

# Indicator Plants of Forest and Woodland Health in Kansas



**K-STATE**  
Research and Extension



# Contents

Introduction .....	1	<i>Galium triflorum</i> .....	29
<i>Aesculus glabra var. arguta</i> .....	5	Fragrant Bedstraw .....	29
Western Ohio Buckeye.....	5	<i>Geum canadense</i> .....	30
<i>Ageratina altissima</i> .....	6	White Avens.....	30
White Snakeroot .....	6	<i>Hackelia virginiana</i> .....	31
<i>Agrimonia pubescens</i> .....	7	Stickseed.....	31
Downy Agrimony.....	7	<i>Helianthus hirsutus</i> .....	32
<i>Allium canadense var. canadense</i> .....	8	Hairy Sunflower .....	32
Meadow Garlic.....	8	<i>Heliopsis helianthoides ssp. scabra</i> .....	33
<i>Amorpha canescens</i> .....	9	Oxeye Sunflower .....	33
Leadplant .....	9	<i>Hylodesmum glutinosum</i> .....	34
<i>Amphicarpaea bracteata</i> .....	10	Pointed Tick Trefoil .....	34
Hog Peanut .....	10	<i>Hypoxis hirsuta</i> .....	35
<i>Anemone virginiana</i> .....	11	Yellow Star Grass.....	35
Tall Anemone.....	11	<i>Liatris hirsuta</i> .....	36
<i>Antennaria parlinii subsp. fallax</i> .....	12	Hairy Gayfeather.....	36
Plantain-Leaf Pussy's-Toes.....	12	<i>Morus rubra</i> .....	37
<i>Arisaema triphyllum</i> .....	13	Red Mulberry .....	37
Jack-in-the-Pulpit .....	13	<i>Osmorhiza longistylis</i> .....	38
<i>Baptisia bracteata var. leucophaea</i> .....	14	Anise Root.....	38
Cream Wild Indigo .....	14	<i>Phlox divaricata</i> .....	39
<i>Boechea laevigata</i> .....	15	Blue Phlox.....	39
Smooth Rockcress .....	15	<i>Phryma leptostachya</i> .....	40
<i>Campanula americana</i> .....	16	American Lopseed .....	40
American Bellflower.....	16	<i>Podophyllum peltatum</i> .....	41
<i>Cardamine concatenata</i> .....	17	Mayapple.....	41
Cut-Leaf Toothwort.....	17	<i>Polygonatum biflorum</i> .....	42
<i>Ceanothus americanus</i> .....	18	Solomon's Seal.....	42
New Jersey Tea .....	18	<i>Prunella vulgaris</i> .....	43
<i>Coreopsis palmata</i> .....	19	Self-Heal .....	43
Prairie Coreopsis .....	19	<i>Rubus spp.</i> .....	44
<i>Corylus americana</i> .....	20	Blackberries and Dewberries .....	44
American Hazelnut .....	20	<i>Sanicula odorata</i> .....	45
<i>Desmodium cuspidatum</i> .....	21	Black Snakeroot.....	45
Large-Bract Tick Trefoil .....	21	<i>Silene stellata</i> .....	46
<i>Dicentra cucullaria</i> .....	22	Starry Campion .....	46
Dutchman's Breeches.....	22	<i>Smilax herbacea var. lasioneura</i> .....	47
<i>Elephantopus carolinianus</i> .....	23	Carrion Flower .....	47
Carolina Elephant's Foot.....	23	<i>Solidago petiolaris</i> .....	48
<i>Eryngium yuccifolium</i> .....	24	Downy Goldenrod.....	48
Rattlesnake Master .....	24	<i>Solidago ulmifolia</i> .....	49
<i>Eupatorium serotinum</i> .....	25	Elm-Leaved Goldenrod .....	49
Late Boneset.....	25	<i>Staphylea trifolia</i> .....	50
<i>Galium aparine</i> .....	26	Bladdernut.....	50
Annual Bedstraw .....	26	<i>Symphoricarpos orbiculatus</i> .....	51
<i>Galium circaezans</i> .....	27	Coralberry, Buckbrush .....	51
Licorice Bedstraw .....	27	<i>Symphotrichum laeve</i> .....	52
<i>Galium pilosum</i> .....	28	Smooth Aster .....	52
Hairy Bedstraw.....	28	<i>Symphotrichum oolentangiense</i> .....	53

Sky Blue Aster.....	53	<i>Viburnum prunifolium</i> .....	58
<i>Taenidia integerrima</i> .....	54	Blackhaw .....	58
Yellow Pimpernel.....	54	<i>Woodsia obtusa</i> .....	59
<i>Tephrosia virginiana</i> .....	55	Blunt-Lobed Cliff Fern.....	59
Goat's Rue.....	55	<i>Zizia aurea</i> .....	60
<i>Thalictrum dasycarpum</i> .....	56	Golden Alexanders .....	60
Purple Meadow Rue.....	56	Literature Cited.....	61
<i>Trillium sessile</i> .....	57	Appendix.....	62
Toadshade Trillium.....	57	Index.....	65

# Introduction

This publication serves as an introduction to identifying herbaceous plants in the forests and woodlands of Kansas. It helps readers interpret what those plants indicate about the ecological conditions of these plant communities. This publication helps landowners and land managers answer questions about the overall ecological health, and the degree of damage or stability, in their woods.

Several noteworthy plants are described according to the environmental conditions they prefer, amount of damage they tolerate, and what their presence, absence, or relative abundance says about environmental stability within a site. Landowners can use this information as an indicator that their woods are ecologically degraded and in need of restoration, or whether they have a high-quality plant community in need of protection and subsequent, gentle management.

More than 90% of woodlands and forests in Kansas are privately owned<sup>1</sup>. Each year, Kansas loses a portion of these wooded communities to urban development or conversion to agriculture. Therefore, private landowners are largely responsible for preserving and improving the health and stability of the remaining woods in the state.

Most landowners want to promote biodiversity, ecological stability, and economic benefits for future generations, to make improvements for wildlife habitat, maintain aesthetic value, control invasive plants, mitigate tree loss from insects and disease, or solve other environmental problems<sup>1</sup>. Many landowners ask how, and if, one should intervene in woodland and forest communities in order to maintain or improve the health of these systems. Landowners are realizing the innate value of promoting biodiversity and pollinator-friendly plants in conjunction with sustainable forest management. This publication provides private and public landowners with a reference to help conduct basic but meaningful ecological evaluations to better understand the condition of forests and woodlands under their management.

Throughout this publication, the term “woods” is used to collectively refer to two different wooded plant communities: forests and woodlands. It is important to understand the distinction between these two plant community types when assessing a property. Forests are generally defined as having

higher tree density with overlapping canopies, and a shadier understory layer. Forests possess approximately 61% to 100% tree cover and tend to occur on more mesic/moist soils<sup>3</sup>. Woodlands have more widely spaced trees, canopies that do not overlap, and are defined as having 26% to 60% tree cover<sup>3</sup>. Woodland communities often have drier soil conditions and a more robust layer of herbaceous plants due to increased sunlight in the understory. It is possible to visualize an ecological gradient of tree density from forest, to woodland, to savanna, to open prairie.

