Planting Natives in Northeast Kansas

Landscaping with Native Plants

K-STATE Research and Extension
Douglas County

KRC
KANSAS RURAL CENTER

GRASSLAND HERITAGE FOUNDATION
PRESERVING PRAIRIE

PLANTING NATIVES IN NORTHEAST KANSAS

LANDSCAPING WITH NATIVE PLANTS

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Visit The Companion Website – Native Kansas

A companion website includes a link to this document as well as pictures, interviews with property owners, plant lists, and many other resources to help you with your native planting project. Go to: plantnativeks.org

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A copy of this guide may be downloaded free of charge at: plantnativeks.org

FOREWORD

Planting Natives in Northeast Kansas is a unique collaborative effort between K-State Research and Extension - Douglas County (KSRE), the Grassland Heritage Foundation (GHF), and the Kansas Rural Center (KRC) to pull together information on and resources for integrating native plants into your landscape, whether it be in your backyard or back 40 acres. Interest in native plants is growing. Evidence for this appeal includes an increased number of native plant sales and selection of natives at garden centers, a flourishing industry of native plant nurseries and seed suppliers, and a swelling demand for information from the public. In recent years, calls to our respective organizations for help and advice on planting native plants, creating pollinator habitats, or restoring prairie have multiplied. This publication is specifically designed for those in the northeast corner of Kansas who wish to plant natives but do not know where or how to start. While the plants, timelines, and resources mentioned in this guide are specific to northeast Kansas, the general principles and methods for planting natives apply not only to the entire state of Kansas but to the whole of the grassland biome in the United States.

For more than a century, KSRE has brought horticultural and agricultural science to landowners. Increasingly, backyard gardeners call or visit the County Extension office for information on native plants, particularly those that attract pollinators. Larger property owners seek advice on converting extensive lawns into pretty meadows or turning old pastures and cropland into prairie habitat. GHF works to preserve tallgrass prairie in eastern Kansas through education, stewardship, and land protection. Founded in the 1980s in an effort to preserve prairie in Johnson County KS, today the organization owns and manages multiple prairie properties and has educated thousands of Kansans about the prairie ecosystem. KRC has long been an advocate for sustainable farming and responsible land use. Founded in 1979, KRC works to promote a farm and food system that is ecologically sound, economically viable, and socially just.

This guide for planting native plants compliments many existing resources, including prairie restoration guides available from other mid-western states such as the Tallgrass Prairie Center's Guide to Prairie Restoration (Iowa), Reconstructing a Tallgrass Prairie: A Seeding Guide for Missouri, and A Guide to Prairie and Wetland Restoration in Eastern Nebraska. In Kansas, publications on planting natives are available from Kansas State University, the Kansas Department of Wildlife, Parks and Tourism's Habitat First program, and the Kansas Biological Survey. The Xerces Society's publication Pollinator Meadows from Seed is also an excellent resource.
The number and variety of resources available are such that landowners may feel overwhelmed by the process of converting their gardens, lawns, and fields to a landscape filled with natives. In this guide, landowners will find plant recommendations and resources specifically for northeast Kansas.

The guide is designed to put necessary information all in one place – instructions, plant lists, plant and seed providers, available financial and planning assistance, reference gardens and prairies, and tips and advice from local landowners who have experience. There is also a companion website with pictures and up-to-date information.

No matter your goal, no matter the size of your property, there is a section of this guide designed for you, including:

- ✓ backyard gardeners
- ✓ property owners wanting to convert old pastures and cropland to prairie vegetation
- ✓ do it yourself landscapers
- ✓ professional landscapers
- ✓ landscape architects desiring to enhance the sustainability and diversity of corporate landscapes
- ✓ suburban property owners wishing to convert traditional lawns
- ✓ schools wishing to install native gardens for education and beauty
- ✓ farmers wanting to enhance crop production and water retention

Choose from one of five publications specific to your goals.

Gardening with Native Plants
For those wishing to tuck some native plants into existing gardens or plant a small front yard or backyard native garden.

Landscaping with Native Plants
For those wishing to replace cool-season lawns, create large native gardens, or establish native wildflower meadows up to an acre in size.

Reconstructing Prairie
For those wishing to reconstruct prairie on old fields, pastures, or cropland.

Establishing Native Cropland Borders and Buffers
For those wishing to plant native forbs and grasses to border croplands in the agricultural landscape.

Restoring Prairie Remnants
For those wishing to restore or enhance degraded, remnant prairies.

Appendices: plant lists, assistance for landowners, places to see prairies and native plantings, and additional resources.

Adding native plants to your landscape, regardless of size, will enhance its beauty, its ability to support native wildlife, and its resiliency.

Thank you.

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INTRODUCTION

Are you tired of mowing and watering that large expanse of grass around your house? Do you want to add low maintenance perennials to perk up your landscape? Why not convert some of that space to large beds of native plants or a prairie-like meadow filled with native flowers and grasses. This section of *Planting Natives in Northeast Kansas* is for those wishing to replace cool-season lawns, create large native gardens, or establish native wildflower meadows of an acre or less.

Unfortunately, shutting down your mower and letting your lawn grow is not "going native". Your lawn is mostly fescue grasses which are cool-season and non-native. Cool-season plants thrive in the spring and fall but go dormant in the summer. That is why a fescue lawn greens up in the spring but gives way to warm-season crabgrass in the hot summer. That patch of old field out back typically consists of cool-season, non-native grasses (often brome) and annual weedy forbs (flowering, broad-leaved plants that are not grasses) such as ragweed, lambsquarters, and daisy fleabane.

Shutting down your mower and letting your lawn grow is not native landscaping. (Photo: S. Ashworth)

An un-mowed lawn will eventually harbor all the unattractive weeds you currently carefully reject like chickweed, yellow nut-sedge, clover, dandelion, crabgrass, henbit, the list goes on. Your neighbors will likely not appreciate the change in scenery nor the encroachment of such plants onto their property. A deliberate planting of native flowers and grasses, whether it be in formal beds or as a more casual meadow, will not only be more successful, but will result in a more attractive landscape for you and your neighbors.

"Going native" does not require a wholesale replacement of your existing landscape. You can start slowly, by taking up a bit of lawn and putting in just one bed of natives to see how it goes. Maybe you just take one section of that old field and create a mini meadow. While natives require very little in the way of pesticides, fertilizer, water, and care, they are not maintenance-free. You will need to water new plants, there will be weeding to reduce competition while new plants fill in the bed, and some natives will need to be looked after so that they do not spread where they are not wanted.

Careful planning and site preparation will help achieve your goal of a lovely landscape filled with native plants. Use this publication to help guide you but know there is no one way to establish a native landscape. Throughout this guide, you will find tips and advice from others who have designed formal beds of natives and from those who have converted a small portion of their property to a native meadow. Those wishing to establish formal beds of native plants and native plantings under an acre will find this section most useful. If you have a larger area you wish to convert to natives see *Planting Natives in Northeast Kansas: Reconstructing Prairie*. If you just want to add some natives to existing landscape beds or establish a small planting in a front or back yard, see *Planting Natives in Northeast Kansas: Gardening with Natives*.

HOW TO LANDSCAPE WITH NATIVE PLANTS

DEFINING YOUR STYLE: FORMAL GARDENS VS. INFORMAL MEADOWS

There are several ways you can convey a deliberate attempt at attractive landscaping with natives. One of your first decisions is the level of formality you want in your landscape.

To maintain some lawn (an excuse to keep that time spent alone on your mower) and create a more formal landscape, shape perennial beds with distinct borders. There are numerous resources for help in designing formal landscapes; page through design books and magazines that have lots and lots of pictures to get a sense for what attracts your eye. Creating a more informal, meadow-like area in your landscape will require less maintenance but is not maintenance free. There are a great number of pictures available on the internet if you simply search 'native landscaping' or 'landscaping with natives'. Compare pictures of formal perennial beds with those that show a more free-form combination of flowers and grasses as you might find in a meadow and decide what might look best in your yard and with your surroundings. There are several locations in northeast Kansas where you can view native plants in formal and informal settings; see Appendix A for a list.

Of course, certain landscape designs may appeal to you but may not appeal to your budget or your available free time. Formal beds planted with transplants are costlier and time consuming but quicker to establish. The higher cost stems from hardscape materials purchased to establish and shape distinct borders for the planting beds and from the purchase of potted plants rather than seeds. To reduce costs, ask your neighbors and friends for plants when they divide their overgrown specimens (see box under *When and how to plant*) or try growing your own transplants (see *When and how to plant*). If you are planting large perennial beds, you can add beds in phases, making sure one is established before starting another to help reduce the cost, labor, and water for a large installation. Do not dig plants from native prairies. Not only will such activity disturb rare native habitats, you may unwittingly transfer invasive weeds to your yard.

The effort put towards designing formal beds can be substantial, but there are many design templates available in books, magazines and on the internet. You will still need to maintain and mow lawn between the beds and, like any perennial bed, you will need to watch for weeds and any overly exuberant spreading of your desired plants.

