plant

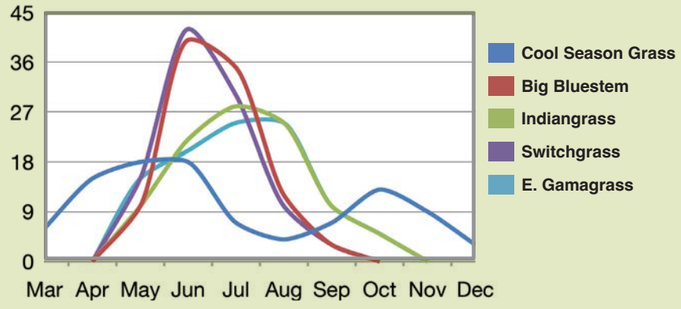
Switchgrass and Eastern Gama Grass produce large quantities of forage earlier than other warm season grasses. Choose one of these if the grazing system has a good balance of warm and cool season grasses.

Although they may produce slightly less tonnage, Big Bluestem and Indiangrass peak in production later. They are ideal for cool season grass dominated operations, and they also work well mixed together.

Little Bluestem will produce a smaller quantity of forage, but it can be a great part of a mix on drier areas of the field.

Even in these conventional plantings of native warm season grass, you can add some native cool season plants. Among other things, the cool seasons and warm seasons mixed together make better use of the ground as a solar collector because the sunlight is being used to produce forage in cool and warm weather. The blend is better for soil health, creates better wildlife habitat, and expedites nutrient recycling.

Percent Total Growth By Month



Each grass has its season of growth. This graph illustrates the percent of the plant's growth that occurs in each month. Cool season grasses begin their growth early in the spring. Warm season grasses wait for the warm temperatures of summer to produce. There are differences in timing of production even among the warm season grasses.

When choosing which to plant in a grazing system, consider the growth curve of the forages already in place and the curve of the forage to be planted. Make sure they complement each other and that quality forage is being produced throughout the growing season.


BIG BLUESTEM


EASTERN GAMAGRASS


INDIANGRASS

Establishment

One downside of the traditional approach to native warm season grass establishment is that at least a year of production will be lost for the plants to establish. However, the Panoramic herbicide (also known as Plateau or imazapic) has decreased establishment time for Big Bluestem, Indiangrass, Little Bluestem, and Sideoats Grama. Eastern Gama Grass and Switchgrass are usually established with the traditional approach.

Use our interactive tool online to choose an establishment plan

Grazing Native Warm Season Grasses

Native grasses must be grazed with care. They do not tolerate overgrazing or continuous, close grazing. It is imperative to move the livestock off of the field to allow the plant to regrow after being grazed. This is usually accomplished with a managed grazing system (also called management-intensive grazing, cell grazing, rotational grazing, etc).

The rule of thumb on native warm season grasses is to rest the pasture at least 45 days before allowing the stock to graze the pasture again. The graze period on a pasture should probably be no longer than five days in the growing season.

WHERE TO GO *from here?*

Don't know a River Oat from a Wild Rye or how to establish natives? No worries! Check out our extensive resources online to learn more or contact us and a real, live person will walk you through the process of choosing or customizing a mix to meet your goals.

We have grazing and haying mixes for diverse native grasslands, native warm season grasses, and overseeding.

THERE'S SO MUCH MORE ONLINE!

WEB LINKS

Planting Timeline Selector Tool:
https://hamiltonnativeoutpost.com/planting-timeline-selector/

Planting Method Selector Tool:
https://hamiltonnativeoutpost.com/planting-method-selector/

How to Guides for Planting Seeding and Maintenance:
https://hamiltonnativeoutpost.com/how-to-guides/

Join us for PASTURE WALKS

LEARN MORE ABOUT UPCOMING PASTURE WALKS AT HAMILTON NATIVE OUTPOST

https://hamiltonnativeoutpost.com/field-days/

VIDEOS & ARTICLES

Using natives for forage is one of our passions, so be sure to check out more thoughts and experiences with grazing Diverse Native Grasslands on our blog.

HERE'S A SELECTION:

Free Fertilizer Using Native Grasses

The Grass That Made Missouri Cattle Country


Double the Hay with None of the Fertilizer Using Native Warm Season Grasses!

Diverse Native Grassland for Cattle - Overview

https://hamiltonnativeoutpost.com/category/forage-livestock/

HABITAT
Wildlife & Pollinators

ESTABLISH A WILDLIFE HABITAT

A diverse mix of native grasses and wildflowers provides an excellent habitat for wildlife and pollinators. However, each species has different preferences. Use the listings below to find the requirements for the wildlife you want to encourage.

Bobwhite Quail

Quail populations have experienced a dramatic decline. In some states, the whistle of the Bobwhite can no longer be heard. Native grasses and forbs (wildflowers) with a little brushy cover make ideal quail habitat. The grasses provide structure and cover, and the forbs provide food by making seeds and attracting insects.

Eastern Wild Turkey

Nesting hens love a good grassland, as does a strutting tom. Like quail, turkeys recognize native grasses and forbs (wildflowers) as prime habitat. The native grasses provide structure and cover for turkeys while the native forbs contribute by making seeds that help sustain the turkeys through the winter and attract insects that serve as food during the summer, which allows the young poults to grow very fast during this season.

Whitetail Deer

Native plantings provide excellent habitat for whitetails, and the best part is that these perennial native plants do not need to be planted each year. Once established, the native plants will serve as a perennial food plot and provide bedding and cover.

Elk

Elk love grasslands. The elk that have been reintroduced into Missouri choose to spend the evening and morning hours foraging in grassland openings, and they bed down there at night. Elk eat grasses, and this makes it important to include a variety of forage-producing native grasses in a mix, including both warm and cool season natives.

Fish & Aquatic Species

There might not be an obvious connection between native plants growing on land and providing habitat for fish and other aquatic species such as crayfish and mussels—the two most endangered animals in Missouri—however, we believe that there is a connection. In order to improve streams as habitats, landscape-scale changes must be made, and native plants are an important part of that change.

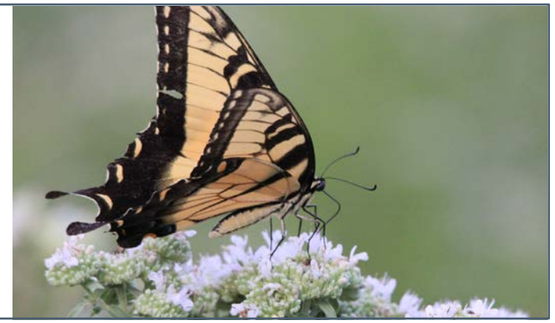
READ MORE IN-DEPTH ABOUT HOW NATIVES CAN BENEFIT EACH SPECIES ON OUR HABITAT WEBSITE PAGE
https://hamiltonnativeoutpost.com/native-plants/wildlife-pollinator-habitat/

ESTABLISH A POLLINATOR HABITAT

Flowers are the centerpiece of the habitat for these critters. A constant supply of flowers from spring through fall is important for many pollinators, and establishing a large diversity of plants means something is always blooming. However, each pollinator group has other important habitat considerations as well.

Butterflies, Moths & Sphinx Moths

In general, habitat requirements are similar among the butterflies, moths, and sphinx moths. As a caterpillar, most of these pollinators have a certain species of plant or narrow group of plants that they consume. For the Monarch, it is the milkweed leaves. After metamorphosing into a butterfly, moth, or sphinx moth, these winged critters are much less discriminating about the flowers from which they collect nectar.



Ruby-throated Hummingbirds

Hummingbirds migrate from their southern winter hideaway to spend the summer here zipping between flowers at lightning speed. A hummingbird may seem drawn to red flowers, but they happily sip nectar from flowers of other colors as well. They prefer flowers that are tubular in shape and flowers that are easy to approach while hovering. Soft-bodied insects are also part of the hummingbird's diet.

Honeybees

Honeybees are much loved for the sweet honey they produce. Since they are not native, a honeybee has no special need for native plants, but they do love many of the native plants. To produce honey throughout the season, it is important to keep flowers blooming from spring through fall.

Native Bees

Bumble bees, sweat bees, leafcutter bees, carpenter bees, and many more are all native and have strong affinities for native plants and ecosystems. The diversity of bees that exists is surprising, with more than 400 species living in the state of Missouri alone! They all share a common need of food from flowers—pollen and nectar.

READ MORE IN-DEPTH ABOUT HOW NATIVES CAN BENEFIT EACH SPECIES ON OUR HABITAT WEBSITE PAGE
https://hamiltonnativeoutpost.com/native-plants/wildlife-pollinator-habitat/

WILDLIFE MIXES

Wildlife Chuckwagon

This mix provides great food, bugging, and cover for quail, turkey, other game birds, and song birds. It also provides great habitat for small and large mammals. These widely adapted species thrive in most areas except extremely wet or dry soils. Plant with Companion Grass Mix. Contains 20+ species of wildflowers (also called forbs).