As they mature, living systems become more intricately linked and ecologically functional. For example, an undisturbed mature forest has connections that instill predictive value for living things at relative persistent and long-term scales. After extensive tornado impact, this same forest is disordered and stripped of complexity. The site can become tangled in vines and shrubs, becoming impenetrable. But, as time progresses, and with wise and gentle management, the forest can rebuild back to its former interwoven form and function.

Of course, any healthy forest of considerable size consists of a spectrum of these states at any given time via canopy gaps, which ultimately maximizes their function and health. Along this path of health, different plant species occupy the forest at different places and times. After damage, pioneering species thrive on chaos and require high levels of nitrogen and light. But as the site matures, these plants decrease into the seedbank, and longer-lived plants colonize. In forests and woodlands that have had significant mature areas for centuries, more sensitive kinds of plant species can be found. These areas also may provide food for more specialized types of wildlife than the typical generalist plants found in immature areas of forests and woodlands. This publication introduces plants from across this spectrum.

In this publication, the word damage is used to describe unrecoverable impacts to a site. These are things that push a system beyond its inherent potential for recovery. Other resources may use the terms disturbance or stressor to mean something similar, but some types of disturbance or stress (insect outbreaks, floods, some types of fire) can be natural or even ecologically beneficial. Damage

implies a negative, often human-induced, effect on a site that results in the loss of high-stability, highly selective plant species that are indicators of an ancient, stable community. There are many types of human-caused damage that may destabilize Kansas woods, including but not limited to: invasive species, fertilizer runoff, mechanical soil disturbance due to heavy machinery or other human activities within a site, alterations to the natural water flow (hydrology) of a site, livestock overgrazing, misuse of pesticides such as insecticides and herbicides, impacts to the soil microbial community, and poorly timed or intense fire. Destabilizing influences can be long-lasting or permanent.

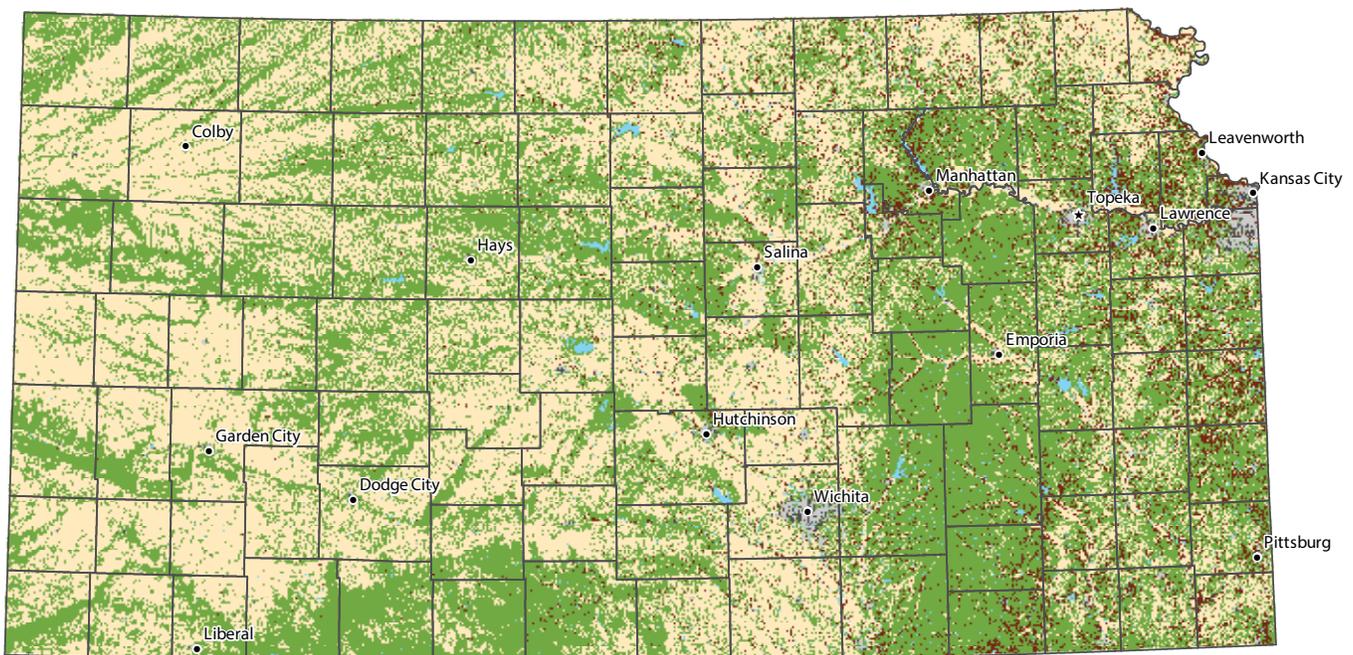
It is important to note that even the most pristine and mature sites should contain a small number of damage-tolerant plants, which persist in naturally disturbed areas such as tip-up mounds of fallen trees, areas of tornado impact, animal burrows, etc. Nearly every location in the state has experienced either natural or human-induced damage to some degree; however, based on the diversity and types of wildlife found in Kansas, it is evident that the majority of the landscape was in a stable mature state (which includes dynamic and healthy forms of disturbance) for nearly all of its

post-glacial history. To lose stability and maturity in too much of our woods is to lose a significant and sensitive portion of the wild creatures that call Kansas home. By evaluating the herbaceous plants at a site, one can interpret whether management techniques (past or current) are creating stability or damage to the woods.

Though presented as a practical reference for woodland assessment, this publication's greatest value will be to encourage nature-literacy on a broader scale. Observing and interpreting the expressions of nature is like any other technical skill, in that it takes practice, becomes a source of personal satisfaction, and eventually creates its own opportunities for practical application. The goal of this publication is to help landowners and land managers understand the property they manage at a deeper level, so they can make informed decisions and help protect the dwindling, changing, and vulnerable woodlands and forests of Kansas.

### Kansas Forest and Woodland Types

Roughly 10 percent of the Kansas landscape is wooded, and most of the forests and woodlands are in the eastern third of Kansas<sup>1</sup>. At least 16 native woodland and forest vegetation community



**Kansas Land Cover Patterns (2015)**



Data prepared and obtained from the Kansas Applied Remote Sensing (KARS) Program



types have been described in the state<sup>3</sup>. All are of conservation concern in Kansas and most historically thrived in alluvial bottomlands or moist upland sites<sup>1</sup>. Defining each woodland or forest type is beyond the scope of this reference but tables listing the unique communities are included in Appendix A.

The woods of Kansas have varying degrees of quality or degradation. At the pristine end of the range, some wooded communities have escaped significant human damage. These retain the soil structure and ecological stability necessary to support plant communities most closely resembling native vegetation before European settlement. At the degraded end of the range, are woods that have colonized over sites that were historically prairie, or grown-over former crop fields. These sites hold little to no high-quality, shade-tolerant forest or woodland plant communities. They are a combination of trees, shrubs and herbaceous plants that did not historically exist together. We call them **novel plant communities**. They are unstable systems developing toward a new type of degraded stability that does not support the richer and more functional services of our native systems. Many examples of Kansas woods fall somewhere in between these two ends of the spectrum. Most have experienced some level of damage over the years, but some still harbor high-quality species and are worthy of protection and careful management to maintain their ecological integrity.