The bulk of the design work that goes into planning an informal, prairie-like meadow comes with choosing a seed mix. Purchasing seed is substantially cheaper than buying transplants. Your choice of a seed mix will be dictated by your aesthetic preferences, your site conditions, your budget, and the availability of seed. Choosing a mix heavy with native wildflowers (forbs) will be more expensive than a mix with a greater percentage of grasses. Do not buy pre-packaged wildflower mixes from hardware stores or garden centers. Such mixes may include flower species not native to our area and often contain seeds from weedy or undesirable species.

Creating a more informal, meadow-like area in your landscape will require less maintenance in the long run but is not maintenance free. You should also to leave a 30-foot-wide mowed space between the native plantings and your house for fire safety (NFPA) and you will need to monitor your meadow for invasive species that can easily go unnoticed until they are everywhere.

The informal approach may raise concerns with neighbors and consequently with city or county officials. Most city weed ordinances emphasize the height of vegetation, and anything over 12 inches is suspect. Some cities have a specific list of plants designated as undesirables. Living in a development with a homeowner's association will likely mean more restrictions regarding landscapes and it is best to check with the association first.

Some locales will allow a homeowner to register a property for natural landscaping. A deliberate attempt at planting native grasses and forbs will go a long way in bolstering an argument for natural landscaping. Discuss your landscaping project with your neighbors, explaining the process you are using to transform your yard and the reasons for doing so. Fashion or purchase an attractive sign designating your project as a work in progress that will soon yield beautiful wildflowers and act as a habitat refuge for native pollinators. Monarch Watch (https://www.monarchwatch.org/waystations/) and the National Wildlife Federation (https://www.nwf.org/garden-for-wildlife/certify) both have programs that offer certification of yards planted to encourage pollinators and wildlife. Remind your neighbors, and yourself, that it will take a few years for an informal native planting to acquire the look of a pleasant meadow.

Considerations for Choosing a Formal Garden or Informal Meadow

Characteristics of FORMAL GARDENS	***Characteristics of INFORMAL MEADOWS***
Defined border	No defined bed border
Species planted in clumps or patterns	Species randomly planted
Emphasizes forbs (wildflowers)	Greater presence of grasses
Established with transplants or plugs	Established with seeds
More expensive	Less expensive
Attractive to pollinators	Attractive to pollinators and possibly other wildlife
Beds generally weeded and mulched	No mulch, no weeding (except removal of invasive or noxious species)
Suited for…	**Suited for…**
Large lot subdivisions with homeowner associations	Country properties
Additions to more formal landscapes	Replacement of large lawn area
High dollar, high visual impact installations	Projects with a longer time frame
Areas with access to water for successful establishment of transplants	Areas that are hard to reach with water

Compare pictures of formal perennial beds (left) with those that show a more free-form combination of flowers and grasses as you might find in a meadow (right) and decide what might look best in your yard and with your surroundings.
(Photos: Patti Ragsdale left: https://happyapplesfarm.com/; Jennifer Moody right)

SITE EVALUATION AND SITE PLAN: SUN, SOIL, WATER, SIZE

A good site evaluation allows for proper purchasing and placement of native plants and seeds, saving you money and hours of wasted labor. You'll need a good starting map of your property. You can download an aerial view of your property from the internet but creating a map on graph paper allows you to identify key features of your existing landscape and measure the distances between these features. Include your house, trees, fences, water features, pathways, water source, and existing garden beds. You also want to note sun exposure, soil type, and the slope of the land. There are landscape design templates available on the internet, but in the references listed at the end of this section we provide a source for a simple worksheet from Iowa State Extension that can be adapted to your particular needs.

How much sun does my landscape get?

Most of our native plants in Kansas are adapted to full sun. Full sun equates to at least six hours of unfiltered sun per day, preferably eight. Native plants that can grow in a bit of shade are found in the moister, forested areas along our rivers and streams. There are fewer native plants, however, adapted for dry, shady areas. Don't despair if you've got shade as we provide some recommendations and can borrow a few suggestions from Missouri, our more wooded neighbor to the east.

Watch your property over the course of the day throughout the growing season and note which areas have more than six hours of sun and which are under varying degrees of shade. If you have a significant slope to your property, a south facing slope will be hotter and drier than a north facing slope. Afternoon sun will be more intense than morning sun.

What kind of soil do I have?

Soil structure refers to the relative amounts of sand, silt, and clay particles that make up soil. The amount of each constituent, plus the amount of organic matter, will determine how well your soil holds water and nutrients. A sandy soil will drain water and dry out quickly while a clay soil will remain wet for a longer time and puddle unless water is added slowly.

A quick and easy way to assess your soil is by feeling it with your hands. Moisten a sample of your soil and rub it between your fingers. The larger bits of sand are easy to feel. If your sample is mostly coarse feeling and of a light color it is a sandy soil. Silt will feel smooth between your fingers and be a darker color. Clay will feel sticky when wet. If you can mold your soil sample and have it retain its shape, you have a significant amount of clay in your soil.

If your yard varies topographically (has low spots and high spots), you should identify areas that tend to hold water or that may be susceptible to quick drying.

Testing Soil Drainage

Dig a hole six inches wide and one foot deep. Fill the hole with water and let it drain. When the water has drained completely, fill the hole with water again and this time keep track of how long it takes for the water to drain from the hole.

If the water drains completely within three hours or less, your soil drains rapidly, probably due to high sand content. If water is still standing in the hole after eight hours, your soil is draining slowly. This type of drainage problem is often due to excessive clay in the soil. If the water drains within four to six hours, this is good moisture retention for most plants.

While testing soil for nutrient availability is critical for successful vegetable, fruit, and cut flower gardening (and lawns), it is not critical for native plants. One of the many benefits of native plants is that they do not require fertilizers. Native plants are adapted to native soil nutrient levels and adding nutrients will only give non-native plants a competitive edge. Do not add any fertilizers, especially nitrogen. Nitrogen will only help the weeds. Adding organic matter, such as compost and manure to your native perennial beds can help with moisture retention, but it isn't necessary and too much organic matter could cause your plants to flop over or get too big, too fast.

How often do I need to water?

By planting natives, you will water far less than you would a lawn. Green lawns and finicky flowers both require more water than plants adapted to the prairie. By planting natives, you are planting a climate resilient landscape. However, you will need to water your transplants to help them get established, particularly through their first summer. Consider the location of your water source when determining where to place your plantings.

If you have a low spot on your property that collects water or where water drains slowly mark that area on your map and consider growing plants that are a bit more tolerant of wet conditions such as cardinal flower, blue verbena, and swamp milkweed (see list of recommended plants in Appendix B and on the website). If the area is especially wet, you might consider installing a rain garden. You can find excellent plans and plant lists for rain gardens online. See Appendix C for a list of resources for rain gardens.

How does the size of my property affect my plans?

Calculating the size of the space or spaces you intend to plant will help you decide what methods of vegetation removal to use, how much your project will cost, how much seed or how many plants you need, and what kind of plants or seeds to purchase. If you are using transplants to establish a bed, take into consideration the mature size of the plant. We often tend to fill an empty space when starting a new garden and not leave adequate room for the growth of the plants.

Many seed purchases and recommended seeding rates are calculated based on pounds per acre. This is important if you are planning a large informal meadow and designing your own seed mix or purchasing a seed mix. For small patches of native flowers, you can buy individual species or custom seed mixes by the ounce (see Appendix D for suppliers of native plants and seeds).

An acre of land is equal to 43,560 square feet. Try visualizing about three-quarters the area of a football field or soccer field. A 200 ft. x 200 ft. plot is 40,000 square feet, just under one acre. A 20 ft. x 20 ft. plot is 400 square feet or 1/100th of an acre.

CHOOSING WHAT TO PLANT

Choosing the plants for your new landscape is the fun part, but it can be overwhelming for those unfamiliar with native plants. There are many, many resources available that will provide lists of native plants or even specific recommendations for what to plant in a single bed. A selection of these resources is provided for you in the Resources section below. Appendix B is a fairly comprehensive list of native plants (perennials, annuals, and shrubs) for gardens in northeast Kansas. We have tried to include plants that can be found at garden centers or by mail order within our region. While pictures in designer books and online make everything tempting, we highly recommend visiting native plantings to see how your favorite plants look in an actual outdoor setting.

To maximize the benefit to pollinators and the ecosystems they support, choose a diversity of species including plenty of forbs. It is particularly important (and aesthetically pleasing) to have plants blooming throughout the growing season. Native plant catalogs often will include information on bloom times. Including grasses will not only add year-round interest to your landscape, they are larval hosts for some butterflies and provide overwintering sites for bumble bees and other insects. Birds, bees, butterflies, and other wildlife utilize plants in different ways. By including a variety of plants you will attract and benefit more wildlife than you would with a simple garden of two or three species.