Butterfly & Hummingbird

Native pollinators including butterflies, hummingbirds, and bees need nectar and pollen sources throughout the growing season. This mix is designed to provide those flowers spring through fall as well as milkweeds for monarch caterpillars. Plant alone or in drifts with other mixes. This is our most diverse mix. Use with Companion Grass Mix. Contains 30+ species of wildflowers.

Buck's Hangout

The buck stops here. That is, he stops to grab a bite to eat. This mix focuses on the fall favorites of whitetails. Contains 15+ species of native grasses and wildflowers.

Hide & Sneak

Wildlife finds safety in tall, dense cover, and this mix is designed to provide that security. The perennial grasses in this mix are 4 to 8 foot tall. Plant it near any other wildlife mix to provide food and shelter all in one location. Contains 5+ species of native grasses.

Companion Grass

This shortgrass mix is ideal for inclusion with the Wildlife Chuckwagon or Butterfly & Hummingbird Mixes; 25-75% of the planting should be grasses. Adding grasses creates better structure for wildlife and provides fuel for controlled burns. Contains 4+ species of native grasses. *Different mixes designed for different soil types.*

Firebreak Mix

Plan ahead for controlled burns and plant this mix along the edges or in other locations where a firebreak is desired. After establishment, mow it in August to create a green line to burn against in the winter. Contains 8+ species of native grasses and wildflowers.

WHERE TO GO *from here?*

Read more in-depth on our widlife page (see link at bottom of facing page) or reach out to us with specific questions.

We also have a lot of videos about natives and wildlife to dig deeper with. Check out some of the wildlife videos below.

Bob White Quail Series

Understand the Land: WILDLIFE Pre-Settlement

The Biggest Anthill We've Seen in the Ozarks

How do Native Plants Shelter Newborn Fawns?

See more articles and videos about wildlife. Use QR code or visit https://hamiltonnativeoutpost.com/category/wildlife-pollinators/

WILDFLOWER MEADOW APPROACH
A wildflower meadow is a more informal and natural approach to landscaping. Colors change throughout the year as blooms change, but the Yellow and Purple Coneflower and Larkspur are showy here.

LANDSCAPING *with* WILDFLOWER MEADOWS

Landscaping with native plants brings back nature's original design. Wildflower meadows create healthy soils. Native plants create a beautiful wildflower meadow from spring through fall. Not only is a wildflower meadow pleasing to the eye, but it also is of great benefit to pollinators and other wildlife.

WILDFLOWERS FOR FORMAL & INFORMAL LANDSCAPING

There are two approaches to using native plants in landscaping: formal and informal. In a formal use, often referred to as a flowerbed, the plants are widely spaced and mulched in between. The informal approach is to create a wildflower meadow akin to a field of wildflowers. The wildflower meadow is a more natural approach, and is basically recreating the native glade, prairie, savanna, and wetland ecosystems with all the ecosystem's functions and benefits. There are pros and cons to each approach.

FLOWERBED VS. WILDFLOWER MEADOW

A flowerbed has a more formal look that is very pleasing to the eye, making it an appropriate choice for, say, a front yard. Using native plants to achieve this formal look is not only beautiful but also a great chance to increase biodiversity, provide for pollinators, manage storm water, and create a more sustainable landscape.

To achieve this look, certain design elements such as borders, focal points, and large masses of a few plants are often used. You can best achieve exact plant positioning and spacing with

Black-Eyed Susan

potted plants. Also, potted plants give instant results, which is advantageous in a highly visible area. Note: If you choose to use potted plants, purchase them from a local provider who understands plant genetics.

Wildflower meadows, on the other hand, are a great choice in larger spaces where the cost and labor to plant potted plants becomes prohibitive or where the work of mulching is not desired. The plants touch and the weed control is achieved by the close spacing of the plants, which shades the soil, rather than mulch.

Seeds are the most effective way to establish a wildflower meadow. The wait for a wildflower meadow is longer, often taking three years before many of the wildflowers bloom, but the results are worth the wait. Also, the inclusion of annual or biennial species that bloom the first year or two can help add some color while other seeds establish.

Seeds and potted plants can also be used together. Establish a formal flowerbed on the most highly visible side of a wildflower meadow. Or, plant a few potted plants in strategic locations in a wildflower meadow so that there are some flowers that bloom sooner.

LEARN NATURE'S LANDSCAPING SECRETS

The native prairies, glades, savannas, and wetlands have many secrets that every landscaper should learn. And, since a wildflower meadow is basically a re-creation of one of these ecosystems, let's learn their secrets:

1 **Choose plants based upon soil.**
There is a sweet spot for each plant as far as soil moisture, from wet to dry. Obviously, a water lily and a cactus grow in very different sites and neither would do well if their sites were swapped.

Characteristics such as rocky soil, clay soil (e.g. after topsoil has been removed), ridgetop or side slope landscape positions, and rooting restrictions (e.g. bedrock or fragipan) all lend dry characteristics.

Wet soils are often evident because they are the places that your shoes sink into the soil at time other than just after a rain. These locations are often where water comes to the surface from within the soil.

Mesic soils (those that are not too wet nor too dry) are deep with good organic matter content and few rocks. Keep in mind that if the slope of the land is facing west or south, the site will be drier than the same site that faces north or east due to sun intensity.

It's possible to alter a site to make it match the requirements of the desired plants. Remove topsoil to make a site drier. This has the added benefit of removing weed seeds. Add organic matter (e.g. compost) to make it moister. But remember that growing plants where they are not adapted will either create a high maintenance landscape or the plants will not thrive.

2 **Choose a diversity of wildflowers.**
Since native wildflowers do not bloom season long, the secret to continuous color is a diversity of wildflowers. This also provides season-long pollen and nectar sources for butterflies, hummingbirds, honeybees, and other pollinators.

3 **Choose plants based upon sun and shade.**
Just as different plants prefer different soil moisture, each plant has a certain amount of sun or shade in which it thrives. The amount of shade is a range with full sun on one end, full shade on the other, and varying amounts of sun and shade in between. Understand the site to be planted. Is it evenly sunny or shady, or is the shade only in certain areas? What percent of the day does a given area get direct sunlight?

4 **Include grass and grass-like plants.**
Native ecosystems contain a component of native grasses and grass-like plants. A mix of both warm and cool season grasses is part of nature's design and is beneficial for a wildflower meadow.

The grasses help shade the ground between wildflower plants, which discourages weeds. Visually, they provide beautiful hues of rusty red, muted browns, bright orange, and silver in the late fall and winter. Additionally, the grasses offer support to tall blooming wildflowers and carry a fire if a controlled burn is desired to renew the earth for next year's flowers. At least 25% of a meadow planting should be grasses.

5 **Seed in winter**.
By design, many seeds—especially wildflowers but also some grasses—will not germinate until they have been through winter. This is a protective mechanism to ensure that the seed does not germinate in fall when the temperatures and soil moisture are favorable only to find the plant is too small to live through the winter. So, built into the seed is the knowledge that after winter comes spring, and spring is the time to start growing. Therefore, plant wildflowers in winter or cold-moist stratify the seed (guide on website).

6 **Don't fertilize.**
Natural ecosystems don't have a fertilizer buggy to bring nitrogen, phosphate, or potash, and most wildflower meadows don't have any need of it either. Nitrogen is especially problematic as it encourages weed growth and can make the wildflowers tall and gangly, and cause them to fall over.

Consider using fertilizer if:
• the pH is really low or really high
• the phosphate or potash levels are really low *(common on areas where the topsoil is missing—read our New Dirt Work guidelines on pg 47)*
• you need a carrier to spread the seed.
Even in these cases, do not apply nitrogen.

7 **Remove the old growth.**
In natural, pre-settlement ecosystems, fire was present. The frequency varied between ecosystem type, but almost every one of them experienced fire in the dormant season. The fires removed the last summer's dead plant leaves to allow the roots below those leaves to bring forth new greenery the next summer.

In a wildflower meadow, do the same. Use prescribed fire or winter mowing every year or every other year to rejuvenate the plants. Do NOT, however, use fire for the first couple of years of the planting as the seedlings, when young, can heave out of the ground and the roots can be consumed by the fire thus killing the plant. Read about controlled burns online.

WHERE TO GO *from here?*

Go online to learn more about establishment and check out our getting started guides. Call if you have specific questions about landscaping with wildflower meadows.