### Floristic Quality Assessment Using C-values

A system called **Floristic Quality Assessment (FQA)** is used to qualify the ecological effects of management on the herbaceous layer of the forest floor over time, even when tree composition shows little change<sup>4</sup>. At the core of Floristic Quality Assessment is a number called the **Coefficient of Conservatism value**, C-value for short. These values are included for every plant in this publication. A **C-value** is a number ranging from 0 to 10 assigned by expert field botanists to each native species in the state<sup>2</sup>. Every C-value is based on a species' affinity to stable community types. To understand this, one must understand that some plants require growing conditions that are high in available nitrogen, some need low available nitrogen, and others require intermediate levels. Available nitrogen does not persist in nature because it leaches out of soil readily and because organisms use it

quickly. Fully optimized, old-growth, mature and stable ecological communities are inherently low in available nitrogen. When nitrogen is low, many species coexist. Conversely, damaged, disturbed, tilled, and simplified communities are high in available nitrogen, at least for a while. As such, they have different plants than stable, mature, old-growth systems, fewer species, and are high in biomass. When nitrogen is high, a few species outcompete the many. Another way to visualize this is to think of how we till a garden to increase plant access to nitrogen or add nitrogen to increase biomass. Neither of these are particularly "natural" processes and both could be considered "damage" if applied to an intact natural forest or woodland. Given this spectrum, a C-value is assigned to each species as an indicator of its affinity for stable systems, temporary/damaged systems, or somewhere in between. Plants that indicate stable systems are assigned numbers closer to 10 and plants that indicate unstable, damaged systems are assigned numbers closer to zero. For example, common ragweed (*Ambrosia artemisiifolia*) is a native species of damaged/disturbed systems. It increases when the stable state is obliterated, which results in high available nitrogen. As such, it has been assigned a C-value of zero. Virginia bunchflower (*Melanthium virginicum*) is only found in stable, intact old-growth grassland communities with low available nitrogen. It has been assigned a C-value of ten. Plant species that define communities, like bur oak (*Quercus macrocarpa*) in a woodland or little bluestem (*Schizachyrium scoparium*) in a prairie are the blue-collar workforce, the persistent and resilient generalists, and are assigned numbers in the three to six range. Non-native species are not assigned a C-value.

While individual C-values are the foundation of Floristic Quality Assessment, the true value of the numbers is found in averaging the C-values of all plants growing at a site. When the collective C-values from a site inventory are averaged, it is called the Mean C-value. This numerical value serves to easily communicate the condition of a site. As the woods change, so does the average C-value.

### How to Use This Guide

It is impractical to expect all landowners to learn every plant species in their region to assess the quality or degradation of their property. However, the ability to recognize and understand the

smaller subset of indicator plants included here is achievable and allows one to interpret the landscape with minimal effort. This publication includes descriptions of 56 plant species that were carefully selected to indicate either stability or damage in a system. The plants included are commonly encountered species that represent a range of plants, from generalist to specialist, found in wooded habitats.

To use this guide, a landowner needs to follow these steps:

1. Flip through this publication to become familiar with the included plants.
2. Survey the wooded area, scanning for any plants found in the publication. Pay special attention to any plants that dominate the landscape as these can be useful indicators of site stability or damage. Also note any changes in vegetation type across management units or natural boundaries.
3. When plants in this publication are encountered, review the C-value and habitat requirements for that species to understand what they are expressing about the health of the woods.

## Conclusion

The vast landscapes of the past were influenced by fire, large herbivores and their predators, and other natural forces, but these influences resulted in dynamically stable plant communities. Over the span of hundreds of years, any given place was likely to be rich, complex, and teeming with life. The landscape shifted and changed slowly and in tune with the colonization rates and potentials of long-lived perennial plants driven by climatological trends across millennia. Today's landscape largely lacks fire, has no large native herbivores or their predators, and many of the native perennial plants have been replaced with exotic and native generalists that do not support the living organisms that give our systems function, and that give us a sense of place and purpose. In an age of invasive species,

habitat fragmentation, and a rapidly changing landscape, humans must be engaged with the green spaces around them in a more healthful and informed manner. When we seek this relationship, when we engage healthfully with living systems, we find a connection that transports us, and the landscapes upon which we live, to a more resilient present and a more sustainable future. Nature ceases to be something we merely view outside our windows and becomes a tapestry of interwoven life forms of which we are a member. In this way, we are able to find greater enjoyment than we ever knew we were denying ourselves. This guide is a chance to begin, or advance, that journey.

## Acknowledgments

Thanks to Jarran Tindle, former watershed forester at the Kansas Forest Service, for initiating this project and providing technical expertise. Thanks to Ryan Armbrust, rural forestry program coordinator at the Kansas Forest Service, for coordinating administrative and financial aspects of the project and providing insightful review of the publication.

A special thanks to Mark Stadtlander, publishing director with K-State Research and Extension for editing, design and production of the final publication.

We also thank Steve Turner, Jacob Hadle, and Richard Abbott who contributed a significant portion of the photos included. Many additional photographers graciously shared their work including Nathan Aaron, Pam Barnabee, Paula Betz, Pat Deacon, Erik Danielsen, Dwayne Estes, Robert Flanagan, Aaron Gunnar, Samantha Heller, Abel Kinser, Miranda Kohout, Karl Kroeker, Ted C. Macrae, Paul Marcum, Jennifer Ogle, Sara Rall, Jeff Skrentny, Kevin Stamey, Suzanne Tuttle, Deb Tyler, and Theo Witsell.

Funding for this project was provided by the USDA Forest Service and administered by the Kansas Forest Service.

# *Aesculus glabra* var. *arguta*

## Western Ohio Buckeye

C-value = 5

### Key Characters

- small tree
- leaflets occur in groups of 7-11 with a central point of attachment (palmately compound)
- leaves have sharp point and the edges have small teeth
- large, upright clusters of greenish-white flowers in the spring
- bark relatively smooth when young but developing rough plates when mature

### Look alikes

- none

### Where it is found

- forests along creeks and rivers, shady understories
- bordering bottomland fields
- thickets along prairie ravines

### What it means

Western Ohio buckeye is a small to medium tree usually found in shady bottomland forests near riverways. It is an understory species. As such, when it is found in abundance it potentially indicates a healthy wooded environment with spring ephemerals and native cool season grasses. However, with a C-value of 5, it is not always an indicator of stable mature woods.



Photo: Hadle



Photo: Hadle



Photo: Tuttle



Photo: Tuttle

# Ageratina altissima

## White Snakeroot

C-value = 1

### Key Characters

- knee to thigh-high plants with opposite leaves and a round stem
- leaves are generally triangular in outline with teeth along the edges
- three primary veins arise from base of leaf
- blooms in mid to late summer with clusters of small white flowers

### Look alikes

- late boneset (*Eupatorium serotinum*) is taller, has narrower leaves and a reddish stem
- false nettle (*Boehmeria cylindrica*) is found in wetlands and wet edges
- members of the mint family (Lamiaceae), which all have square stems

### Where it is found

- woodlands, mesic forests, pastures, overgrown fields, roadsides

### What it means

White snakeroot is often abundant in recently damaged woods where it persists for a few years then declines slowly as the woods mature. As it is one of the first rungs in the ladder to redeveloping a healthy, stable system, it should not cause alarm. Rather, it is a good species to monitor successfully-stabilizing woods by the rate at which it declines. It can be found sparingly in intact woods.