Formal Native Plantings Open to the Public

LAWRENCE

- Free State High School - demonstration prairie planting
- Prairie Park Nature Center - garden in front of building
- Lied Center on KU's West Campus
  roundabout at entrance
- University of Kansas Native Medicinal Garden
- Monarch Watch - Foley Hall, KU West Campus

MANHATTAN

- Kansas State University Gardens

OVERLAND PARK

- Blue Valley School District
  Wilderness Science Center Garden
- Overland Park Arboretum and Botanical Gardens

TOPEKA

- Shawnee County Extension
  Native Plant Garden at Cedar Crest
- Children's Discovery Center
- Kansas Museum of History Native Plant Garden

There are some concerns regarding the benefits of nativars for supporting native pollinators. A native plant that has been manipulated by selective breeding or crossbreeding to highlight a desirable trait is called a nativar. One example is the white "purple" coneflowers, a selectively bred *Echinacea purpurea* that has a white flower head. You can also get red, yellow, and orange "purple" coneflowers. Nativars will have a varietal name in addition to the species name. For example, *Echinacea purpurea* 'Avalanche' is one variety of white coneflower. Many "native" plants found at garden centers are nativars rather than true natives. Look for the variety name to distinguish between natives and nativars. For a discussion of the benefits and potential drawbacks of planting nativars, see Appendix E.

SITE PREPARATION — REMOVING EXISTING VEGETATION

There are two critical goals for site preparation — reducing weed competition and making sure the seeds you plant have good contact with the soil. Achieving these goals will involve a lot of work and time up front, but you will thank yourself in the long run when you are enjoying wildflowers rather than fighting weeds. Weeds compete with native plants for water, sunlight, and nutrients.

Choosing from the available options for removing existing vegetation will depend upon time available, cost, and the size of your landscape. It's one thing to put some plastic or mulch over a 20 ft. x 20 ft. bed, another if you've got an acre to cover. You might also want to consider a combination of the options listed below as weeds will always stage a comeback and no one method is fool proof.

If you remove your existing vegetation over the course of the summer and into the fall and are not able to or do not wish to plant natives right away, you could consider planting the site with a cover crop of oats or tiller (daikon) radishes for the winter months. A cover crop will keep live roots in the soil through the first freeze and then provide biomass and cover until the spring when the plant remains can be raked away or planted through. The roots of tiller radishes can help improve compacted soil by creating spaces for air and water. Cover crops will prevent soil erosion, an especially important consideration if your property has any steep slopes.

Note: If you have used any pre-emergent herbicides on your landscape prior to beginning your project, check the label for the time required between application and planting or seeding. Some herbicides, such as atrazine or trifluralin remain in the soil for months after application and will negatively affect any transplants or seed germination.

Black Plastic Sheeting - Occultation

Covering your existing vegetation with thick black plastic will prevent photosynthesis and kill the plants below. This is very effective for annual weeds and lawn grasses but not as effective for perennial weeds (these weeds store enough energy in rhizomes to recover once you remove the plastic) or the annual seeds buried in the seed bank.

Mow your lawn as short as possible and cover with thick black plastic (at least 1.25 mm, or 4 to 6 mil thick) and pin down the edges. Leave in place for at least four to six weeks during the summer. Remove the dead vegetation once the plastic is removed. Tilling the dead vegetation into the soil will add organic matter, but you also will stir up weed seeds and give them ample opportunity to sprout by exposing them to the sun. If your lawn had few weeds prior to treatment, you can plant your native transplants in the late summer or fall immediately following treatment or wait to uncover and remove the dead vegetation in winter before seeding. If your area was rather weedy, you may want to allow some germination of the weed seeds and then follow up with another occultation treatment or light tilling (with a rake or hoe, not a rototiller) to kill the second batch of weeds before planting.

Covering your existing vegetation with thick black plastic will prevent photosynthesis and kill the plants below. (Photo: Tom Buller)

Clear Plastic Sheeting - Solarization

Covering your existing vegetation with thick, clear, UV-stable plastic will not prevent photosynthesis, but will raise the soil temperatures enough to kill existing plants and some of the weed seeds in the seed bank.

Mow your lawn as short as possible and water so that the soil is moist for at least the top foot. Cover with thick, clear plastic (at least 1.25 mm thick, like that found for high tunnels and greenhouses) and pin down or bury the edges. Sealing the edges as much as possible is important for this technique as it aids in elevating soil temperature by trapping moisture. Weigh down the center of the sheet in case the wind gets un-

Covering your existing vegetation with thick, clear, UV-stable plastic will not prevent photosynthesis, but will raise the soil temperatures enough to kill existing plants and some of the weed seeds in the seed bank. (Photo: Tom Buller)

der the edges. Leave in place for at least four to six weeks, preferably longer, during the summer. Remove the dead vegetation once the plastic is peeled back but don't till as it may bring more weed seeds to the surface. Plant transplants in the fall or keep the area covered until winter seeding.

Heavy Mulch

Mow your lawn as short as possible and cover your existing vegetation with corrugated cardboard or several layers of newspaper and top that with at least three inches of mulch. Leave in place for at least two months over the summer. Remove the dead vegetation once the mulch is raked away. Tilling the dead vegetation into the soil will add organic matter, but you also will stir up weed seeds and give them ample opportunity to sprout by exposing them to the sun. If your lawn had few weeds prior to treatment, you can plant your native transplants in the late summer or fall immediately following treatment. If your area was rather weedy, you may want to allow some germination of the weed seeds and then follow up with a light hand tilling to kill the new batch of weeds.

Another option is to plant directly into the mulch. Create layers of mulch and compost (sometimes called lasagna gardening or sheet mulching) to smother existing vegetation and provide a clean base for planting. Start with cardboard or several layers of newspaper as above and then alternate layers of nitrogen-rich materials (compost, grass clippings, plant clippings) with carbon-rich materials (leaves, hay), each layer one to three inches deep. Water each layer as you place it down and keep the whole thing moist through the summer to encourage decomposition. You can place a layer of wood chips on top to discourage weeds and help retain moisture. If you are using transplants, you can plant directly into the layers in the fall. If you plan on seeding during the dormant season, you'll want to remove this last layer of wood chips before doing so.

Herbicides

Glyphosate is a non-selective herbicide that will kill grasses and forbs (wildflowers). You may choose to use this herbicide following any of the treatments outlined in this section to kill subsequent weed germination. You also may choose to use herbicides for the initial treatment of the existing vegetation.

It is important to apply glyphosate while the plants are actively growing. If you are treating a weedy fescue lawn, apply glyphosate in the spring after mowing the area as low as possible. Remove the dead vegetation by raking or lightly tilling. Allow weed seeds to sprout and grow to about four to six inches and apply another round of glyphosate before the weeds set seed. Again, remove the dead vegetation and allow weed seeds to sprout before spraying. Repeat treatments at two to six-week intervals as weeds reach four to six inches during the growing season. Read the label on the herbicide carefully to determine how much time to allow between herbicide applications and planting or seeding.

Mechanical Turf Removal

If you are working with a relatively weed free lawn, you can remove the sod using a sod cutter and then transplant directly into the exposed soil or loosen the soil surface (do not till) and seed. Water the lawn 24 hours in advance to loosen the soil before cutting. Sod removal can be done in the fall or spring followed by planting transplants. If you are going to seed the area it is best to wait until the dormant season or seed in spring.

Mow your lawn as short as possible and cover your existing vegetation with corrugated cardboard or several layers of newspaper and top that with at least three inches of mulch. (Photo: S. Ashworth)

If you are working with a relatively weed free lawn, you can use a sod cutter and then transplant directly into the exposed soil. (Photo: S. Ashworth)

If starting with a weedy lawn you may want to further treat the area with plastic sheeting or mulch after cutting the sod, or lightly hand till to kill any germinating weeds before planting.

Tilling

Tilling your existing lawn, especially if it harbored weeds in addition to fescue, will kill existing plants but also bring a host of weed seed to the surface. Your initial tilling can be done in the fall or spring, but either way you will need to follow up with another tilling once the new crop of weeds germinates. You may need to till several times through the growing season at regular intervals to kill newly emerged weeds and prevent them from going to seed. This method of soil preparation is not recommended for slopes where soil erosion can be an issue. Too much tilling can destroy soil structure and create a hardpan in clay soils at the depth of your tiller blades. You also can follow up an initial tilling with plastic sheeting or heavy mulching as described above or an herbicide treatment as described next.

WHEN AND HOW TO PLANT

Native plants and seeds can be planted in the fall or the spring. There are pros and cons to each scenario regardless of whether you are planting potted plants into formal beds or broadcasting seed for a backyard meadow.

Transplants, Potted Plants, and Plugs

Plant in the spring or fall. In the fall plant in early September, approximately six weeks before the ground freezes. There are a number of native plant sales you can take advantage of in the spring (a few organizations will also offer plant sales in the fall) and the selection at garden centers will be greater in the spring, but you might have to water more frequently if we hit a droughty summer. If you plant in fall, you may only need to water weekly, or less frequently, after initial planting and until the freeze. Take advantage of friends dividing their natives in either season.