VIDEOS & ARTICLES ABOUT LANDSCAPING

Native Woodland Wildflowers

Wildflower Meadows: Benefits of Diversity

Mother Nature's Landscaping Secrets

Diversity: Green in All Seasons

DIG DEEPER WITH ARTICLES & VIDEOS ON OUR WEBSITE!

https://hamiltonnativeoutpost.com/category/landscaping/

Wildflower Meadow LANDSCAPING MIXES

CHOOSE A MIX ACCORDING TO SOIL TYPE & AMOUNT OF SHADE

DRY · AVERAGE · MOIST · WET

PART TO FULL SHADE · FULL SUN TO PART SHADE · FULL SUN

Dry'n Rocky

A very showy combination; ideal for dry, rocky areas including sites with little to no topsoil, such as dams, road cuts, and construction sites. To make a site drier, scrape off 3"-6" of topsoil; this will also remove many competing weed seeds. Plant with Companion Grass Mix. Contains 20+ species of wildflowers.

Prairie Patchwork

These plants thrive in average soils; not too dry or too wet. This mix lends color to a landscape from May to October just as these same plants once added color to the vast expanses of prairie covering the Midwest. Use with Companion Grass Mix. Contains 20+ species of wildflowers.

Shadows & Sunbeams

Large park-like trees and an understory of native grasses and wildflowers define a savanna. This wildflower mix enjoys the paradox of sun and shade found in savannas and will do best in areas with at least 50% sunshine. Plant with Companion Grass Mix. Contains 20+ species of wildflowers.

Wet Meadow

Chosen for their ability to grow in damp and seepy areas that dry out only in the driest weather, these beautiful wetland plants can be a great addition to wet parts of a rain garden or a naturally wet area. Plant with Companion Grass Mix. Contains 20+ species of wildflowers.

Companion Grass / / /

Different mixes for dry, mesic, wet and shade sites

This is an essential part of any planting because these non-aggressive prairie grasses discourage weeds by filling voids and provide support for the wildflowers. Because they are relatively short, these grasses don't detract from the flowers and also provide color in the winter landscape. For easy care, 25% to 50% of any planting should be grasses. Contains 4+ species of native grass.

Firebreak Mix

Plan ahead for controlled burns and plant this mix along the edges or in other locations where a firebreak is desired. After establishment, mow it in August to create a green line to burn against in the winter. Contains 8+ species of native grasses and wildflowers.

To see the contents of our mixes see our website

These Landscaping Mixes are designed with informal landscaping projects, like a wildflower meadow, in mind. They are showy and, being generally less than waist high, are relatively short. While they are not designed with wildlife in mind, wildlife will find that these mixes provide suitable habitat.

RESTORATION

Prairies, Savannas & Glades

RESTORATION OF TALLGRASS PRAIRIES, GLADES AND SAVANNAS

Many factors have deteriorated native ecosystems. However, it is possible to re-create tallgrass prairies, glades, and savannas and bring back their benefits for wildlife and soil health.

RESTORING THE SYSTEM

When the settlers arrived on the shores of America, they brought the plants that they knew and used in the old country. This invasion of new plant species, along with plowing the grasslands to grow crops, overgrazing, and other factors have dramatically changed the appearance of the landscape. However, it is possible to bring back or recreate these ecosystems and the benefits that they have for wildlife, pollinators, herbivores, and soil health.

EXAMPLE OF A GLADE. Glades are grasslands without much soil.

NATIVE GRASSLANDS *then & now*

Many of the early explorers left written record of the land's appearance when they settled or traveled through. They encountered many different grassland types. Today, the temperate grasslands of the world, which are so valuable for raising crops and livestock, are the most endangered and least protected habitats on earth. Counted among these grasslands are our own native grasslands:

TALLGRASS PRAIRIES

A tallgrass prairie is a treeless or nearly treeless grassland that is filled with native grasses and wildflowers. The mixed-grass and shortgrass prairies were the tallgrass prairie's counterpart in drier climates. The prairies formed the rich, deep soils that are now considered America's breadbasket because such an abundance of food is produced upon them. Today, the tallgrass prairie ecosystem remains at less than one half of 1% of its original extent.

GLADES

Glades are grasslands without much soil. Due to bedrock being close to the soil's surface and the fact that they usually have a south- or west-facing aspect, these ecosystems are the home of dry-loving plants and animals. Today, many glades have been overrun by cedar trees or other brush and trees.

SAVANNAS AND WOODLANDS

Both savannas and woodlands are grasslands with the incorporation of trees. (Technically, a woodland has more trees than a savanna.) These ecosystems were the meeting ground of the tallgrass prairie and the forest. In these savannas and woodlands, trees and herbaceous plants (grasses and wildflowers) coexisted.

Fire and herbivores were the mediator in this uneasy relationship between very different plant types. Today, most of the land that would have historically been savanna and woodland bears no resemblance to Henry Rowe Schoolcraft's description of "a tall, thick and rank growth of wild grass…in which the oaks are standing interspersed like fruit trees in some well cultivated orchard, and giving the scenery the most novel, pleasing and picturesque appearance.

Now, for the most part, we see forest or there is open land. The two do not intermingle, due in large part to the removal of fire from the ecosystems.

RESTORATION PROTECTS THE PLANTS

Because many of our native ecosystems are endangered, so are the plants that are associated with them. Each ecosystem has a unique array of plants associated with it. Some plants may inhabit more than one grassland ecosystem, but others may be obligates of specific ecosystems. Pale Purple Coneflower, for example, can be found growing on glades, savannas, and prairies while its close relative, Yellow Coneflower, is found only on the glades. By re-creating or restoring these ecosystems, the plant species allied with them are also protected.

RESTORATION PROTECTS THE WILDLIFE & POLLINATORS

Native ecosystems once lent shelter to abundant populations of wildlife ranging from the large mammals to the smaller mammals, amphibians, and insects. Today, some of these animals still roam across the countryside, but many, such as the bison and elk, are a memory of yesteryear.

Some species of wildlife depend on certain ecosystems. For example, glades are the much-preferred habitat of the Eastern Collared Lizard, Lichen Grasshopper, and Greater Roadrunner. Restoring our imperiled native plant communities creates habitat for species of wildlife that are adapted to the ecosystems.

Many native pollinator species cannot exist without native plants. In some cases, this dependency is so strong that dependent pollinators and plants cannot exist independently. In fact, about one-third of Missouri's native bee species need a certain plant species or narrow group of plants to carry out their life. Another third of these bees require a certain ecosystem. Planting a diverse palette of natives provides necessary habitat requirements for pollinators.

To learn more about the habitat needs of specific wildlife and pollinators see pg 20.

RESTORATION PROTECTS LIVESTOCK FORAGE

Native herbivores, including bison and elk, once roamed free through the tallgrass prairie, savannas and woodlands, and glades. Today, these ecosystems can be re-established to provide high-quality forage for domestic livestock.

Learn more about establishing native ecosystems for forage on page 15.

WHERE TO GO *from here?*

Seed mixes for restoring rare and declining habitat should be chosen with care. Plants should be adapted to the site and to the ecosystem to be restored. Learn more about restoration online (see some places to start below) or contact us to design a custom mix or see what is available to meet your needs.

VIDEOS & ARTICLES ABOUT RESTORATION

This Savanna Restoration Paid For Itself

Biochar & Soil Health

Using Native Plants and Dead Trees to Restore Stream Banks

Vegetating Wetlands and Savannas

Healing a Small Stream Using Native Plants

DIG DEEPER WITH ARTICLES & VIDEOS ON OUR WEBSITE!

https://hamiltonnativeoutpost.com/category/restoration-ecosystems/

How-to guide CONTENTS

Section 1: START WITH A PLAN

Section 2: CHOOSE THE SEED

Section 3: PLANT THE SEED

ESTABLISHMENT PLAN OVERVIEW

Indiangrass

CHOOSING THE RIGHT TIMELINE

First off, if you are doing a planting with the help of government cost-share, make sure you stick to their timeline or get permission to deviate from it.

Otherwise, choosing an establishment timeline begins with identifying the existing vegetation and determining the end goal of the planting. In essence, "I'm going from a field with A to a field of B."

To maximize your investment in seed, follow an establishment plan to get the best chance of success. Remember, these timelines are guidelines. Weather and individual situations can change the process and the dates mentioned are only recommendations.

During establishment and for the life of a native planting, always consider the movement of seed with vehicles and equipment. We recommend you blow down or wash off equipment and vehicles before entering the field, especially if the equipment/vehicle was recently used in a field ripe with seed of a species you do not want in your native planting (e.g. fescue, sericea, Johnsongrass).

Find your current field situation below to help narrow down the best establishment plan for your situation. You can also use our interactive Planting Timeline Selector on our website.

UNDESIRABLE VEGETATION IS GONE

In some situations, the undesirable vegetation has already been removed or killed (or thinned in the case of a forest of trees). The establishment timelines that most often apply in this situation include the **Crop Field Establishment Plan**, the **New Dirt Work Establishment Plan**, and the **Savanna Establishment Plan**, which is for areas where the trees have been logged or significantly thinned.