# *Agrimonia pubescens*

## Downy Agrimony

C-value = 5

### Key Characters

- leaves comprised of 3 to 9 primary leaflets (pinnate) that become larger toward the tip of the leaf
- leaves and stem are fuzzy
- base of each leaf has two noticeable stipules on the stem
- small yellow flowers grow on an upright flowering stem

### Look alikes

- swamp agrimony (*Agrimonia parviflora*)
- leaves have 11 to 23 leaflets
- mostly found in wetter habitats

### Where it is found

- moist upland forests

### What it means

Downy agrimony is usually found in woodlands or forests that have some stability. While its presence does not necessarily indicate lack of damage, it can be a good sign that there is still a “pulse” of stability.



# *Allium canadense* var. *canadense*

## Meadow Garlic

C-value = 2

### Key Characters

- thick but flat leaves coming from a small bulb
- crushed leaves have a strong onion/garlic scent
- bulb covered in interwoven fibers
- at least some, and sometimes all, flowers replaced with small bulblets

### Look alike

- wild onion (*Allium mutabile*) only produces flowers, never bulblets as in meadow garlic
- found in high quality prairie communities
- field onion (*Allium vineale*) has smaller leaves that are round in cross section and hollow
- found in very degraded open habitats

### Where it is found

- a variety of habitats including woodlands, prairies, old fields and pastures, roadsides, tops of bluffs

### What it means

Meadow garlic is widely adapted to several habitats and conditions. It is most commonly seen in weedy places, like old fields, lawns and roadsides. Its presence in large numbers indicates extensive past destabilization of a site. Interestingly, the degree to which this species produces bulblets, instead of flowers, usually corresponds to the intensity of damage where it is growing. As a site stabilizes, meadow garlic will produce more flowers instead of all bulblets.



Photo: Hadle



Photo: Turner

# *Amorpha canescens*

## Leadplant

C-value = 7

### Key Characters

- compound leaves with numerous small, approximately oval leaflets that are silvery-green
- small woody stem at the base
- brilliant purple spikes composed of tiny flowers in late spring to early summer

### Look alikes

- Goat's rue (*Tephrosia virginiana*)
- generally shorter plant, with fewer but larger, narrower leaflets
- individual flowers are large with yellow and pink petals

### Where it is found

- typically in upland prairies, savannas, and bluffs but also in open upland forests

### What it means

Leadplant is an indicator of stable prairies and woodlands. Its upright, silvery-purple inflorescences stand out amongst the other early summer flora. While the presence of leadplant does not necessarily indicate a lack of disturbance, it usually means there is good stability in an intact prairie or woodland. A healthy population of this plant likely means there are other neighboring conservative species.



Photo: Hadle



Photo: Hadle



Photo: Hadle



Photo: Turner

# *Amphicarpaea bracteata*

## Hog Peanut

C-value = 3

### Key Characters

- trailing vine
- leaves with three leaflets, the central one with a sharp pointed tip
- side leaflets have central vein that is off-centered
- small white, purple, or pink flowers that hang from the main stem

### Look alikes

- several other trailing trifoliate legumes, most all of which have blunt leaf tips

### Where it is found

- dry to moist woodlands and forests and along creeks and rivers

### What it means

Hog peanut is a common component of forests in the eastern United States. It often can be found in great quantities along shaded slopes where it tangles along the ground and up nearby vegetation into near monocultures. An abundance of hog peanut in a forest or woodland suggests that the site was historically impacted and that the site may have stabilized but it has not diversified.



Photo: Hadle



Photo: Hadle



Photo: Turner

# *Anemone virginiana*

## Tall Anemone

**C-value = 4**

### Key Characters

- flower arising on tall naked stalk with 5 white petals and green head
- deeply toothed leaves with wide, sharply pointed lobes
- veins of leaves deeply impressed
- densely fuzzy fruiting head the size and shape of a thimble

### Look alike

- thimbweed (*Anemone cylindrica*)
- has a narrow cylindrical fruiting head instead of a rounded fruiting head
- found in open prairies

### Where it is found

- dry upland woodlands, forests, and savannas, edges of fields, restabilized damaged sites

### What it means

Tall anemone is a common native of woodlands and dry forests. It is usually not found in great quantities. It can persist through mild disturbance but is usually found in mature woodlands with well-drained soils. The presence of this species in an eastern Kansas site should prompt a search for more conservative species likely nearby.



Photo: Turner



Photo: Hadle



Photo: Hadle



Photo: Hadle

# *Antennaria parlinii* subsp. *fallax*

## Plantain-Leaf Pussy's-Toes

C-value = 5

### Key Characters

- spoon-shaped and -sized leaves close to the ground growing in colonies
- leaves with three to five prominent veins
- whole plant is covered in dense cobwebby hairs
- undersurface of leaves are white
- flowers in late spring with tall stalks with flowers that look like kitten toes

### Look alikes

- prairie pussy's-toes (*Antennaria neglecta*)
- leaves are much more narrow and generally smaller
- leaves with one vein
- mostly found in dry prairies

### Where it is found

- primarily occurs on thin soil in acidic woodlands and upland forests especially in windswept areas like shoulder slopes and the bases of large trees

### What it means

Pussy's-toes is commonly found in acidic woodlands. This small plant has an overall "cute" appearance as it covers the ground with its fuzzy, greenish-gray leaves. It's not a particularly conservative species, but it is almost always found in any good-quality acidic woodland. It tends to persist at dry and rocky sites even after slight damage, and to recolonize post-damage stabilized woodlands.



Photo: Danielsen



Photo: Deacon



Photo: Deacon

# *Arisaema triphyllum*

## Jack-in-the-Pulpit

C-value = 6

### Key Characters

- leaves divided into three nearly equal segments
- the inflorescence is a long cylindrical spike wrapped in a hooded bract (thus the common name)
- fruit are a bundle of bright red “berries”

### Look alikes

- green dragon (*Arisaema dracontium*)
- leaves with five or more segments
- inflorescence bract is tighter and has a long drawn-out tip

### Where it is found

- moist forested slopes, bottomland forests

### What it means

Jack-in-the-pulpit is at home in shaded, mesic to dry-mesic forests and woodlands with deep rich organic soils. Flowering in the spring, its unique flower is green with a mottled purple hood. It is a decent indicator of stable and maturing woodland and forest.



# *Baptisia bracteata* var. *leucophaea*

## Cream Wild Indigo

C-value = 6

### Key Characters

- leaves and the low multi-branched stem have a grayish green appearance due to dense hairs
- what looks like five leaflets is really three leaflets and two large basal stipules
- flowers are rows of cream-colored petals on a low spreading branch
- when dried, all parts of this plant turn slate gray to black

### Look alikes

- white wild indigo (*Baptisia alba*)
- much taller plant that lacks stipules (only three leaflets)
- stem and flowers grow upright
- flowers are a brighter white
- open habitats
- blue wild indigo (*Baptisia australis*)
- hairless leaves and stems
- upright flowering branch with blue-purple flowers
- open habitats

### Where it is found

- acidic woodlands, upland prairies, roadsides, sometimes pastures

### What it means

Cream wild indigo is bushy and low growing with conspicuous cream white flowers in the spring and early summer. It is commonly found in acidic woodlands and prairies. It is a great sign of a woodland/grassland that still has a healthy potential. It also does well in less mature habitats like mowed roadsides and along pastures. There is reason for a thorough search for more indicative species where this plant is found.