Pros And Cons For Planting Times And Type Of Planting

TRANSPLANTS

Fall (late August through October)

Planting 6 weeks before first frost will allow plants to establish themselves before winter begins. Water deeply (to the depth of planted roots) at least once a week (more if in drought) as the plant establishes itself.

Water occasionally through winter if there is little precipitation.

Winter (November through January)

Not recommended.

Spring (February through April)

Often nurseries and garden centers have more stock on hand in the spring.

Water deeply (to the depth of planted roots) at least once a week (more if in drought) as the plant establishes itself. It is best to water deeply but infrequently once the plant has begun to grow in its new location.

SEEDS

Fall (late August through October)

The main advantage of planting in the fall is it allows the seed time to stratify.* Planting seed too early won't significantly assist in that process, however, and will likely result in a larger loss of seed to bird and mammal predation. We recommend seeding December – January.

Winter (November through January)

Planting forb seeds in winter (November through January) will allow seeds to stratify* increasing the chance of germination in spring.

Seeding in winter will not require watering

Grass seed germination will be lower.

Seed predation might be higher than seed planted in the spring.

Spring (February through April)

Seed germination will be higher for warm-season grasses and lower for flowers as compared to winter planting.

** Many native forb seeds require a cold, moist, dormant period for successful germination. Most forb seeds will germinate after 30 days of stratification although some need up to 90 days. Planting in November through January ensures that most species in a seed mix experience a long enough stratification period.*

Break up the roots in the root ball before planting and plant so that the top of the root ball, the crown, is even with the soil surface. The width of the hole should be double the size of the root ball. If you are planting in a heavy clay soil, you can mix the original soil with some good topsoil to prevent air pockets created by backfilling with large clay clods, but don't fill the hole only with topsoil. Roots will grow easily through the good soil, then hit the hard clay wall of reality and turn back. Pay close attention to spacing —think carefully about how big that plant will be eventually. After planting, mulch around the new plant to help keep the soil moist during hot weather and to prevent frost heaving through the winter.

However, don't over mulch! Many gardeners have been taught to space plants far apart with a heavy layer of mulch in-between. That may appease our need for order and formality, but it doesn't look natural and it will feel strange in a native plant garden. It also just creates more space for you to weed. Instead, space plants a little more closely together (still leaving room for them to grow) and consider planting groundcovers or low-growing plants beneath taller ones. Use mulch sparingly and never put it against plant stems. With time, your new native plants will grow and fill in the empty spaces, possibly eliminating the need for mulch altogether. Be flexible and if something just doesn't work, replace it. Most of the plants beginning native gardeners use aren't rare or precious. It's okay to make mistakes and change things. If you do have an uncommon plant that you just can't keep, find a native plant enthusiast to take it.

Always water newly planted plants. Water at least once a week until they are established. Do not water every day as this will promote shallow roots that will eventually undermine the health of the plant. Thereafter, plants need not be watered except during long dry periods during the summer.

Starting Your Own Plants from Seed

You can start your own plants from seed to reduce costs, supplement purchased plants, and ensure the availability of hard to get plants. For most native forbs, winter sowing provides the correct environment for germination in the spring. You can seed them into a garden plot or raised bed over winter (if bird predation is a problem, cover the seed bed with netting) or try the milk jug method. Cut through a half-gallon milk jug so that the two pieces are as a clamshell, then fill the bottom part with potting soil. Seed a single species in the jug, water, and set in a protected area to overwinter. Check occasionally to see that the soil has not dried out. The top of the milk jug protects against seed predation and acts as a miniature greenhouse. A detailed description of the milk jug method is provided through a link on the website. You also can find a detailed description of the method in the January 2016 issue of Kansas City's Greenability Magazine.

You can start native forb seeds in a home-made greenhouse with milk jugs and some potting soil. Keep the soil moist. (Photo: S. Ashworth)

Native Perennials to Divide and Share

PLANT	SCIENTIFIC NAME	WHEN TO DIVIDE
Alumroot	(*Heuchera spp.*)	spring or early fall
Barren Strawberry	(*Fragaria virginiana*)	spring or early fall
Black-eyed Susan	(*Rudbeckia spp.*) *	spring
Golden Ragwort	(*Packera aurea*)	spring
Mistflower	(*Eupatorium coelestinum*)	spring or fall
Mountain Mint	(*Pycnanthemum tenuifolium*)	spring
Poppy Mallow	(*Callirhoe involucrata*)	spring
Prairie Coreopsis	(*Coreopsis spp.*)	spring or early fall
Purple Coneflower	(*Echinacea spp.*)	spring
Pussytoes	(*Antennaria neglecta*)	fall
Rose Verbena	(*Glandularia canadensis*)	spring or early fall
Shining Blue Star	(*Amsonia tabernaemontana*)	fall
Solomon's Seal	(*Polygonatum biflorum*)	spring
Spiderwort	(*Tradescantia spp.*) *	spring
Wild Bergamot	(*Monarda fistulosa*) *	spring
Wild Ginger	(*Asarum canadense*)	spring or fall

* Plants marked with an asterisk can spread beyond their designated space.

Seed Mixes for Informal Meadows

To ensure good seed contact with the soil remove existing vegetation (see under *Site Preparation* — removing existing vegetation) and prepare the soil bed before planting. Try to remove large clumps and debris and smooth the soil surface without tilling.

- **Purchasing Seed**

Nationwide there are many native plant nurseries that can make up a seed mix for you based on desired species or customize a mix for the particular characteristics of your site (see under *Site Evaluation* above). However, it is best to buy seed from a supplier that not only carries species native to northeast Kansas but one that grows the plants that supply the seed in this general region. K-State recommends purchasing seed grown within 200 miles (Kansas, Nebraska, Iowa, Missouri, Oklahoma). While a nursery in Oregon might have species native to Kansas, the plants grown in Oregon may not be adapted to the environmental conditions found in Kansas. Regional plants are adapted to regional conditions. Sources for regionally grown native plant seeds are listed in Appendix D and on the accompanying website. It is best to order your seeds in the fall if possible for a winter or spring seeding. Lack of seed availability becomes an issue when trying to order in the spring.

- **Collecting and Cleaning Seed**

If you know someone with native plants in their landscape, you can collect your own seeds. You might also ask permission of public parks, state lands, or nature centers to collect seed. Never collect seed from the wild without first asking permission from the landowner. Some native species are rare and collecting seed could further impair wild populations.

Seed collecting and cleaning is done in the fall after the growing season has ended. The time to collect seed will vary from species to species or location to location. Try shaking out some seeds from the heads of desired species or grabbing grass seed heads to see if the seeds come off readily to gauge when you might collect. To maintain the integrity of the patch of native plants you are collecting from, do not collect from more than 1/3 of the plants. Note that the germination rate of seed collected from wild patches of plants is likely to be significantly less than that in a purchased seed mix.

The germination rate is higher if you remove the chaff around the seed. Chaff is the collective term for the other parts of a flower that surround the seed — the dried bracts, petals, and seed hulls. A cheap but labor-intensive method for cleaning seed is to make or purchase a wire screen mounted on a wooden square. Mesh size should be coordinated with seed size. Varying mesh sizes between 1/8 and 1/2 inch will work for most native seeds. Once you have your screens, you will rub your collected seeds back and forth over the screen as the seeds fall through the mesh (some chaff will fall through also and that is ok). Save stems and large debris for mulch or compost. Keep the seeds in paper sacks in a cool, dry, protected place until you are ready to plant.

Advice from Kim Bellemere on Purchasing Seed

1. Assess your goals. A seed mix containing a high percentage of wildflowers will look pretty but cost more. The more species you want, the more expensive your planting will be. Rarer species also cost more.

2. Order your seed early in the fall before your dormant season planting (seeds generally arrive within a couple of weeks). If you wait until January or February some of your desired species will be unavailable. If you obtain seeds in late spring, keep them in a refrigerator over the summer to keep them cold and dry.

3. It can be overwhelming to design your own seed mix. It helps to talk with an expert.

4. If you purchase a pre-determined seed mix, you can always add desired species purchased separately or add new species in subsequent years.

5. Pre-determined seed mixes may contain a few species that are technically not native to NE Kansas and may not live in your meadow for very long. However, such species are often very successful in the first one or two years after planting and can provide valuable cover and a welcome pallet of color, or in Kim's words a "morale booster", while your meadow gets established. Examples include blanket flower (*Gaillardia pulchella*, native to western Kansas) and clasping coneflower (*Dracopis amplexicaulis*, native to SE Kansas).

Advice from Courtney Masterson, Native Lands LLC, on Collecting and Cleaning Seed

Wait for seeds to dry on the plant before collecting. Most seeds darken in color when mature and sometimes the seeds will rattle in their capsules or pods. If the seeds are shriveled or flexible, they are not viable. Do not collect seeds when they are wet. Even if seeds appear dry, keep them in a paper bag in a dry space for at least 10 days before removing the chaff around the seeds. Check the seeds and seed heads for insects. Some seed heads will likely require additional drying time, such as coneflower, rattlesnake master, and black-eyed Susan. These larger, spiny seed heads will be easier to clean if you let them dry in a paper sack for at least two weeks.