OVERSEEDING IN NATIVE WARM SEASON GRASSES (NWSG)

Perhaps you already have a native warm season grass planting and you desire to add diversity of native wildflowers (forbs) and/or native cool season grasses. The **Adding Diversity to an Existing Warm Season Grass Planting Plan** is a good start in this situation.

FESCUE/CLOVER FIELDS

In some situations, the existing vegetation needs to be killed so that the native plants can successfully establish. In this case, you need to identify the existing vegetation first so you can develop a plan of attack. If you have predominately fescue or fescue/clover, there are multiple timelines to choose from. To narrow down the choices, it is important to decide the end goal of the planting. *(continued next page)*

(FESCUE/CLOVER FIELDS setion continued from previous page)

End Goal: Native Warm Season Grasses Only

If the end goal is to simply have the native warm season grasses, the herbicides Panoramic (also called Plateau) and Atrazine may be useful. The **Panoramic Establishment Plan for Warm Season Grasses Only** works well for establishing Big Bluestem, Indiangrass, Little Bluestem, and/or Sideoats Grama. The **Atrazine Establishment Plan for Warm Season Grasses Only**, on the other hand, works well for establishing Eastern Gama Grass and Switchgrass.

End Goal: Diversity Of Native Plants

If you plan to include both native warm season grasses and native cool season grasses and/or wildflowers (forbs) in your planting, choose an establishment plan to accommodate this diversity of plants. If forage is not a primary goal, the **Traditional Establishment Plan for Diversity** is often the favorite choice. When forage is a main objective, there are three establishment timelines that can work well:

DRY & MESIC SITES FOR FORAGE

On dry and mesic sites, the **Traditional Establishment Plan for Diversity** and the **Panoramic Establishment Plan for Diversity** are both good options. Here are some pros and cons to consider when choosing between them:

The panoramic/plateau herbicide eliminates a good deal of annual weed competition while establishing some of the native warm season grasses. For this reason, it is often a good choice for folks without a lot of planting experience. However, the Panoramic timeline does contain a split seeding (e.g. planting in the spring and then again in the following winter).

On the other hand, the Traditional timeline allows for planting all of the native seed at one time and gives the option of a year of cover-cropping. The Traditional timeline is particularly fitting if you expect lower-than-average weed pressure.

WET SITES FOR FORAGE

When the site is wet, the **Traditional Establishment Plan for Diversity** and the **Atrazine Establishment Plan for Diversity** are both good options. Here are some pros and cons to consider when choosing between them.

Atrazine is an herbicide that is helpful with the establishment of some warm season grasses and using this herbicide in the establishment may give an edge over weeds. However, it is a restricted-use herbicide and has extra rules that go along with it. Also, when establishing a Diverse Native Grassland with Atrazine, it will require a split seeding (e.g. planting in the spring and then again in the following winter). The Atrazine method may be a particularly good choice when this is one of the first native warm season grass plantings because it gives the extra control over weeds during establishment.

On the other hand, the Traditional timeline allows for planting the native seed all at once and gives an opportunity for a year of cover-cropping. The Traditional timeline is particularly fitting if you expect lower-than-average weed pressure.

NON-HERBICIDE OPTIONS

Using herbicides before planting native plants is widely recognized as the best method and is generally the most successful. If the concern of using herbicides overrides all other factors, we have put together some tips and techniques in the **Non-Herbicide Establishment Plan**. However, these methods require you to really seek to understand the principles and be a good observer to achieve some level of success.

FOLLOWING AN ESTABLISHMENT PLAN

On the following pages are establishment guidelines for different situations:

To maximize your investment in seed, follow the establishment plan to get the best chance of success. These timelines are guidelines. Weather and individual situations can change the process and the dates mentioned are only recommendations.

CHOOSE THE BEST TIMELINE

If you're not sure which is the right establishment plan for your situation, use our PLANTING TIMELINE SELECTOR TOOL online

Notes on using herbicides

Always read and follow label directions of an herbicide! The labels are not only helpful in knowing how to be safe, but they also provide great information about how the herbicide is most effective and how to keep the soil and environment healthy.

Notes on cropping an area

Another alternative to the "Kill existing vegetation" section of the establishment plan above is to grow glyphosate-resistant crops for two consecutive years before jumping in with the "Plant native seeds" section. Other herbicide/crop combinations may also be used, but it is important to ensure the herbicides do not have a carryover problem in the soil that will impact the native seedlings.

Identify the plants in the field so that the proper herbicide(s) may be used. During the two years of cropping before establishing natives, make sure that weed seeds do not fall on the ground, and also make sure that the perennial plants have been killed.

Crops may be harvested by any means that do not introduce weed seeds to the field, such as combine, cutting for silage, or grazing.

When converting crop fields, usually field borders, fence lines, grassed waterways, etc. are not killed out and planted to crop, but it is important to make sure these areas also undergo cropping for two years or the timeline outlined above is followed on these areas. If this is not done, seeds from these areas pollute and invade the native planting.

Sometimes long-term crop fields do not establish well, possibly because the soil biology is unhealthy. If you feel this is the case with your field, consider cover cropping and other techniques to boost soil health before planting natives.

TRADITIONAL ESTABLISHMENT PLAN FOR DIVERSITY

ESTABLISHING DIVERSE NATIVE GRASSLAND

The Traditional Establishment Plan is an ideal method to use when converting a fescue/clover pasture to a planting with a lot of diversity. It is especially applicable when a good component of cool season grasses and grass-like species are desired.

These guidelines are for fescue/clover pastures that maybe contain some Spotted Knapweed or even an abundance of Broomsedge. If the pasture contains Bermudagrass, Johnson Grass, Sericea Lespedeza, Caucasian Bluestem, Crown Vetch or other problematic species, the guidelines may need to be adjusted.

The timeline below details a process to kill the existing vegetation, but an alternative is to grow glyphosate-resistant crops for two consecutive years before planting natives. See the notes on page 46 for more information on cropping to establish natives.

KILL EXISTING VEGETATION

1. Remove unwanted trees	Before starting establishment
2. Graze, mow, or hay	Early August, year 1
3. Spray with glyphosate	September 1-15, year 1
4. Spray with glyphosate again	Around May, year 2
5. Plant cover crop	Immediately following the spray, year 2
6. Graze, harvest, or mow again	Summer, year 2
7. Spray with glyphosate again	September 1-15, year 2
8. Plant cover crop again	Immediately following the spray, year 2
9. Final graze, harvest, or mow	Fall / winter, year 2

PLANT NATIVE SEEDS

10. Plant diverse natives	Winter, year 2/3

January is a great target, but definitely plant before February 15.

BE SURE TO READ THE MORE DETAILED GUIDE ONLINE BEFORE PROCEEDING!
https://hamiltonnativeoutpost.com/traditional-establishment-plan-for-diversity/

CHOOSE THE BEST TIMELINE

If you're not sure which is the right establishment plan for your situation, use our PLANTING TIMELINE SELECTOR TOOL online or read ESTABLISHMENT PLAN OVERVIEW on page 35.

PANORAMIC ESTABLISHMENT PLAN FOR DIVERSITY

SPLIT-PLANTING OF DIVERSITY WITH PANORAMIC HERBICIDE

Based upon the knowledge that native warm season grasses are slow to establish, there are occasions where an establishment plan involving imazapic (i.e. Panoramic, Plateau) may be a better choice. The advantage is quicker establishment of the Big Bluestem and Indiangrass (Little Bluestem and Sideoats Grama can also be a component of the mix on drier sites). The disadvantage is that the planting will be dominant in the above-mentioned grasses.

These guidelines are for fescue/clover pastures. If the pasture contains Bermudagrass, Johnson Grass, Sericea Lespedeza, Caucasian Bluestem, Crown Vetch, an overabundance of Broomsedge or other problematic species, the guidelines may need to be adjusted.

The timeline below details a process to kill the existing vegetation, but an alternative is to grow glyphosate-resistant crops for two consecutive years before planting natives. See the notes on page 46 for more information on cropping to establish natives.

KILL EXISTING VEGETATION

1. Remove unwanted trees	Before starting establishment
2. Graze, mow, or hay	Early August, year 1
3. Spray with glyphosate	September 1-15, year 1

PLANT NATIVE SEEDS

4. Plant *only* imazapic-tolerant native warm season grasses & spray with glyphosate and imazapic	Around April, year 2
5. Spray with glyphosate	Around early November, year 2
6. Plant remaining natives	Nov. 15 - Feb. 15 of year 2/3

BE SURE TO READ THE MORE DETAILED GUIDE ONLINE BEFORE PROCEEDING!
https://hamiltonnativeoutpost.com/panoramic-establishment-plan-for-diversity/

CHOOSE THE BEST TIMELINE

If you're not sure which is the right establishment plan for your situation, use our PLANTING TIMELINE SELECTOR TOOL online or read ESTABLISHMENT PLAN OVERVIEW on page 35.