# *Boechea laevigata*

## Smooth Rockcress

C-value = 5

### Key Characters

- tall straight unbranched plants with long narrow leaves whose bases lobe around the stem
- leaves and stem have a blue-green waxy coating (glaucous)
- a spring ephemeral with small white flowers
- long narrow seed pods that droop toward the ground

### Look alikes

- sickle-pod rockcress (*Boechea canadensis*)
- bases of leaves don't lobe around the stem
- leaves and stem have some hairs

### Where it is found

- moist forests and woodlands especially in rocky areas and well-drained soils

### What it means

Smooth rockcress is an often overlooked species that can be observed in moist, rocky environments. It doesn't do well with competition from other taller species so is often restricted to mature habitats.



Photo: Turner



Photo: Turner



Photo: Turner



Photo: Turner

# *Campanula americana*

## American Bellflower

C-value = 4

### Key Characters

- tall straight plants with alternate leaves
- leaves are lance-shaped and have white-tipped teeth
- blue symmetrical flowers on a single tall spike
- white milky sap

### Look alikes

- great blue lobelia (*Lobelia siphilitica*)
- deep blue asymmetrical flowers
- leaves with more or less rounded tips
- green milky sap

### Where it is found

- openings in forests especially along creeks and temporarily wet areas

### What it means

American bellflower is a common mid-summer flower of mesic woodlands and forests. While it isn't a great indicator of utmost stability and maturity, it does not occur in highly damaged systems. Rather, its presence is more associated with the stages leading to a healthful recovery in woodland and forest systems.



# *Cardamine concatenata*

## Cut-Leaf Toothwort

**C-value = 6**

### Key Characters

- deeply lobed (like fingers on a hand) and toothed leaves that emerge in the early spring
- white or pink flowers with four petals

### Look alikes

- none

### Where it is found

- shaded woods and forests

### What it means

Cut-leaf toothwort is a classic early spring ephemeral, often occurring with spring beauty, trillium, and rue anemone. It is tolerant of types of damage that haven't mechanically disrupted the soil.



Photo: Turner



Photo: Turner



Photo: Turner



Photo: Turner

# *Ceanothus americanus*

## New Jersey Tea

C-value = 9

### Key Characters

- small (less than three feet) woody shrub
- leaves fuzzy to the touch and with three distinct sunken veins
- leaves have red-tipped teeth
- rounded clusters of white flowers on leafless stalks coming off the side of the stem

### Look alikes

- prairie redroot (*Ceanothus herbaceus*)
- leaves smaller and less fuzzy
- flower and fruit clusters on leafy stalks on stem tips
- only found in prairies

### Where it is found

- acidic woodlands, openings in forests, prairies

### What it means

New Jersey tea is found in acidic woodlands with significant remnant maturity. Its presence points to good stability that likely supports a diverse array of woodland grasses and forbs. It can sometimes be found in shaded, overgrown woodlands where the canopy has closed in.



# *Coreopsis palmata*

## Prairie Coreopsis

C-value = 7

### Key Characters

- small plants with straight unbranched stems that grow in colonies
- three-lobed leaves that look like a bird's foot
- crushed leaves smell like carrots

### Look alikes

- none

### Where it is found

- prairies and woodlands

### What it means

Prairie coreopsis is a good indicator of remnant quality in both woodlands and prairies. As such, it is especially fond of savanna expressions. It is an excellent sign that a woodland/grassland may still harbor healthy potential. There is reason for a thorough search for more indicative species where this plant is found.

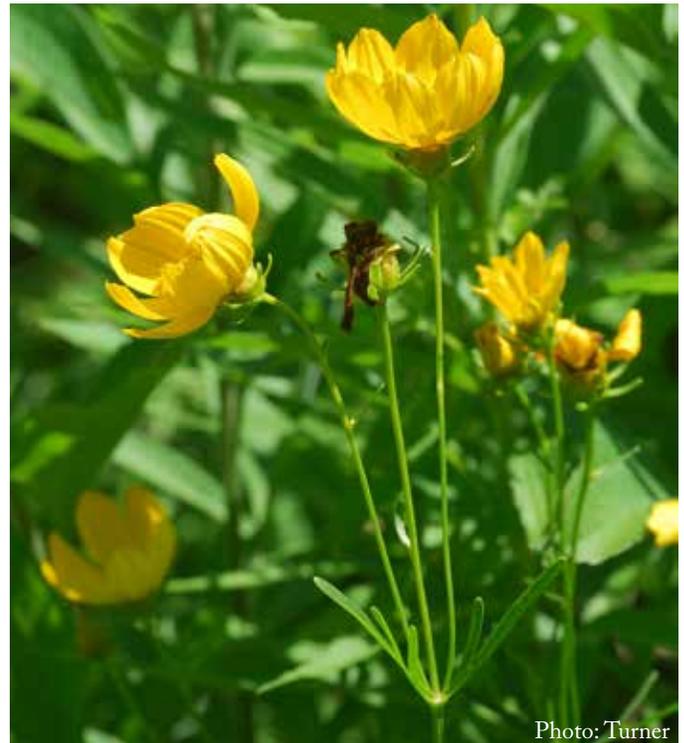


Photo: Turner



Photo: Abbott



Photo: Hadle



Photo: Turner

# *Corylus americana*

## American Hazelnut

C-value = 5

### Key Characters

- a true shrub with multiple stems arising from the base and the ability to form thickets
- fuzzy rounded leaves with jagged margins that are both wavy and toothed
- pollen producing flowers occur as long, cylindrical catkins in the winter and spring
- fruits covered in wrinkled, leafy bracts

### Look alikes

- none

### Where it is found

- woodlands, overgrown prairie draws and streams

### What it means

American hazelnut is a classic thicket-forming plant. It is common along stream corridors in grasslands. In woodlands it is often associated with more intact and mature plant species suggesting that it might aid in system stability.



Photo: Ogle



Photo: Turner



Photo: Betz



Photo: Hadle

# *Desmodium cuspidatum*

## Large-Bract Tick Trefoil

C-value = 6

### Key Characters

- medium-sized plants with unbranched stem and trifoliate leaves
- central leaflet that tapers to a sharp point
- leaves are generally hairless

### Look alikes

- other tick trefoils (*Desmodium* spp.)
- leaflets have rounded or otherwise blunt tips

### Where it is found

- moist forests and woodlands

### What it means

Large-bracted tick trefoil likes the rich soils of mesic woods, especially well-drained slopes and somewhat rocky areas. It is a good indicator of intact stability and forest/woodland system maturity.



# *Dicentra cucullaria*

## Dutchman's Breeches

C-value = 7

### Key Characters

- short spring wildflowers with fanned-out leaves
- white flowers that look like upside-down pants arranged on a long inflorescence

### Look a-likes

- none

### Where it is found

- shaded woods and ravines

### What it means

Dutchman's breeches is a common spring ephemeral in the eastern United States. It is a good sign of remnant moist forest wherever it is abundant. It can tolerate a fair amount of overstory damage but not mechanical soil damage.