A cheap but labor-intensive method for cleaning seed is to make or purchase a wire screen mounted on a wooden square. (Photo: K. Bellemere)

If you won't be planting during the dormant season and wish to stratify (keep in a cold, moist environment to break dormancy) your seeds before spring planting, refer to species specific instructions from the Tallgrass Prairie Center. You can also try growing your own plants by planting the seeds in a garden bed or milk jugs over the winter (see above under *Starting your own plants from seeds*).

- **How Much Seed**

Recommendations vary from 40 to 60 seeds per square foot. There are several factors to consider when determining how much seed you will need: the time of year you are planting, the pure live seed contained in your chosen seed mix, and the ratio of forbs to grasses in your mix. Pure live seed, or PLS, is the percentage of viable seed per unit weight of the seed mix. If you plan to sow during winter, you might spread more seed to compensate for seed lost to predation. Certain species will have lower germination rates so you might increase the percentage of those species in your mix. A seed mix heavy with forbs will be more expensive. A more detailed discussion of how much seed is needed for areas over an acre in size can be found in the prairie reconstruction section of *Planting Natives in Northeast Kansas*. For small (less than ½ acre) informal meadows in a defined bed, you can purchase individual packets of seeds or custom seed mixes (see Appendix D).

- **Planting Seed**

Rake the prepared seed bed before broadcasting your seed so that you have an even but roughed up surface to promote good contact between the soil and the seeds. You don't want the seeds laying on top of a smooth, hard surface as there is a greater chance they will wash away or get eaten.

Native seeds vary greatly in size so it is difficult to find a setting on your typical lawn seed spreader that will handle a mix of native seeds. To help spread seeds evenly by hand, mix your seed with a carrier – sand or sawdust will work. You will need 2.5 cubic feet of carrier for 1,000 square feet of area planted. Dampen the carrier with water and then mix in your seeds. Divide your seed mixture in half. To ensure coverage of your whole planting area, broadcast the entire area with one-half your mixture walking in one direction and then cover it again with the second half, walking in a perpendicular direction. For example, walk west to east for the first pass and then north to south on the second pass. Try to cover the entire site with each half of the seed mixture.

After seeding, cultipack (firm the soil by rolling a heavy weight over the soil) the area to ensure good seed contact with the soil. If the area is small enough, you can walk over a large cardboard or plywood sheet placed on top of the newly seeded bed.

If possible, you may water when planting in the spring (not necessary if seeds are planted in the fall unless there is a prolonged dry spell of more than a month), but just enough to keep the ground moist through seedling development. If water is not available, don't fret, it just means things will germinate more slowly.

MAINTAINING YOUR LANDSCAPE

MAINTENANCE FOR FORMAL GARDENS

Native plants are low maintenance, but they are not no maintenance. Native plants will need little water once established and no pesticides or fertilizers. Just like any other perennial bed however, you will need to weed and divide your natives when they begin to outgrow their allotted space. Some natives can be aggressive in a garden setting where competition is far less than they encounter in the wild. If you want a neat and tidy native perennial bed you might want to avoid planting natives such as black-eyed Susan, and many of the sunflower species (*Helianthus spp*.). Some taller native plants may grow in areas that receive less than six hours of sun but tend to flop over if not part of a dense planting. Some examples include tall goldenrod, rigid goldenrod, and Illinois bundle-flower.

Many people clean up their perennial beds in the fall by cutting down dead plant stems and raking leaves. To provide maximum benefit for insects and birds let the dead vegetation stand and don't rake the leaves until spring. Native bees overwinter in stems and in burrows beneath the litter. Polyphemus and cecropia moths overwinter in cocoons in the leaf litter. Do, however, remove any diseased plant material. Clean up in spring when you start to see the insects flying about again or when daytime temperatures are consistently at least 50^0 F. Waiting might be hard but just think of all the time you'll have to enjoy the fall colors followed by the spring burst of bees and butterflies in your yard.

MAINTENANCE FOR INFORMAL MEADOWS

The fun thing about having an informal native plant meadow out your back or front door will be watching how it changes from season to season, year to year. Different sets of species will dominate in different years depending upon winter moisture and growing season weather. To maintain the diversity of species that creates a changing palette of color you will need to vary your maintenance schedule. Despite careful site preparation the first year will necessitate a battle with weeds. To reduce weed cover, mow your meadow before the cool-season annuals flower in the spring following a winter planting. You can mow to a height of 8 inches for this first mow as prairie plants will be shorter and struggling in the shade of the non-native vegetation. Mow again when the vegetation gets to a height of 12 inches and continue this pattern for the first growing season. Mowing the cool-season annuals in the spring allows more sunlight to reach the germinating native seeds and prevents the cool-season weeds from setting seed. You can spot spray known weeds with glyphosate if you wish but take care not to get the herbicide on any desirable (or unknown) plants.

During the second year mow in the early spring but not thereafter. If you can identify the weeds you might hand trim them, pull them, or spray them before they set seed.

If you have good establishment of natives after that first year you might mow once every three years. Mowing continues to benefit warm-season natives as cool-season weeds will always be fighting for space and attempting to overrun your meadow. If your natives are struggling against the weeds, mow once a year for two or three years in a row after the first year and then re-evaluate. During that first year or two you will mow in the spring, but you might change the time of year you mow in subsequent years so that a small group of species does not establish dominance. If you wish to add more forb seeds in subsequent years, mow in the fall before putting down seed that winter. Even in small spaces with good establishment of natives, you will need to watch for invasive species such as bindweed, sericea lespedeza, and trumpet vine. Take the time to dig these out or spot spray with glyphosate, or the next time you look there will be more of them.

ADVICE FROM PEOPLE WHO HAVE DONE IT

Advice from Susan Rendall on What NOT to Plant for a Well-Behaved Native Perennial Garden

COMMON NAME	SCIENTIFIC NAME
Snow on the mountain	*Euphorbia marginata*
Hops	*Humulus lupulus*
Trumpet vine	*Campsis radicans*
Dutchman's pipe vine	*Aristolochia macrophylla*
Passionflower	*Passiflora incarnata*
Phlox	*Phlox spp.*
Compass plant	*Silphium perfoliatum*

SUSAN AND DOUG RENDALL

Susan Rendall lives in rural Douglas County on five acres of land. She and her husband purchased their property in 2001 and at that time it consisted of mowed grassland and typical landscape plantings around the house. While four acres remains in native prairie vegetation, Susan has created numerous formal garden beds around her house. In place of lawn, wood mulch paths wind through formal beds of flowering plants, shrubs, and trees, many of them native to northeast Kansas or just a bit to the east. Before transforming her landscape, Susan studied what to plant. Her criteria for admission into her garden included plants native to the region, plants that would survive the site conditions, seasonal color, and design features such as height and growth form. During the initial stages of creating her gardens Susan read a book by Doug Tallamy promoting the use of native plants in gardens and decided to emphasize natives for the benefit of pollinators.

Susan's advice centers on knowing your site conditions and putting the right plant in the right place. While some gardeners might wish to strictly adhere to the "natives only" motto, Susan recognizes that there may be spots in your garden where a northeast Kansas native plant will not thrive. For her shaded areas, she borrows natives from our more wooded neighbor, Missouri. She also uses nativars (see Appendix E for a discussion of natives and nativars) that better fit her design goals, such as shorter, more upright varieties of aster (New England aster 'Purple Dome') and coreopsis (*Coreopsis verticillata* 'Zagreb'), or the more striking cultivar of blue gramma grass 'Blonde Ambition'. Some natives are just not well-suited to gardens and are better left out in the prairies where greater competition and harsher conditions keep them in check. In the accompanying box Susan lists some native plants that can be a bit aggressive when placed in a cared-for garden bed. When placed in gardens with good soil and a bit of shade some native prairie plants grow tall but then tend to flop over, such as plants in the genus *Silphium* (cup plant is one example) or *Helianthus* (sunflowers).

JILL KLEINBERG

Jill Kleinberg lives on five acres in northwest Lawrence. She built her house 18 years ago on a former pasture surrounded by deciduous woods. During the construction of her house, the existing vegetation was stripped off but most of the topsoil remained. This left her just under half an acre of open ground to contemplate out her front door. Jill decided that she wanted to plant "what was right for the place" and what was right for this place was a mix of native prairie grasses and forbs. She finds nature thrilling and enjoys living with something of nature close at hand, including the birds and insects the prairie attracts.

Jill found a native seed provider who designed a seed mix appropriate for northeast Kansas and hand broadcast the seed in the spring of 2000. As it happens, the following summer was extremely dry, and Jill feared that her little prairie would not germinate (no watering). She persevered by waiting patiently, weeding out what she knew was not welcome and transplanting into sparse areas plants she knew she wanted. It helped that Jill was very open-minded about what plants are considered weeds.