SAVANNA ESTABLISHMENT PLAN FOR DIVERSITY

ESTABLISHING DIVERSE SILVOPASTURES, WOODLANDS, OR SAVANNAS

Silvopasture (a combination of the Latin word, silva, meaning trees and the word pasture), savanna, and woodland are roughly equivalent terms in that they signify a grassland scattered with trees. The tree plus grassland ecosystem is exceptional habitat for wildlife, and it is quite pleasing to the eye in its park-like appearance.

Planting diverse natives in a wooded area is a great way to make use of otherwise nonproductive land (e.g. rocky, wooded, south-facing hillslope; land that has been logged hard).

KILL EXISTING VEGETATION

1. Clear or thin the woodland	Before winter
2. Plant cover crop	Spring/Fall before planting (if needed)

PLANT NATIVE SEEDS

3. Plant	Between November 15 and February 15

BE SURE TO READ MORE DETAILED GUIDE ONLINE BEFORE PROCEEDING!
https://hamiltonnativeoutpost.com/savanna-establishment-plan-for-diversity/

CHOOSE THE BEST TIMELINE

If you're not sure which is the right establishment plan for your situation, use our PLANTING TIMELINE SELECTOR TOOL online or read ESTABLISHMENT PLAN OVERVIEW on page 35.

ATRAZINE ESTABLISHMENT PLAN FOR DIVERSITY

CONSIDERATIONS WHEN ESTABLISHING WITH ATRAZINE

Both the University of Missouri Extension and Natural Resources Conservation Service (NRCS) have outlined establishment plans for Eastern Gama Grass using Atrazine. This guide for establishing diversity is an adaptation of these plans. A possible disadvantage to using Atrazine is that the planting will be dominated by the native warm season grasses.

These guidelines are for fescue/clover pastures. If the pasture contains Bermudagrass, Johnson Grass, Sericea Lespedeza, Caucasian Bluestem, Crown Vetch, an overabundance of Broomsedge or other problematic species, the guidelines may need to be adjusted.

The timeline below details a process to kill the existing vegetation, but an alternative is to grow glyphosate-resistant crops for two consecutive years before planting natives. See the notes on page 46 for more information on cropping to establish natives.

KILL EXISTING VEGETATION

1. Remove unwanted trees	Before starting establishment
2. Graze, mow, or hay	Early August, year 1
3. Spray with glyphosate	September 1-15, year 1

PLANT NATIVE SEEDS

4. Plant *only* Atrazine-tolerant native warm season grasses & spray with glyphosate and Atrazine	Around April, year 2
5. Spray with glyphosate	Around early November, year 2
6. Plant remaining natives	Between Nov. 15 and Feb. 15, year 2/3

BE SURE TO READ MORE DETAILED GUIDE ONLINE BEFORE PROCEEDING!
https://hamiltonnativeoutpost.com/atrazine-establishment-plan-for-diversity/

CHOOSE THE BEST TIMELINE

If you're not sure which is the right establishment plan for your situation, use our PLANTING TIMELINE SELECTOR TOOL online or read ESTABLISHMENT PLAN OVERVIEW on page 35.

PANORAMIC ESTABLISHMENT PLAN FOR WARM SEASON GRASSES ONLY

ESTABLISHING DIVERSITY WITH PANORAMIC HERBICIDE

The imazapic herbicide (ie; Panoramic or Plateau) reduces annual weed competition during the establishment year of the native warm season grasses. By using it, the native grass plants will often mature a year quicker. Not all native plants are tolerant of Panoramic, however, it is a great choice for the establishment of Big Bluestem, Indiangrass, Little Bluestem and Sideoats Grama.

These guidelines are for fescue/clover pastures. If the pasture contains Bermudagrass, Johnson Grass, Sericea Lespedeza, Caucasian Bluestem, Crown Vetch, an overabundance of Broomsedge or other problematic species, the guidelines may need to be adjusted.

The timeline below details a process to kill the existing vegetation, but an alternative is to grow glyphosate-resistant crops for one year before planting natives. See the notes on page 46 for more information on cropping to establish natives.

KILL EXISTING VEGETATION

1. Remove unwanted trees	Before starting establishment
2. Graze, mow, or hay	Early August, year 1
3. Spray with glyphosate	September 1-15, year 1

PLANT NATIVE SEEDS

4. Plant and Spray Plant only the imazapic-tolerant warm season grasses. Spray with glyphosate and imazapic.	Around April, year 2
5. Spray Again	Around early November, year 2

BE SURE TO READ THE MORE DETAILED GUIDE ONLINE BEFORE PROCEEDING!

https://hamiltonnativeoutpost.com/panoramic-establishment-plan-for-warm-season-grasses-only/

CHOOSE THE BEST TIMELINE

If you're not sure which is the right establishment plan for your situation, use our PLANTING TIMELINE SELECTOR TOOL online or read ESTABLISHMENT PLAN OVERVIEW on page 35.

ATRAZINE ESTABLISHMENT PLAN FOR WARM SEASON GRASSES ONLY

ESTABLISHING WARM SEASON NATIVES WITH ATRAZINE HERBICIDE

Both the University of Missouri Extension and Natural Resources Conservation Service (NRCS) have outlined establishment plans for Eastern Gama Grass using Atrazine. This guide for establishing diversity is an adaptation of these plans.

These guidelines are for fescue/clover pastures. If the pasture contains Bermudagrass, Johnson Grass, Sericea Lespedeza, Caucasian Bluestem, Crown Vetch, an overabundance of Broomsedge or other problematic species, the guidelines may need to be adjusted.

The timeline below details a process to kill the existing vegetation, but an alternative is to grow glyphosate-resistant crops for one year before planting natives. See the notes on page 46 for more information on cropping to establish natives.

KILL EXISTING VEGETATION

1. Remove unwanted trees	Before starting establishment
2. Graze, mow, or hay	Early August, year 1
3. Spray with glyphosate	September 1-15, year 1

PLANT NATIVE SEEDS

4. Plant warm season grasses & corn then spray with glyphosate & apply Atrazine	Around April, year 2
5. Spray with glyphosate	Around early November, year 2

BE SURE TO READ THE MORE DETAILED GUIDE ONLINE BEFORE PROCEEDING!

https://hamiltonnativeoutpost.com/atrazine-establishment-plan-for-warm-season-grasses-only/

CHOOSE THE BEST TIMELINE

If you're not sure which is the right establishment plan for your situation, use our PLANTING TIMELINE SELECTOR TOOL online or read ESTABLISHMENT PLAN OVERVIEW on page 35.

ADDING DIVERSITY TO EXISTING WARM SEASON GRASSES

ADDING OTHER GRASSES & WILDFLOWERS TO YOUR PLANTING

This is a method to use when you want to add diversity to an existing native warm season grass (NWSG) stand. It is especially applicable if you want to add native cool season grasses and native forbs. If the pasture contains Bermudagrass, Johnson Grass, Sericea Lespedeza, Caucasian Bluestem, Crown Vetch or other problematic species, the guidelines may need to be adjusted. However, cool season plants such as tall fescue can be dealt with as part of this plan.

Note: Overseeding when the existing plants are mature is never as good as planting all the species at one time, and more seed may need to be planted to get the same effect as the new seedlings will be competing with big, deep rooted, established native warm season grasses. This means the seedlings may have a higher mortality rate and they may be slower to establish.

1: STRESS EXISTING PLANTING TWO TIMES — Summer, fall before frost, year 1

- **Haying, Mowing, Prescribed Fire, or Grazing:** *Perform any combination of two of these actions. If the NWSG plants are in their first growing season, skip this step*

2: SPRAY UNDESIRABLE COOL SEASON PLANTS — Nov. – Dec. year 1 or Feb. – early Mar. year 2

- **Spray glyphosate when native warm season grasses are dormant**

3: PLANT NATIVE SEEDS — Jan. – Feb. 15, year 2

4: GRAZE, MOW, OR HAY — End of May – June, year 2

Don't go below 6-8 inches

BE SURE TO READ THE MORE DETAILED GUIDE ONLINE BEFORE PROCEEDING!

https://hamiltonnativeoutpost.com/adding-diversity-to-existing-warm-season-grasses/

CHOOSE THE BEST TIMELINE

If you're not sure which is the right establishment plan for your situation, use our PLANTING TIMELINE SELECTOR TOOL online or read ESTABLISHMENT PLAN OVERVIEW on page 35.

NON-HERBICIDE ESTABLISHMENT PLAN

ESTABLISHING NATIVES WITHOUT HERBICIDE

Using herbicides to establish native plants is the most widely practiced and is very effective. Some herbicides also speed up the establishment process of native plants. However, if you are wanting to avoid the use of herbicide, there are several ways to go about the process.

Choosing the best method

Some non-herbicide establishment methods have been shown to work well such as removing topsoil and some methods are not well proven such as using plastic or stress and smother. Though well-proven, removing topsoil can be a big expense on a large area. Likewise, using plastic may not be realistic on a larger area. On the other hand, the stress and smother method can be very feasible on a larger area.