Photo: Hadle



Photo: Hadle



Photo: Macrae

# *Elephantopus carolinianus*

## Carolina Elephant's Foot

C-value = 4

### Key Characters

- small to medium plants with largest leaves at the base
- leaves distinctly wrinkled with narrow base that broadens toward the middle
- small lavender or white flowers in the middle of three small bracts

### Look alikes

- native thistles can look similar but their leaves are white on the undersurface

### Where it is found

- moist to upland woods, woodlands, edges of prairies and fields, roadsides, along trails

### What it means

Carolina elephant's foot is one of the common constituents of disturbed or grazed woods. Though it can also be regularly found in more intact habitats (especially along trails), its presence in great quantities is a sign that the system is maturing, but not yet fully stable.



# *Eryngium yuccifolium*

## Rattlesnake Master

C-value = 7

### Key Characters

- long strap-like leaves reminiscent of yucca
- edges of leaves have white fibrous, bristly protrusions

### Look alike

- yucca (*Yucca* spp.)
- leaves sharply pointed
- stringy, fibrous filaments along leaf edges, but no bristly protrusions

### Where it is found

- open woodlands, savannas, and prairies

### What it means

Rattlesnake master is a great indicator of intact woodlands and prairies. It can sometimes linger in overgrown or disturbed sites, where it tends to cease flowering. A grassland or woodland with rattlesnake master is very likely a site worthy of management and protection.



Photo: Hadle



Photo: Hadle



Photo: Hadle

# *Eupatorium serotinum*

## Late Boneset

C-value = 2

### Key Characters

- medium to tall unbranched plants with dark green leaves and a (usually) pinkish to purplish stem
- opposite, triangular leaves with distinct teeth
- stem covered in fine hairs
- upper leaf surface often with subtle, glossy, sheen

### Look alikes

- white snakeroot (*Ageratina altissima*)
- shorter plants with wider leaves

### Where it is found

- upland prairies, old fields, edges of glades, disturbed woodlands, fencerows, pastures

### What it means

Late boneset can be found in a variety of habitats and is an indicator of a fairly recently damaged system. As the system matures, the plant naturally fades, but this could take several years postimpact.



Photo: Turner



Photo: Hadle



Photo: Hadle



Photo: Hadle

# *Galium aparine*

## Annual Bedstraw

C-value = 0

### Key Characters

- a low plant that sprawls along the ground as it matures
- stiff, downward pointing hairs on square stem cause leaves to cling to clothing
- 6-10 rounded leaves per node with minute, sharp tips
- leaves widest toward the tip

### Look alikes

- other bedstraws (*Galium* spp.), especially fragrant bedstraw (*Galium triflorum*) which has leaves widest at the middle, strictly six leaves per node, and few clinging hairs on stem and leaves

### Where it is found

- damaged bottomland to upland forests and woodlands

### What it means

Annual bedstraw is a common and recognizable native famous for its ability to adhere to the shoes and clothing of a passerby. A large population of this plant is a good sign of site damage and low stability.



Photo: Barnabee



Photo: Turner



Photo: Hadle



Photo: Turner



Photo: Turner

# *Galium circaezans*

## Licorice Bedstraw

C-value = 3

### Key Characters

- small to medium sized plants with upright or leaning stem
- four football-shaped leaves per stem whorl
- each leaf has three distinct veins
- leaves are slightly hairy (but do not cling to clothes)

### Look alikes

- hairy bedstraw (*Galium pilosum*)
- much hairier plants with more rounded leaves
- each leaf has one distinct vein

### Where it is found

- dry to moist forests and woodlands

### What it means

Licorice bedstraw is a common native bedstraw. While not a strong indicator of mature woods, it doesn't persist in heavily degraded sites. Its presence should be interpreted as an indication of potential stability and maturity in the system.



# *Galium pilosum*

## Hairy Bedstraw

C-value = 7

### Key Characters

- small to medium sized plants with unbranched stems and whorled leaves
- small, oval-shaped, slightly fuzzy leaves in whorls of four each with one central vein

### Look alikes

- licorice bedstraw (*Galium circaezans*)
- leaves more football-shaped
- leaves with three distinct veins

### Where it is found

- dry upland forests and woodlands usually on acidic substrate

### What it means

Hairy bedstraw is a frequent member of acidic woodlands, such as those underlain by sandstone or chert. It is more sensitive to damage than the other bedstraws in this guide and is a good indicator of mature woodlands.



# *Galium triflorum*

## Fragrant Bedstraw

C-value = 6

### Key Characters

- leaves in whorls along the stem
- leaves arranged in whorls of six
- leaves widest at middle and tapering to the tip and base
- square stems

### Look alikes

- other bedstraws, especially annual bedstraw (*Galium aparine*) which has leaves that are widest toward the tip and many more tiny, hooked barbs on leaves and stem that cause it to “cling” to things

### Where it is found

- mesic woods

### What it means

While fragrant bedstraw is not a hallmark of high quality woods, it will be found in stabilizing to mature woods. Places it occurs should be revisited in the spring to look for spring ephemerals.



Photo: Abbott



Photo: Hadle



Photo: Thomas

# *Geum canadense*

## White Avens

C-value = 1

### Key Characters

- medium-sized plants with a straight stem that branches into long arching inflorescences at the top
- lower leaves trifoliolate and/or scallop-shaped
- stem leaves with noticeable stipules (small, leafy structures)
- small white flowers with five petals
- fruits a bur-like sphere of many long-tailed fruits
- hairy leaves and stem

### Look alikes

- rough avens, (*Geum laciniatum*)
- stem covered in long hairs
- growing in wetter habitats

### Where it is found

- bottomland to upland forests

### What it means

White avens is a native plant with evergreen basal leaves that is usually a sign of past damage and/or soil disturbance, especially when found in abundance.



Photo: Hadle



Photo: Hadle



Photo: Hadle



Photo: Hadle

# *Hackelia virginiana*

## Stickseed

C-value = 3

### Key Characters

- medium to tall plants with straight stems that branch into long bur-laden fruiting branches
- a biennial species that produces lots of basal leaf clusters that may not flower for a year or two
- leaves have sunken veins and a light sandpapery texture
- fruit (a bur) and stems covered with hooked hairs that cling to clothing

### Look alikes

- none

### Where it is found

- bottomland to upland woods

### What it means

Stickseed is an indicator of damaged woods. The more of it there is, the more damaged the woods are, or the more recent the damage has been. It will decline as the system stabilizes, but woods that have stickseed usually don't have the potential to fully recover without restoration, management, and time.



Photo: Hadle



Photo: Hadle



Photo: Hadle

# *Helianthus hirsutus*

## Hairy Sunflower

C-value = 6

### Key Characters

- opposite leaves with short stalks, round bases
- leaves narrow and long, tapering to the tip
- upper surfaces of leaves are very coarsely scratchy to the touch
- small yellow-orange sunflower-type flowers

### Look alike

- false sunflower (*Heliopsis helianthoides*)
- leaves are more triangular and less scratchy

### Where it is found

- upland woods and edges

### What it means

Hairy sunflower is a common sunflower of dry woodlands with remnant quality. This species can increase substantially when prescribed fire is reintroduced to a system, but it begins to decline as the system stabilizes.