It took about five years for Jill to feel like what she could see out her front door was the prairie vegetation she had hoped for. Except for new transplants, the meadow is never watered, and the entire meadow is mowed every year in late winter to keep the surrounding trees at bay. At the wood's edge, poison ivy and heath aster are a problem so Jill digs up these plants when she can and spot sprays the poison ivy with glyphosate. Still, Jill continues to "edit" her little prairie. One certainly does not need to continually micro-manage an informal meadow, beyond controlling noxious weeds and establishing a mowing schedule, but Jill enjoys strategically placing patches of color here and there to increase her enjoyment of the landscape.

Some Key Pieces Of Advice From Jill

To appreciate a naturalistic garden is to appreciate a different kind of beauty. With a naturalistic garden one learns to enjoy the serendipity of native plants as the diversity and position of groups of plants change over the years.

To get rid of undesirable vegetation, or to incorporate something specific into the meadow matrix, smother the existing vegetation under cardboard and heavy mulch. Plant into the space after the existing vegetation has died.

Don't be afraid to re-arrange your meadow. If you'd love a spot of color just there, go ahead and plant a patch of coneflower or blue sage just there. Add clumps of color and form where you want them.

CHECKLIST OF ACTIVITIES

- ❑ Create a map of your property
- ❑ Identify spaces for native plantings
- ❑ Measure size of native plant spaces
- ❑ Determine sun exposure, slope, soil drainage, and water access
- ❑ Decide if your goal is a formal or informal planting for each space
- ❑ Decide on your method for removing existing vegetation
- ❑ Draw up a timeline of activities: site prep, seed collecting and starting (if applicable), seed orders or plant purchases, planting, establishment, maintenance
- ❑ Design your planting and create a desired species list
- ❑ Determine which seed or plant providers have your desired species, repeat the previous activity
- ❑ Prepare your planting areas
- ❑ Order plants and/or seeds OR purchase plants at local native plant sales and garden centers
- ❑ Plant transplants or sow seeds
- ❑ Water any transplants at least once a week to a depth of one inch for several weeks or through a hot, dry summer

RESOURCES

BOOKS ON NATIVE GARDENING

A New Garden Ethic: Cultivating Defiant Compassion for an Uncertain Future by Benjamin Vogt
Attracting Native Pollinators: The Xerces Society Guide to Conserving North American Bees and Butterflies, The Xerces Society
Gardening with Prairie Plants by Sally Wasowski
Planting in a Post-Wild World: Designing Plant Communities for Resilient Landscapes by Thomas Rainer and Claudia West
The Humane Gardener by Nancy Lawson
The Living Landscape: Designing for Beauty and Biodiversity in the Home Garden by Douglas Tallamy and Rick Darke

HELPFUL ORGANIZATIONS

Douglas County Extension Master Gardeners: https://www.douglas.k-state.edu/lawn-garden/index.html
Grassland Heritage Foundation: https://www.grasslandheritage.org/
Jayhawk Audubon Society: https://www.jayhawkaudubon.org
Kansas Rural Center: https://kansasruralcenter.org/
Monarch Watch: https://monarchwatch.org/

INSECT IDENTIFICATION GUIDEBOOKS

A Photographic Field Guide to the Butterflies in the Kansas City Region by Betsy Betros
Bees: An Identification and Native Plant Forage Guide by Heather Holm
Pollinators of Native Plants: Attract, Observe and Identify Pollinators and Beneficial Insects with Native Plants by Heather Holm

MISCELLANEOUS INFORMATION / NEONICOTINOIDS

Kansas Native Plant Society resource lists: https://www.kansasnativeplantsociety.org/resources.php
KSU Research and Extension, select publications: https://hnr.k-state.edu/extension/publications/
North American Plant Atlas: http://bonap.net/napa
Xerces Society information on neonicotinoids and pollinators: https://www.xerces.org/pesticides/understanding-neonicotinoids

PLANT IDENTIFICATION WEBSITES

Kansas Wildflowers and Grasses: https://www.kswildflower.org/
Missouri Botanical Garden: http://www.missouribotanicalgarden.org/plantfinder/plantfindersearch.aspx

PLANT LISTS

Grassland Heritage Foundation Top 20 Plants for New Native Plant Gardeners: https://www.grasslandheritage.org/
Johnson County Master Gardeners, KSRE, Native Plants: https://www.johnson.k-state.edu/docs/crops-livestock/native-grass-seed/Native%20Plants%20-%20EMG.pdf
Missouri Prairie Foundation Grow Native Lists: https://grownative.org/native-plant-info/grow-native-top-ten-native-plant-lists/
The Xerces Society Pollinator Friendly Plants: https://xerces.org/pollinator-conservation/pollinator-friendly-plant-lists

PLANT IDENTIFICATION BOOKS

Field Guide to the Common Grasses of Oklahoma, Kansas, and Nebraska by Iralee Barnard
Kansas Wildflowers and Weeds by J. Haddock, C. Freeman, and J. Bare
Native Plants of the Midwest by Alan Branhagen
Trees, Shrubs, and Woody Vines in Kansas (Revised and Expanded) by Michael John Haddock and Craig C. Freeman
Wildflowers and Grasses of Kansas by Mike Haddock

GLOSSARY

COOL-SEASON PLANT
A plant that thrives in the spring and fall, going dormant during the summer heat. Cool-season plants green-up in the spring earlier than warm-season plants.

FORB
A broad-leaved, flowering plant. Not a grass or sedge.

INVASIVE PLANT
A plant that is both non-native and able to establish itself on many sites, grow quickly, and spread to the point of disrupting plant communities or ecosystems. Examples in northeast Kansas include bush honeysuckle (*Lonicera maackii*) and crown vetch (*Securigera varia*).

NATIVARS (CULTIVARS)
A cultivar is a named variety of plant, like the distinction among apples. All apples are the same species but include varieties such as gala, Cortland, red delicious, granny smith, and many, many others. Cultivars have been selectively bred for certain characteristics like color, height, or disease resistance.

A native plant that has been manipulated by selective breeding or crossbreeding to highlight a desirable trait is called a nativar. One example is the white "purple" coneflower a selectively bred *Echinacea purpurea* that has a white flower head. You can also get red, yellow, and orange "purple" coneflowers. Nativars will have a varietal name in addition to the species name. For example, *Echinacea purpurea* 'Avalanche' is one variety of white coneflower. Look for the variety name to distinguish between natives and nativars.

NATIVE PLANT
Common examples of plants native to northeast Kansas include pale purple coneflower (*Echinacea pallida*), prairie blazing star (*Liatris pycnostachya*), and stiff goldenrod (*Oligoneuron rigidum*).

"A plant that is a part of the balance of nature that has developed over hundreds or thousands of years in a particular region or ecosystem. Note: The word native should always be used with a geographic qualifier (that is, native to New England [for example]). Only plants found in this country before European settlement are considered to be native to the United States." —*Natural Resources Conservation Service*

NATURALIZED PLANT
A non-native plant that does not need human help to reproduce and maintain itself over time. Yellow foxtail (*Setaria pumila*) and dandelion (*Taraxacum officinale*) are examples.

NON-NATIVE PLANT
A plant introduced with human help (intentionally or accidentally) to a new place or new type of habitat where it was not previously found. Examples of plants commonly found in our region that are not native to northeast Kansas include butterfly bush (*Buddleia* spp.), lilac (*Syringa* spp.) and cosmos (*Cosmos sulphureus*). Purple coneflower (*Echinacea purpurea*) is native to Kansas but not the northeastern part of Kansas. Not all non-native plants are invasive or otherwise problematic.

NOXIOUS WEED
The term "noxious weed" is a legal term and plants declared noxious weeds vary from state to state. In Kansas, noxious weeds include Sericea lespedeza (*Lespedeza cuneata*) and field bindweed (*Convolvulus arvensis*).

From the federal Noxious Weed Act: any living stage (including seeds and reproductive parts) of a parasitic or other plant of a kind which is of foreign origin, is new to or not widely prevalent in the U.S., and can directly or indirectly injure crops, other useful plants, livestock, poultry or other interests of agriculture, including irrigation, navigation, fish and wildlife resources, or the public health. For more information refer to the USDA noxious weed list for Kansas.

WARM-SEASON PLANT
A plant that thrives during the warmest parts of the growing season. Warm-season plants green-up in late spring after cool-season plants have already started growing. Most of our native grasses and forbs are warm-season plants.