If you are going to try the plastic method or stress and smother method, understand the principles, be a good observer, and understand what is happening to have a successful establishment. The most important steps behind a successful establishment are to make sure that all the mother plants of the weed species are killed, then the seedlings that emerge need to be killed for at least another year.

METHOD 1 — REMOVING TOPSOIL

- **Get rid of weed seeds that are in the top inches of the soil by removing topsoil**

METHOD 2 — STRESS & SMOTHER

- **Repeated mow, graze, plow, or burning to stress unwanted species.**
- **Plant a cover crop to smother**
- **Repeat process for multiple years**

METHOD 3 — PLASTIC (MOST APPLICABLE ON SMALL AREAS)

- **Lay plastic on top of the existing vegetation to kill mother plants**
- **Hand weed deep rooted plants that remain**
- **Repeat the smothering process to kill the seedlings that come back the following year**
- **A cover crop can be planted to smother remaining weeds**

BE SURE TO READ MORE DETAILS ABOUT THESE OPTIONS BEFORE PROCEEDING!

https://hamiltonnativeoutpost.com/non-herbicide-establishment-plan/

CHOOSE THE BEST TIMELINE

If you're not sure which is the right establishment plan for your situation, use our PLANTING TIMELINE SELECTOR TOOL online or read ESTABLISHMENT PLAN OVERVIEW on page 35.

CROP FIELD ESTABLISHMENT PLAN

CONVERTING A CROP FIELD

You may want to convert a field that is currently being cropped to perennial native plants. Or you may want to crop a field for a couple years to produce income while preparing for your native planting. If either of these is the case, this timeline is for you.

These guidelines are for fescue/clover pastures. If the pasture contains Bermudagrass, Johnson Grass, Sericea Lespedeza, Caucasian Bluestem, Crown Vetch or other problematic species, the guidelines may need to be adjusted.

If the field to be planted has already been cropped the previous year or years with good weed control, you can skip to the Plant Native Seeds section. However, check to make sure that the herbicides that have been used will not negatively impact the native seedlings.

Read more about special considerations for crop fields on the online version of this guide.

KILL EXISTING VEGETATION

1. Spray with glyphosate	**September - November, year 1**
2. Plant crops	**Spring, year 2**
3. Spray again	**Summer, year 2**
4. Harvest the crop	**August – November, year 2**

PLANT NATIVE SEEDS

5. Plant diverse natives **Winter/spring, year 2/3**
January is a great target, but definitely plant before February 15 if planting diversity or May 30th for native warm season grasses.

6. Spray: more details on spraying herbicide depending on your planting is available in the online version of the guide.

BE SURE TO READ THE MORE DETAILED GUIDE ONLINE BEFORE PROCEEDING!
https://hamiltonnativeoutpost.com/crop-field-establishment-plan/

CHOOSE THE BEST TIMELINE

If you're not sure which is the right establishment plan for your situation, use our PLANTING TIMELINE SELECTOR TOOL online or read ESTABLISHMENT PLAN OVERVIEW on page 35.

NEW DIRT WORK ESTABLISHMENT PLAN

Many times after the construction of a pond, home, road, or on other construction sites, the soil has been disturbed and there is no topsoil remaining. This can create a very droughty, inhospitable condition for plant growth.

Adding topsoil to the site is an option; however it is quite expensive and many times can be more of a problem than a solution as this soil contains an abundance of weed seeds. These weeds can cause problems in the planting at a later date and potentially out-compete the native plants.

Since the topsoil has been removed from these areas, much of the soil's water holding capacity has also been lost. As a result, choose plants or mixes that love dry sites.

Once construction is completed, apply lime and fertilizer uniformly and, if possible, work them into the area to be seeded in amounts according to soil test or using the minimum amounts listed below:

Limestone: 1,500 lbs ENM/acre
Nitrogen: 30 lbs/acre
Phosphate: 90 lbs/acre
Potash: 90 lbs/acre

The soil is in its best condition for seeding immediately after construction, however, seasonally this may not be the best time to plant native seeds. The following is a rough guide to establishing native grasses and wildflowers on sites where construction is completed during the various times of the year listed below.

CONSTRUCTION COMPLETE: NOVEMBER 1 – FEBRUARY 1

- **Plant Native seeds ASAP**

CONSTRUCTION COMPLETE: FEBRUARY 1 – APRIL 15

- **Purchase wildflower seeds and cold-moist stratify seeds for 4-6 weeks** Plant by May 15

CONSTRUCTION COMPLETE: APRIL 15 – AUGUST 31

- **Plant cover crop**
- **Disc, till or spray cover crop** Between November and February
- **Plant desired seed mix** Between January 1 and February 15

CONSTRUCTION COMPLETE: AUGUST 31 – OCTOBER 31

- **Plant cover crop of oats and or wheat**
- **Disc, till or spray cover crop and plant desired seed** Between January 1 & February 1
- **Plant desired seed mix** Between January 1 & February 15

Additional steps for special situations

- **Mulch in critical areas**
- **Apply additional nitrogen fertilizer if cover crops have been used**
- **Cold moist stratify the seed for sites with steep slope of concentrated water flow**

BE SURE TO READ THE MORE DETAILED GUIDE ONLINE BEFORE PROCEEDING!
https://hamiltonnativeoutpost.com/new-dirt-work-establishment-plan/

CHOOSE THE BEST TIMELINE

If you're not sure which is the right establishment plan for your situation, use our PLANTING TIMELINE SELECTOR TOOL online or read ESTABLISHMENT PLAN OVERVIEW on page 35.

CHOOSING WHICH NATIVE SPECIES TO PLANT

There are many native plant species to choose from, but some are better choices than others for a given project. Here are some of the considerations when selecting which native plants to include in a planting.

GET THE RIGHT PLANT IN THE RIGHT PLACE

Some plants like it wet while others like it dry. Some prefer full sun while others prefer shade. In other words, don't plant a Yellow Coneflower, which loves a dry, rocky, full-sun site, in a shady swamp where it won't survive. This is to say, it is important to get the right plant in the right place.

Evaluate your site. Are the soils wet or dry? How shady is it? Study the site during the establishment process. Are certain areas in the planting site wetter for longer after a rain than other parts of the site? Is part of the site on top of a rocky, dry ridge? Determine the conditions in your field, keeping in mind that one single field could have many conditions, then choose plants or mixes that are adapted.

PONDER YOUR PLANTING GOALS

There are so many reasons to plant native plants, and these motives can influence the species chosen for a planting. Consider for a moment the following native planting motives and the resulting mix choices:

Livestock forage

Is the goal to establish summer forage or year-round forage? This will determine whether the planting should be only native warm season grasses or whether if you should include native cool season grasses and forbs/legumes (wildflowers) as well.

Wildlife

Do you want to focus on all wildlife, only deer, or only pollinators? For a deer bedding planting, focus on tall grasses. For a pollinator planting, focus on season-long blooming wildflowers with a minor grass component. In all-purpose wildlife plantings, diversity of plants is usually key. Is there a special wildlife focus for your planting?

Restoration of glades, savannas, and prairies

In restoration, the goal is often to match the area's future plant community to the past plant community. In this case, only choose species that were historically present. However, for other restoration projects, the parameters may be broader.

Landscaping with a wildflower meadow

When aesthetics are the primary goal, season-long interest is important. So, choose a mix with a diversity of bloom times. Is plant height a motivating factor? In other words, is it desirable to avoid 10-foot-tall plants or would taller plants add another element of visual interest?

Section 2: CHOOSE THE SEED

DIVERSITY BY DESIGN

Most native ecosystems are a mix of native plant species. Diversity has so many benefits, ranging from stability to weed control to even soil health. Usually, you want to choose a mix with nature's design of diversity. The most stable plantings are usually those with a good mix of functional diversity groups (native warm season grasses, native cool season grasses and grass-like species, and native forbs and legumes). Each of these groups has a unique niche function in a planting.

ADAPTED GENETICS

Genetics are a little more difficult to picture but very important. When planting fruit trees and field crops, we consider planting zones because we know that not every variety will grow well in every location. With native seeds, it's just as important to consider where a given species group, or ecotype, will grow well. In general, moving seed very far north and south from where its ancestors grew when the bison roamed the grasslands, or moving seed from a dry to a wet climate or vice versa can mean that the planting may not persist well into the future. To the extent possible, match the soils, day length, and climate.

START WITH A MIX

Starting with a mix designed to match your soils and project goals is a great way to begin. These mixes take the guesswork out of selecting species and designing a well-balanced planting. It's also an economical way to begin. You can always add to a mix if you have favorite native species that are not included. Occasionally, project goals, difficulties presented by the site (usually in the form of certain invasive weeds), or other parameters will make a custom mix more desirable. If this is the case, we can help create a balanced blend with your project goals and constraints in mind.