Photo: Hadle



Photo: Hadle



Photo: Hadle



Photo: Hadle

# *Heliopsis helianthoides ssp. scabra*

## Oxeye Sunflower

C-Value = 6

### Key Characters

- leaves opposite and lightly scratchy to the touch
- leaves triangular and toothy
- flowers typically orange-yellow

### Look alikes

- several sunflowers (*Helianthus* spp.) are similar

### Where it is found

- moist to dry woodlands, forests, and prairies, especially areas with rocky soil

### What it means

Oxeye sunflower is a common summer wildflower. It can be a good sign of remnant quality that can be increased by careful management.



Photo: Aaron



Photo: Turner



Photo: Turner



Photo: Aaron

# *Hyloidesmum glutinosum*

## Pointed Tick Trefoil

C-value = 3

### Key Characters

- leaves with three leaflets
- leaves all coming from nearly the same point on stem (whorled)
- broad, round-based leaflets widest toward the base with notably long pointed tip
- leafless flowering stalk
- fruit is a triangular “sticktight” with rounded margins

### Look alikes

- none

### Where it is found

- wooded slopes, forests, ravines, dry woodlands, bases of rocky outcrops

### What it means

This common forest legume can be found in colonies in woods. It readily colonizes slopes that have experienced damage or loss to the original ground flora. In more intact settings it is often present but uncommon.



# *Hypoxis hirsuta*

## Yellow Star Grass

C-value = 5

### Key Characters

- short plants with hairy, grass-like leaves
- bright yellow flowers with five petals low to the ground

### Look alikes

- none

### Where it is found

- mesic to upland woods and prairies

### What it means

Yellow star grass is a good indicator that an area has remnant quality. It is not commonly found in woods that have been severely damaged.



# *Liatris hirsuta*

## Hairy Gayfeather

C-value = 7

### Key Characters

- medium sized plant with many linear leaves along the stem
- stem and leaves are densely to loosely covered in fine hairs
- leaves are long and narrow and typically twist
- green bracts on flower heads curl back to a sharp point

### Look alikes

- other blazing stars (*Liatris* spp.)

### Where it is found

- prairies and open woodlands

### What it means

Hairy gayfeather often can be indicative of thin rocky soils. Its presence in woods can be an indicator that the woods and prairie have grown into each other or that the plant has simply colonized the woods. It would only persist in or colonize woods that have not been severely impacted or woods in which complexity is returning.



Photo: Witsell



Photo: Aaron



Photo: Aaron



Photo: Hadle

# *Morus rubra*

## Red Mulberry

C-value = 5

### Key Characters

- small to medium tree
- leaves are rather spade-shaped and have varying degrees of lobing (sometimes not lobed at all)
- red to dark purple blackberry-like fruit in the early summer
- cloudy sap

### Look alikes

- white mulberry (*Morus alba*)
- upper leaf surface smooth and glossy

### Where it is found

- bottomland to upland woods, edges of woods, and fence lines bordering old pastures

### What it means

Red mulberry can be an abundant tree in young woods. Over time as woods mature, it becomes less common, but some older trees will persist in stable and complex systems. If it is young and abundant the woods are probably immature. If it is old and infrequent, the woods are probably more mature and more stable too.



Photo: Abbott



Photo: Abbott



Photo: Hadle



Photo: Abbott

# *Osmorhiza longistylis*

## Anise Root

C-value = 3

### Key Characters

- a medium sized plant with dissected (like parsley) leaves
- small white flowers in upright clusters (umbels) held above the leaves
- strong scent of anise from the roots and often the leaves

### Look alike

- other members of the carrot family

### Where it is found

- generally mesic to dry-mesic habitats: mesic to dry-mesic forests and woodlands

### What it means

Anise root occurs regularly in shaded woodlands and forests in low-lying areas or on the edges of slopes. When abundant it is indicative of woods that have been damaged. When uncommon, it is potentially in a more mature system.



# *Phlox divaricata*

## Blue Phlox

C-value = 3

### Key Characters

- small to medium plant with opposite, unstalked leaves
- vibrant, lavender to purple flowers blooming in mid-spring
- hairy stem

### Look alikes

- prairie phlox (*Phlox pilosa*)
- leaves are much narrower (linear) and the corolla (flower) tube is hairy

### Where it is found

- mesic woods

### What it means

Blue phlox can often persist through some disturbance and linger in disrupted mesic systems (along roads, for example). It is always a good sign that there is at least a pulse of remnant quality.



Photo: Hadle



Photo: Hadle



Photo: Hadle



Photo: Hadle

# *Phryma leptostachya*

## American Lopseed

C-value = 5

### Key Characters

- short plants with opposite leaves
- leaves stalked and with squared-off bases
- leaves without lateral mid-veins (not triple-nerved like white snakeroot)
- tiny purple flowers arranged oppositely on tall, naked spikes that branch from main stem
- fruit downward pointing
- often has two much smaller, broadly triangular leaves at the base of plant

### Look alikes

- white snakeroot (*Ageratina altissima*)
- three prominent, longitudinal veins arising from base of leaf (triple-nerved)

### Where it is found

- mesic forests and bottomlands

### What it means

American lopseed indicates woods that may have some intact quality, especially if accompanied by other plant species of stable communities.



Photo: Hadle



Photo: Hadle



Photo: Hadle



Photo: Abbott

# *Podophyllum peltatum*

## Mayapple

C-Value = 4

### Key Characters

- medium sized plants with distinctly umbrella-like leaves
- stem attaches to center of leaf undersurface
- leaves are lobed and occurring singly or in pairs from a single stem
- a single large white flower arises between the leaf branches
- occurs in large colonies

### Look alikes

- none

### Where it is found

- woodlands and forests, sometimes yards and fields that used to be woods

### What it means

Mayapple indicates potential quality in woods and persists in deep shade by maturing before trees fully leaf out. It is a sign that at least marginal site integrity remains, especially if accompanied by other plants of stable communities. It persists in woods even with deep leaf litter.



Photo: Turner



Photo: Turner



Photo: Turner



Photo: Abbott



Photo: Abbott

# *Polygonatum biflorum*

## Solomon's Seal

**C-value = 5**

### Key Characters

- alternate, hairless leaves arranged along a nodding, branchless stem
- clusters (often a pair) of white flowers hang beneath each leaf node
- leaves have many distinct raised veins on underside

### Look alikes

- False Solomon's seal (*Maianthemum racemosum*)
- leaves are on short stalks and have only five prominent veins
- flowers occur at the tip of the stem

### Where it is found

- deep mesic slopes and shaded woodlands and forests

### What it means

Solomon's seal is a good sign of an intact mesic system, and is likely to be found alongside other spring flora of mature and maturing systems.



Photo: Aaron



Photo: Kohout



Photo: Turner

# *Prunella vulgaris*

## Self-Heal

C-Value = 0

### Key Characters

- low-growing forb with opposite leaves and square stem
- singular dense inflorescence with white and purple flowers
- bracts of inflorescences are hairy

### Look alikes

- other members of the mint family — many of which have a minty fragrance

### Where it is found

- mesic woods, edges, roadsides and lawns

### What it means

Self-heal thrives in certain damaged systems and is therefore an indicator of destabilized woods and edges. It will be mostly absent from mature quality woods. It seems to like compacted and clayey soils.