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SITE PLAN

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APPENDIX A

PLACES TO SEE PRAIRIES AND NATIVE PLANTINGS IN NE KANSAS

County and Name	Location	Size
ANDERSON COUNTY		
Leadplant Prairie		17 acres
DOUGLAS COUNTY		
Prairie Acre	726 Sunnyside Ave., Lawrence	< 1 acre
Prairie Park Nature Center	2730 Harper St Lawrence	1 - 3 acres
Clinton Lake - Sanders Mound	872 N 1402 Rd Lawrence (office)	7 acres
Clinton Lake - Coblenz Marsh Road Prairie	872 N 1402 Rd Lawrence (office)	54 acres
Clinton Lake - Elk Creek Prairie East	872 N 1402 Rd Lawrence (office)	35 acres
Clinton Lake State Park Prairie	872 N 1402 Rd Lawrence (office)	5 acres
Baker Wetlands	1365 N 1250 Rd Lawrence	927 acres
Black Jack Battlefield and Nature Park	163 E 2000 Rd Wellsville	
Akin Prairie	N. 1150 Rd Lawrence	16 acres
Ivan L. Boyd Prairie Preserve	2011 North 200 Rd Wellsville	15 acres
Pioneer Cemetery Prairie	300-398 N 200 Rd Baldwin City	13 acres
JEFFERSON COUNTY		
Rockefeller Prairie	Wild Horse Rd Lawrence	9 acres
JACKSON COUNTY		
Rachel Snyder Prairie	Mayetta; contact GHF*	140 acres
JOHNSON COUNTY		
The Prairie Center	26325 W 135th St Olathe	45 acres
Kill Creek Park	11670 Homestead Lane Olathe	varies
Ernie Miller Nature Center	909 North KS-7 Olathe	varies
Ogg Road Prairie	79th St. and Ogg Rd Shawnee Mission Park	4 acres
Wilderness Science Center	5001 W. 163rd Terrace, Stilwell	< 1 acre
Overland Park Arboretum and Botanical Gardens	8909 W 179th St Overland Park	180 acres
Big Bull Creek Park	20425 Sunflower Rd, Edgerton	NA
OSAGE COUNTY		
Osage State Fishing Lake	3 miles S, 1/2 mile E of Carbondale	366 acres
POTTAWATOMIE COUNTY		
Jeffrey Energy Center - Oregon Trail Nature Park	US 24, between Belvue and St. Marys	< 5 acres
RILEY COUNTY		
Konza Prairie Biological Research Station	100 Konza Prairie Ln Manhattan	8817 acres
SHAWNEE COUNTY		
Kansas Museum of History	6425 SW 6th Ave Topeka	< 5 acres
Shawnee State Fishing Lake	NW Humphrey Rd Menoken	400 acres
Grant Bradbury Park	6600 SW Westview Rd Topeka	80 acres
MacLennan Park (Cedar Crest)	Governor's Lake Rd and SW 6th Ave Topeka	NA
Kansas Children's Discovery Center	4400 SW 10th Ave Topeka	< 1 acre
WAUBAUNSEE COUNTY		
Mt. Mitchell Heritage Prairie Preserve	29377 Mitchell Prairie Ln Wamego	50 acres
Bolton Wildlife Area	Mulberry Creek Rd Paxico	600 acres

APPENDIX B

RECOMMENDED PLANTS FOR NATIVE GARDENS AND LANDSCAPES

Annuals and Perennials	Scientific Name
Western yarrow	Achillea millefolium
Shining blue star*	Amsonia illustris
Thimbleweed*	Anemone virginiana
Prairie pussytoes	Antennaria neglecta
Pussytoes*	Antennaria parlinii
Canada columbine *	Aquilegia canadensis
White sage	Artemisia ludoviciana
Wild ginger *	Asarum canadense
Tall green milkweed	Asclepias hirtella
Swamp milkweed	Asclepias incarnata
Butterfly milkweed	Asclepias tuberosa
Whorled milkweed	Asclepias verticillata
White false indigo	Baptisia alba
Blue false indigo	Baptisia australis
Cream wilk indigo	Baptisia bracteata
Purple poppy mallow	Callirhoe involucrata
Oak sedge*	Carex albicans
Pitcher's leather flower	Clematis pitcheri
Mist flower	Conoclinium coelestinum
Bigflower coreopsis	Coreopsis grandiflora
Lanceleaf coreopsis	Coreopsis lanceolata
Prairie coreopsis	Coreopsis palmata
White prairie clover	Dalea candida
Purple prairie clover	Dalea purpurea
Shooting star*	Dodecatheon meadia
Pale purple coneflower	Echinacea pallida
Rattlesnake master	Eryngium yuccifolium
Boneset	Eupatorium perfoliatum
Sweet joe-pye weed *	Eupatorium purpureum
Wild Geranium*	Geranium maculatum
Indian physic*	Gillenia stipulata
Rose verbena	Glandularia canadensis
Common sneezeweed	Helenium autumnale
Rough ox-eye	Heliopsis helianthoides
Coral bells*	Heuchera richardsonii
halberd-leaf rose-mallow	Hibiscus laevis
Common rush	Juncus effusus
Round-headed bush clover	Lespedeza capitata
Tall gayfeather	Liatris aspera
Hairy gayfeather	Liatris squarrosa
Dotted gayfeather	Liatris punctata
Thickspike gayfeather	Liatris pycnostachya
Cardinal flower *	Lobelia cardinalis
Blue lobelia	Lobelia siphilitica
Virginia bluebells*	Mertensia virginica
Missouri evening primrose	Oenothera macrocarpa
Roundleaf groundsel *	Packera obovata
Cobeae beardtongue	Penstemon cobaea
Smooth beardtongue	Penstemon digitalis
Pale beardtongue*	Penstemon pallidus
Fame flower	Phemeranthus calycinus
Wild sweet william*	Phlox divaricata
Prairie phlox	Phlox pilosa
Jacob's ladder*	Polemonium reptans
Solomon's seal*	Polygonatum biflorum
Prairie coneflower	Ratibida columnifera
Grayhead prairie coneflower	Ratibida pinnata
Sweet coneflower	Rudbeckia subtomentosa
Fringe-leaf ruellia	Ruellia humilis
Blue sage	Salvia azurea
Bloodroot*	Sanguinaria canadensis
Gray goldenrod	Solidago nemoralis
Showy goldenrod	Solidago speciosa
Drummond's aster	Symphyotrichum drummondii
Smooths aster	Symphyotrichum laeve
New England aster	Symphyotrichum novae-angliae
Aromatic aster	Symphyotrichum oblongifolium
Azure aster	Symphyotrichum oolentangiensis
Large flower bellwort*	Uvularia grandiflora
Western ironweed	Vernonia baldwinii
Culver's root	Veronicastrum virginicum
Golden Alexanders	Zizia aurea

Grasses	Scientific Name
Big bluestem	Andropogon gerardii
Side oats grama	Bouteloua curtipendula
Prairie June grass	Koeleria macrantha
Switchgrass	Panicum virgatum
Little bluestem	Schizachyrium scoparium
Indian grass	Sorghastrum nutans
Prairie dropseed	Sporobolis heterolepis
Eastern gama grass	Tripsacum dactyloides
Blue grama	Bouteloua gracillis

Shrubs	Scientific Name
Service berry *	Amelanchier arborea
Leadplant	Amorpha canescens
False indigo	Amorpha fruticosa
New Jersey tea	Ceanothus americana
Common buttonbush *	Cephalanthus occidentalis
American hazelnut *	Corylus americana
Eastern wahoo *	Euonymus atropurpureus
Smooth hydrangea*	Hydrangea arborescens
Fragrant sumac	Rhus aromatica
Smooth sumac	Rhus glabra
Golden currant *	Ribes odoratum
Black raspberry *	Rubus occidentalis
Maryland senna	Senna marilandica
Rusty black-haw viburnum *	Viburnum rufidulum

WETTER AREAS

Annuals and Perennials	Scientific Name
Swamp milkweed	Asclepias incarnata
Mist flower	Conoclinium coelestinum
Boneset	Eupatorium perfoliatum
Common sneezeweed	Helenium autumnale
Halberd-leaf rose-mallow	Hibiscus laevis
Common rush	Juncus effusus
Thickspike gayfeather	Liatris pycnostachya
Cardinal flower *	Lobelia cardinalis
Blue lobelia	Lobelia siphilitica
Roundleaf groundsel *	Packera obovata
Western ironweed	Vernonia baldwinii

Grasses	Scientific Name
Switchgrass	Panicum virgatum
Prairie cordgrass	Spartina pectinata

Shrubs	Scientific Name
Common buttonbush *	Cephalanthus occidentalis

SHADY AREAS

Annuals and Perennials	Scientific Name
Shining blue star*	Amsonia illustris
Thimbleweed*	Anemone virginiana
Pussytoes*	Antennaria parlinii
Canada columbine *	Aquilegia canadensis
Wild ginger *	Asarum canadense
Oak sedge*	Carex albicans
Shooting star*	Dodecatheon meadia
Wild Geranium*	Geranium maculatum
Indian physic*	Gillenia stipulata
Coral bells*	Heuchera richardsonii
Cardinal flower *	Lobelia cardinalis
Virginia bluebells*	Mertensia virginica
Roundleaf groundsel *	Packera obovata
Pale beardtongue*	Penstemon pallidus
Wild sweet william*	Phlox divaricata
Jacob's ladder*	Polemonium reptans
Solomon's seal*	Polygonatum biflorum
Bloodroot*	Sanguinaria canadensis
Large flower bellwort*	Uvularia grandiflora

Shrubs	Scientific Name
Service berry *	Amelanchier arborea
Common buttonbush *	Cephalanthus occidentalis
American hazelnut *	Corylus americana
Eastern wahoo *	Euonymus atropurpureus
Smooth hydrangea*	Hydrangea arborescens
Golden currant *	Ribes odoratum

PLANTS FROM OUTSIDE NE KANSAS (NATIVE AREA)

Annuals / Perennials	Scientific Name	
Eastern Blue Star*	Amsonia tabernaemontana	SE KS
Pennsylvania sedge*	Carex pensylvanica	MO
Rose turtlehead*	Chelone obliqua	MO
Leather flower*	Clematis versicolor	MO
Calamint	Clinopodium arkansanum	MO
Purple coneflower*	Echinacea purpurea	SE KS
Closed gentian*	Gentiana andrewsii	MO
Beebalm*	Monarda bradburiana	SE KS
Royal catchfly	Silene regia	SE KS

Shrubs	Scientific Name	
Ozark witchhazel	Hamamelis vernalis	MO

*** Will tolerate some shade**

Note: Plants that are difficult to find either through mail order or in regional garden centers have not been included in this list.