Native plants are rooted in resilience

2
HOW-TO GUIDES
CHOOSE THE SEED

SEEDING DATES

WHEN IS THE BEST TIME TO PLANT MY SEED?

Planting widows vary depending on what is being planted. Some plants' seeds can be planted in only the winter and others can be planted in the winter or spring. These plants can be grouped into 2 general categories of plantings:

1) Warm Season Grasses (except Eastern Gamagrass, which belongs in the second group)
2) Diverse Plantings & Eastern Gamagrass Plantings

Warm Season Grasses (Except Eastern Gamagrass):

Warm season grasses can be planted from the onset of winter weather to the end of spring weather. Here in southern Missouri, we consider this window to be November 15th to May 30th. Other factors may influence planting dates within this range such as planned herbicide applications or other weed control measures. The seeds of these grasses do not require the cold of winter, however, it does not hurt their seeds. Planting too late in the summer runs the risk of either a summer dry spell during the early phase of establishment or that the plants will not be big enough to make it through winter.

If participating in a cost share program, the state agency will have recommended seeding dates that must be adhered to.

Diverse Plantings & Eastern Gama Grass:

The seeds of many native plants need to experience a cold, moist period before they will germinate. In order to get an adequate amount of cold and wet weather, here in Missouri, we recommend planting between November 15th and February 15th.

This period breaks the dormancy of the seed, which could be described as waking the seed up out of hibernation. The process of going through a cold, moist phase to "wake up" the seed is called stratification. Most native wildflower (forb) species require this and some of the native warm and cool season grasses also require it. Requiring a cold, moist period is Mother Nature's way of ensuring that the seed germinates in spring because, after all, spring follows winter.

Being planted early and exposed to the elements can also help with scarification, which is breaking the hard seed coat. Legumes are the most common species to need scarification.

By requiring seed to go through a cold, moist period, this is nature's way of ensuring that germination only occurs under the right conditions, which increases the odds that the plant will survive. It also allows for the seedlings to naturally "harden off" as they emerge in the spring, and the seedlings are more likely to get a start in life with good soil moisture due to early spring rains.

CAN I PLANT AFTER IT SNOWS?

Many people opt to plant after a snow because it is easier to see where you've been and where the seeds have fallen. However, this only works if it is a soft snow that allows the seed to settle. If a hard crust has developed on the snow, you are better off to wait until the snow starts to melt so that the seed doesn't blow away.

One last note, don't miss a planting deadline while waiting for a snow. The snow is not a necessary element for a successful planting.

Section 3: PLANT THE SEED

HOW DO I AVOID MISSING MY PLANTING WINDOW?

1) Order early.
2) Don't put off planting until the last minute because fields often get saturated from the spring rain, making planting difficult if not impossible.

WHAT IF I MISSED MY PLANTING WINDOW?

1) Wait until the next year to plant or postpone ordering. If you have already received the seed, store it in a cool, dry place out of direct sunlight.
2) If the deadline has recently passed, it may be worth going ahead and spreading the seed. If this is the action taken, make sure to get very good seed-to-soil contact to speed up the process of the seed absorbing water.
3) It is also possible to do an artificial stratification if the seed you are planting requires seeding during the winter. This can be done by wetting the seed and placing it in the refrigerator. See our Cold Moist Stratification Guide online for more details.

HOW-TO GUIDES PLANTING 3

SEEDING METHOD OVERVIEW

Seeding equipment can be as simple as a bucket and your hand or as complex as a remote-controlled flying drone. There are 2 general categories of seeding methods: broadcasting and drilling. To take a quiz to match a particular site and situation to a seeding method, check out our Seeding Method Selector (link below).

Many times, a seeding method, especially the broadcast methods, need to be paired with another action to improve the seedbed or create seed-to-soil contact. Learn more about seedbeds in the Seedbed Preparation Overview (pg 52), or learn about the guiding principles for a seedbed online.

TELL ME MORE ABOUT **DRILLING** SEED...

A seed drill is a device that sows seeds in rows by positioning them in the soil, and often burying the seed in the soil. Some drills have a fluffy grass box with picker wheels, which is needed if fluffy seeds, such as many of the native grasses, are being planted. Here are some advantages and words of caution when using a seed drill:

Advantages:

- A seed drill not only distributes the seed but also ensures seed-to-soil contact. (Unless there is a lot of thatch on the soil… read more in the words of caution below.)
- Drilling minimizes soil disturbance.
- With some government cost-share practices, less seed is required when drilling than when broadcasting.

Words of Caution:

- It is easy to bury the seeds too deep with a drill. Most native plants do best when the seed is buried no more than 1/8" to 1/4". To be on the safe side, it is ideal to see 50% of the seed on top of the soil.
- Too much thatch on top of the soil means that the drill won't be able to get the seed in contact with the soil. If there is a lot of thatch (e.g. a full growth of cover crop), consider grazing the growth off with livestock or using a controlled burn.
- Drills do not love rocky soils.
- Drills do not love stumps and other obstacles commonly found in savanna restorations or silvopasture plantings.
- A drill can be intimidating. If you have never used one before, a resource such as the local Soil and Water Conservation District, which also often rents drills to landowners in the area, can be helpful.

PLANTING METHOD SELECTOR TOOL:
https://hamiltonnativeoutpost.com/planting-method-selector/

Section 3: PLANT THE SEED

TELL ME MORE ABOUT **BROADCASTING** SEED...

Broadcasting involves scattering the seeds on top of the ground. The key to this method is ensuring seed-to-soil contact. The seeds do not need to be buried but do need to be in contact with the soil. There are advantages and cautions to broadcasting seed:

Advantages:

- While rocks can a big hinderance to a drill, the various broadcast methods can still scatter seed in rocky places.
- Stumps, standing trees, downed treetops, and other obstacles commonly encountered on savanna restorations or silvopasture plantings can be broadcast over the top of either by hand sowing or with the aerial drone seeder.
- It is unusual that broadcast seed is buried too deep in the soil.

Words of Caution:

- Achieving seed-to-soil contact is very important and is one of the biggest concerns to keep an eye on while broadcasting seed. The need for seed-to-soil contact can usually be met by employing one of the methods of getting a good seedbed found in the Seedbed Preparation Overview (pg 54).
- Some cost-share programs may require a higher seeding rate when broadcasting seed than when drilling. So, if seeding for a cost-share program, check the program's rules.

WHAT ARE THE METHODS OF BROADCASTING SEED?

There are many methods of broadcasting seed, and below is a list of commonly used methods. To learn about a particular method, click on its associated guide (if available). Keep in mind that broadcast seeding methods should usually be paired with good seedbed preparation techniques, which can be found in the Seedbed Preparation Overview (pg 54).

1. **Hand Sowing** – For small areas (or even larger areas where no other seeding methods seem practical), sowing seed by hand is an option. This is a low-tech method – put a bucket under one arm and start slinging seed with the other. To pick up a few pointers on doing this well, check out our Hand Sowing Guide (on website).
2. **Pendulum Spreader** – Also commonly called a Vicon Spreader, this device is used with a tractor. It has a hopper to hold the seed and a tube that sticks out the back end that moves quickly back and forth – much like the tail on a dog wagging side to side. As the tube moves side-to-side the seed is slung to both sides of the seeder. This device is one of the few broadcast spreaders that works well with fluffy seed because the agitator inside the hopper prevents the seed from bridging up over the metering (exit) hole, and the metering hole can also be opened wider than most. To read more or see a video about using this tool, check out the Pendulum (Vicon) Spreader Guide (online).
3. **Fertilizer Truck or Buggy** – This is possibly one of the easiest mechanical spreading methods to find locally. The buggies can often be rented, or a fertilizer truck can often be hired. Both spreaders have a chain-drag type of dispersal. When using this seeding method, a carrier will be needed. To learn more about this and other tips, reference the Fertilizer Truck and Buggy Seeding Guide (online).
4. **Aerial Spreader on a Drone** - Steep or rocky terrain, wet soils, or obstacles such as treetops or trees are no problem for the Aerial Spreader. In fact, challenging situations like these are why we here at Hamilton Native Outpost developed this unique device. This method is just as fast as broadcasting with a tractor and much faster than hand seeding. The drone seeder can spread many different sizes of seed as well as fluffy native grass seeds. If you would like more information about using an Aerial Spreader visit the Aerial Spreader website (www.aerialspreader.com).
5. **Other Broadcast Equipment** – There are many broadcast spreaders designed to spread seed and fertilizer, but most were not designed with fluffy seeds in mind. Most of these seeders can easily handle materials that flow downhill, but many native seeds come in many shapes and sizes including fluffy (like feathers), large and flat (like a fingernail), or long (like a straight pin). Most seeders were not designed to handle this variety of seeds. The most common problem is that the seeds bridge up over the metering (exit) hole, and this can potentially be helped by adding significant amounts of carrier (like pelletized lime) to the seed and checking regularly that seed is coming out of the seeder. Another potential pitfall is that the seeds are too large to fit out of the metering hole.