APPENDIX C

SOURCES FOR INFORMATION ON RAIN GARDENS

Information on designing and planting a rain garden

KCMO Resident Rain Garden Booklet
https://www.kcwaterservices.org/wp-content/uploads/2013/04/KCMO-Resident-Rain-Garden-Booklet-2015.pdf

Kansas Healthy Yards rain gardens and bioswales video
http://kansashealthyyards.org/component/allvideoshare/video/rain-gardens-and-bioswales

Lawrence Kansas Public Works raingarden brochure
https://assets.lawrenceks.org/assets/public-works/docs/raingarden.pdf

Mid-America Regional Council rain garden designs and instructions
http://www.marc.org/Environment/Water-Resources/Landscaping-and-Lawn-Care/Rain-Gardens

K-State Rain Garden Guidebook
http://faculty.capd.ksu.edu/lskab/KSU-LARCP_Rain-Garden-Guidebook-lrs.pdf

APPENDIX D

SOURCES FOR REGIONALLY GROWN NATIVE PLANTS AND SEEDS

Retail Source	Location	Phone	Website

KANSAS SEEDS

De Lange Seed, Inc.	Girard, KS	620-724-6223	www.delangeseed.com
Douglas County Conservation District	Lawrence, KS	785-843-4260	http://www.douglasccd.com/
Feyh Farm Seed	Alma, KS	866-765-3415	http://www.feyhfarmseed.com/
Happy Apple's Farm	Tonganoxie, KS	816-260-6417	https://happyapplesfarm.com/
Leavenworth County Conservation District	Leavenworth, KS	785-338-9946	http://www.sccdistrict.com/
Sharp Bros. Seed Co.	Healy, KS	800-462-8483	www.sharpseed.com
Star Seed	Osborne, KS	800-782-7311	https://www.gostarseed.com/
Tri Star Seed Company	Springhill, KS	800-874-3308	http://www.tri-starseed.com/index.cfm

KANSAS PLANTS

Grimm's Gardens	Hiawatha, KS	888-459-2586	www.grimmsgardens.com/hiawatha/
Happy Apple's Farm	Tonganoxie, KS	816-260-6417	https://happyapplesfarm.com/
Kansas Forest Service	Manhattan, KS	785-532-3300	www.kansasforests.org
Sunflower Farms	Cherryvale, KS	620-336-2066	
Vinland Valley Nursery	Baldwin City, KS	785-594-2966	www.vinlandvalleynursery.com

REGIONAL SEEDS

Hamilton Native Outpost	Elk Creek, MO	417-967-2190	www.hamiltonnativeoutpost.com
Missouri Wildlflowers Nursery	Jefferson City, MO	573-496-3492	http://mowildflowers.net/
Stock Seed Farm	Mudock, NE	800-759-1520	http://www.stockseed.com/
Heartland Seed of Missouri, LLC	Eolia, MO	866-476-7333	www.heartlandseed.com

REGIONAL PLANTS

Bluebird Nursery, Inc.	Clarkson, NE	800-356-9164	http://www.bluebirdnursery.com/
Critsite: Prairie and Wetland Center Retail Store	Belton, MO	816-331-9738	http://www.critsite.com/index.cfm/fuseaction/pwc.retail/index.htm
Missouri Wildlflowers Nursery	Jefferson City, MO	573-496-3492	http://mowildflowers.net/
Sow Wild Natives	Kansas City, MO	816-974-6201	http://sowwildnatives.com/
Great Plains Nursery	Weston, NE	402-540-4801	greatplainsnursery.com
Down to Earth Services	Kansas City, MO	816-207-7960	DTEKC.com
Easy Living Native Wildflower Perennials	Willow Springs, MO	417-469-2611	https://easywildflowers.com/

* Listing does not imply endorsement of products or services. Sources listed advertise a large selection of native plants.

APPENDIX E

NATIVES AND NATIVARS

While the definition of a native plant can depend upon who you ask, the two definitions below capture the essence of what it means for a plant to be native without complicated addendums or artificial boundaries. Common examples of plants native to northeast Kansas include pale purple coneflower (*Echinacea pallida*), prairie blazing star (*Liatris pycnostachya*), and stiff goldenrod (*Oligoneuron rigidum*).

"A plant that is a part of the balance of nature that has developed over hundreds or thousands of years in a particular region or ecosystem. Note: The word native should always be used with a geographic qualifier (that is, native to New England [for example]). Only plants found in this country before European settlement are considered to be native to the United States." — *Natural Resources Conservation Service*

"A plant species is actually native to the ecoregion where it has evolved in concert with soils, climate, fauna and other members of the plant community." — *University of Maryland Extension Service*

A native plant that has been manipulated by selective breeding or crossbreeding to highlight a desirable trait is called a nativar. One example is the white "purple" coneflowers - a selectively bred *Echinacea purpurea* that has a white flower head. You can also get red, yellow, and orange "purple" coneflowers. Nativars will have a varietal name in addition to the species name. For example, *Echinacea purpurea* 'Avalanche' is one variety of white coneflower. Look for the variety name to distinguish between natives and nativars.

Should you plant nativars in a native garden? Answers vary and there are several factors to take into consideration.

GENETIC DIVERSITY

Plant traits manipulated can include color, height, style or size of bloom, disease resistance, and size of fruit. Variations in these traits are sometimes found in nature but are often the result of hybridization and selective breeding. A plant with a desired variation is most often propagated as a clone. Most nativars are grown as clones of the original stock (wild type) or are cloned from hybridized nativars which means there is no genetic diversity in the population of that nativar. This of course results in consistency in the desired trait but does not make the cultivar adaptable to changing environmental conditions.

Open pollinated seed production has the best opportunity for producing genetic diversity in a species. Why is genetic diversity important? Think of genetic diversity as an insurance policy for environmental changes; to survive, species must adapt to changing conditions.

POLLINATORS AND PREDATORS

Recent research suggests that pollinator use of nativars as compared to strictly native plants varies and is dependent upon the trait manipulated. Emily Baisden and her team at the University of Delaware found a general reduction in leaf foraging on nativars whose leaves were red or purple rather than their native green1. Red and purple colors are produced by a set of pigments called anthocyanins which are abundant in red and purple leaves, and anthocyanins may deter insect feeding.

In preliminary research out of the University of Vermont2, thirteen pairs of native plants and their nativars were evaluated based on pollinator visits. Seven of the native cultivars attracted significantly fewer bee pollinators than the straight species. There was no significant difference in pollinator visits in five of the pairs. One native cultivar, Veronicastrum virginicum 'Lavender Towers' attracted significantly more native bee pollinators than the straight species.

AVAILABILITY

According to a survey of regional nurseries conducted by the Mt. Cuba Center, a botanical garden focused on native plants in Delaware, 77% of the native plants for sale in that region are nativars. Casual observation of our region suggests that is the case here as well. Straight native species are available through online catalogs and native plant sales, often conducted as fundraisers for local groups.

SITE SPECIFIC CONSIDERATIONS

Some characteristics emphasized in nativars may not influence pollinator visitation or herbivory and are better suited for your yard. Dwarf varieties and natives bred for disease resistance may be excellent choices for your garden beds.

[1]Baisden, Emily C., Douglas W. Tallamy, Desiree L. Narango, and Eileen Boyle. "Do Cultivars of Native Plants Support Insect Herbivores?" *HortTechnology* 28, no. 5 (2018): 596-606.

[2]White, Annie, "From Nursery to Nature: Evaluating Native Herbaceous Flowering Plants Versus Native Cultivars for Pollinator Habitat Restoration" (2016). *Graduate College Dissertations and Theses*. 626.

NOTES AND DOODLES

NOTES AND DOODLES