Find links to online guides on each seeding method on page 58.

HOW-TO GUIDES
PLANTING
3

SEEDBED PREPARATION OVERVIEW

Proper seedbed preparation, where seed gets into contact with the soil, is imperative for planting success. This overview discusses proper seedbeds and methods for achieving one. Any discussion about seedbed preparation is not complete without mention of seeding methods (how the seed will be scattered/distributed across the field). More information can be found in the Seeding Methods Overview (pg 52) or use the Seeding Method Selector tool on our website.

WHAT IS A SEEDBED AND WHY IS IT IMPORTANT?

A seedbed is soil that is prepared and ready for planting seeds. A proper seedbed can be the difference between a successful planting and a failed planting. It can take on many looks, but the guiding principles are that the seedbed should:

1. allow the seeds to make contact with the soil
2. have no more than 50% of the soil covered by thatch when the seeding is completed
3. have no living plants on the field
4. have firm soil

To read more about these principles, read the article, Guiding Principles for Seedbeds (on website)

DO I NEED TO TILL THE SOIL TO GET A GOOD SEEDBED?

While tillage is an option to prepare a seedbed, it is not necessary. The end goal is simply to get a field that is clean of weeds without excessive amounts of thatch, while at the same time having the soil smooth and firm.

Tillage can be a good option if the field is rough and needs to be smoothed or if you want to avoid using herbicides. However, note that in a field growing perennial plants, tillage alone is not enough.

No-till options (killing the existing plants without plowing or discing the soil) are a great choice when erosion is a concern and when the soils are rocky. No-till also protects soil moisture and soil organic matter.

See the Establishment Timelines on pg 35 for more information on preparing the site, or use the Choose an Establishment Timeline tool online.

DOES MY SEEDING METHOD AFFECT SEEDBED PREPARATION?

Yes, seeding method and seedbed preparation go hand in hand. First, understand that there are two general methods for distributing seed across the field: drilling and broadcasting. Drilling seed involves a seed drill that buries seed in rows at a specific depth. Broadcasting seed, on the other hand, is simply scattering the seed on top of the soil. There are many methods of broadcasting seed including mechanical spreaders, hand sowing, and spreading with an aerial drone spreader, but they all have the same general effect of scattering the seed.

The method of seeding can impact the amount and type of seedbed preparation that is needed. Likewise, the condition of the seedbed can impact the method of seeding. However, usually there is a preference for a certain seeding method, and this drives the decisions about seedbed preparation.

Read more about drilling and broadcasting in the Seeding Methods Overview on pg 52 or use our Choose a Seeding Method tool online to receive thoughts on good methods for your site.

Section 3: PLANT THE SEED

WHAT ARE METHODS OF GETTING A GOOD SEEDBED?

There are many methods of achieving seed-to-soil contact:

- **Drilling** — A drill buries seeds in the soil, getting seed-to-soil contact at the same time it is distributing the seed.
- **Dragging** — When paired with broadcast seeding, dragging will help get seed in contact with the soil.
- **Discing** — The soil may be tilled as part of the seedbed prep process to receive seed via a drill or a broadcast method.
- **Controlled Burn** — Controlled burns can clear the dead plant material from an area and help prepare a seedbed ready to receive seed.
- **Livestock** — Livestock can eat the plant material in a field when it is excessive. Also, their hooves can help to prepare a seedbed and press seed into contact with the soil.
- **Options for small areas** — If the area to be seeded is small, often the techniques used in larger fields are not appropriate. In this case, raking or other options may be useful.
- **Other Options** — The above list is by no means exhaustive. Special situations will mean that other solutions will be helpful (see common problems below). Ingenuity may yield other tools useful in seedbed preparation, just keep in mind the guiding principles covered in the Guiding Principles for Seedbeds (online).

Find links to online seeding guides on page 58 & 59

WHAT ARE COMMON PROBLEMS WITH A SEEDBED?

Problems occur when either the seed cannot make good contact with the soil and become embedded in the soil, or when the seedbed is excessively "fluffy" or loose.

Excessive thatch

If there is a large amount of thatch or dead plant material on top of the soil, seed cannot make good contact with the soil. Thatch is especially a concern when it is horizontally oriented because the thatch holds the seed up off the soil. Thatch that is standing upright (e.g. a bare, naked stalk of last year's plant) is usually much less of a concern because the seeds can fall down between the upright stems, and the upright stems do not significantly shade the soil. However, in cases where there is a large amount of upright plant material, such as a terminated cover crop, even the vertically oriented dead plant material can be a problem.

Ground not properly prepared for broadcast: there is too much thatch covering the ground, the tree leaves are especially bad because they are horizontal in nature and the seed can't get down to the ground.

Problems with excessive thatch rarely occur in tilled fields unless leaves have blown into the field after the tillage was done. This is a bigger concern in no-till situations.

Solutions vary depending on the amount of thatch. For moderate amounts, options include dragging, a controlled burn, discing, using a drill, and small area techniques such as raking. When the thatch is super-heavy, a controlled burn or discing are likely the best options. For either moderate or heavy thatch, livestock may be used to eat the forage or in some other way help lessen the amount of thatch.

Recently killed sod or pasture

Where the plants have recently been killed, especially grass plants whose roots and leaves seem to keep seeds from making solid contact with the soil, additional seedbed work is needed.

As long as the thatch is not too thick (see excessive thatch on previous page), viable solutions include burning, dragging, discing, drilling, and small area techniques such as raking.

Compacted, capped, or crusted-over soil

The condition of the layer of soil at the very surface is important to a seed. If the surface soil is more like a hard layer of cement rather than soft soil, it will be more difficult for the seed to become embedded in the soil.

Solutions to overcome dense surface soil include dragging, discing, and drilling. With a very concerted effort, livestock might be used as well.

"Fluffy" or loose soil

Loose soil will also cause problems. If your boot heels sink more than a quarter-inch when walking across the field, the soil is too loose. Fluffy seedbeds most often occur following tillage or dozing.

The solution to firm up the seedbed is to wait for it to rain on the soil before planting or roll it before planting.

"Cloddy" soil

If tillage has been used to prepare the field, the texture of the soil at the surface is important. If it is in clods and rather rough, action will need to be taken before planting the seed. Tilled soils need to be fine, smooth, and firm. In rough, cloddy fields, there is risk of burying the seed too deep and at the same time poor seed-to-soil contact.

Possible solutions are using a cultipacker or using a drag.

Section 3: PLANT THE SEED

Live plants or seedlings

These plants can not only keep the seed from becoming embedded in the soil but will be competition to the native plant seedlings. Take the opportunity to eliminate these plants before planting. It is worth the effort to kill existing plants before planting native seeds as it greatly improves the likelihood of success for the planting. If nothing has been done to date to prepare the site, reference the Establishment Timelines on pg 35. If the existing plants have been killed and there are now just annual volunteer seedlings or annual cover crop plants, take action because the annual weeds or cover crops develop much more quickly and compete with the native, perennial seedlings.

Solutions to kill green, growing, annual weeds include herbicide and discing. In rare situations where a good amount of thatch could carry a fire, a controlled burn may also eliminate the problem.

Nice seedbed in regards to getting good seed-to-soil contact. However, the pieces of tree and rocks could be discouraging when using a drill.

SEED-TO-SOIL CONTACT

To watch a video that shows methods of getting seed-to-soil and examples of good and bad seedbeds, check out Preparing Your Seedbed: Seed-to-Soil Contact (online). And, once there is a plan in place for seedbed preparation, read more about seeding in the Seeding Methods Overview on pg 52.

Not ideal because of the leaves again but also because there are a lot of green plants growing that will have a jump-start on the native seedlings next spring.

HOW-TO GUIDES
PLANTING
3

SEEDBED PREPARATION GUIDES

- Seedbed Preparation by Dragging Guide
- Seedbed Preparation with Livestock Guide
- Seedbed Preparation for Small Areas
- Cold, Moist Stratification Guide
- Mulching Guide

SEEDING METHODS GUIDES

- Planting Method Selector (Interactive Tool)
- Seeding Method: Pendulum (Vicon) Spreader
- Seeding Method: Fertilizer Truck or Buggy
- Seeding Method: Drill
- Seeding Method: Hand Sowing
- Seeding Method: Drone Spreader

Hamilton Native Outpost

NATIVE GRASS AND WILDFLOWER SEEDS

16786 Brown Rd,
Elk Creek, MO 65464

Phone: 417-967-2190
Toll Free: 1-888-967-2190
Fax: 417-967-5934
www.HamiltonNativeOutpost.com
natives@hamiltonnativeoutpost.com