## *Rubus* spp.

# Blackberries and Dewberries

**C-value = various, but always low**

### Key Characters

- leaves of flowerless stems (primocanes) with five leaflets
- stems with prickles
- undersurface of leaves not whitened

### Look alikes

- black raspberry (*Rubus occidentalis*)
- undersurface of leaves whitened

### Where it is found

- open prairies, forests, and woodlands, disturbed areas, old fields, fencerows, roadsides

### What it means

There are 17 species of blackberries and dewberries in Kansas, and all are members of the genus *Rubus*. While they share similar traits, such as three- or five-parted leaves and woody stems with prickles, they are divided into two groups because blackberries are upright shrubs and dewberries trail along the ground. Both can be indicators of recently or perpetually damaged systems. They become more abundant with increased light and nitrogen but fade as light and nitrogen decrease. This can take many years. Because they are long lived, stability-based management should not express them from the seed bank. One way to prevent their increase is to avoid shocking the system with things like spring or growing season fires or excessive soil upheaval.



# *Sanicula odorata*

## Black Snakeroot

C-value = 2

### Key Characters

- leaves deeply divided into five parts (lower leaves) with jagged margins
- tiny, yellowish-green flowers
- at maturity, the styles (female part of the flower) arch backwards
- clusters of small fruit with hooked bristles

### Look alikes

- Canada black snakeroot (*Sanicula canadensis*)
- styles do not arch
- tiny, white flowers

### Where it is found

- mesic to dry-mesic woods

### What it means

Black snakeroot is a common member of the ground flora in shaded woods and forests. The proportion of this species at a site indicates how recent and extensive any damage may have been. In woods that have been heavily damaged it can become the dominant understory species. Intact, stable or maturing woods will have few and scattered amounts of black snakeroot.



# *Silene stellata*

## Starry Champion

C-value = 5

### Key Characters

- plants are medium to tall
- leaves in whorls of four
- fringed white flowers with lobed petals
- finely hairy stem

### Look alikes

- none

### Where it is found

- mesic to dry forests and woodlands

### What it means

Starry campion indicates there is at least a fair amount of stability and integrity in the local plant community. It prefers rich soils of woods with a moderately open understory and a mixed aged canopy. Sites that have had extensive damage will not have starry campion.



# *Smilax herbacea* var. *lasioneura*

## Carrion Flower

C-value = 3

### Key Characters

- herbaceous vine with alternate leaves
- leaves with five to nine parallel main veins, undersurface covered in small hairs
- clusters of grape-like purple fruits arranged in a sphere

### Look alikes

- bristly catbrier (*Smilax hispida*)
- stem is densely armed with narrow, almost linear prickles

### Where it is found

- mesic to dry-mesic forests, especially in thickets

### What it means

While carrion flower does not necessarily indicate high-quality woods, it does indicate that a site has woodland or forest character and potentiality. It will not be found in completely degraded woods, and as such is a sign of some increasing stability in maturing woods.



# *Solidago petiolaris*

## Downy Goldenrod

C-value = 7

### Key Characters

- medium sized plants with straight, unbranched stem
- stiff, slightly rough leaves that usually lack teeth
- most of the flowers tightly hug the stem (other goldenrods have spreading flowering branches)
- showy yellow flowers, with green bracts at the base that curve backwards

### Look alikes

- other goldenrods (*Solidago* spp.)
- the recurved flower bracts and stiff leaves are very distinct for *S. petiolaris*

### Where it is found

- upland prairies, savannas, and dry woodlands

### What it means

Downy goldenrod is an excellent indicator of good quality woodlands and prairies especially on acidic soils. It prefers dry rocky sites with mixed aged canopies and an open understory. Because it also occurs in prairies, it is often found along the transition zone of woods and prairies.



# *Solidago ulmifolia*

## Elm-Leaved Goldenrod

C-value = 4

### Key Characters

- wide, wrinkled leaves with toothed margins
- largest leaves toward base of plant and progressively smaller up the stem
- flowers borne on widely arching branches toward tip of stem in late summer

### Look alikes

- other goldenrods (*Solidago* spp.)
- the wide, toothed leaves of the lower stem and arching flowering branches separate this goldenrod from others in the area

### Where it is found

- woodlands and forests

### What it means

Elm-leaved goldenrod is a common component of intact or stabilizing upland woods. It is especially fond of open woods with sparse midstories. Like woodland sunflower, elm-leaved goldenrod increases for a few years with dormant season fire but eventually reduces as other woodland grasses and forbs establish. Its presence is a good sign that other species of quality may be in the area as well.



# Staphylea trifolia

## Bladdernut

C-value = 6

### Key Characters

- a small tree or shrub growing in colonies
- opposite, trifoliate leaves with minutely jagged margins
- clusters of greenish-white flowers in the spring
- fruit are inflated three-angled pods

### Look alike

- common hop tree, (*Ptelea trifoliata*)
- leaves are alternate and larger
- fruit are small winged capsules

### Where it is found

- bottomlands, mesic forests, and bases of rocky wooded slopes

### What it means

Bladdernut is a small tree or shrub that often forms colonies along rocky slopes under larger, usually hardwood, trees. It is a reliable indicator of a true forest remnant. When it is present, other species with moderate to high C-values are likely to be found.



Photo: Hadle



Photo: Hadle



Photo: Hadle



Photo: Flanagan

# *Symphoricarpos orbiculatus*

## Coralberry, Buckbrush

C-value = 1

### Key Characters

- small, woody shrub
- opposite, round leaves that are slightly hairy
- pink to purple berries that persist into winter

### Look alikes

- Japanese honeysuckle (*Lonicera japonica*)
- a non-native woody vine

### Where it is found

- woodlands, forests, pastures, and prairies

### What it means

Coralberry is a frequently encountered small shrub of damaged fields, forests, and woodlands. The more common it is at a site, the more extensive and/or recent the damage has been. Over time, it does yield to complexifying and maturing systems. It tends to decrease with dormant season prescribed fire.



Photo: Turner



Photo: Turner



Photo: Turner

# *Symphyotrichum laeve*

## Smooth Aster

C-value = 7

### Key Characters

- small to medium plants
- glabrous (hairless) blue-green stems and leaves
- bright blue flowers in the early fall

### Look alikes

- other asters (*Symphyotrichum* spp.)
- smooth aster is the only entirely hairless aster to occur in grassland or woodland systems

### Where it is found

- upland prairies, woodlands, and occasionally openings of forests

### What it means

Smooth aster can be a good indicator of remnant woodland or savannah quality. Because it does not colonize completely damaged woodlands, its presence likely indicates that historical complexity and maturity are still intact.



Photo: Hadle



Photo: Turner



Photo: Hadle



Photo: Hadle



Photo: Hadle

# *Symphyotrichum oolentangiense*

## Sky Blue Aster

C-value = 8

### Key Characters

- small to medium sized plants
- basal and lower leaves often broader, with heart-shaped bases
- leaves higher up the stem becoming narrower and lance-shaped
- stem and leaves are covered in short, slightly rough hairs
- purple-blue flowers in the early fall

### Look alikes

- other asters (*Symphyotrichum* spp.)
- the combination of heart-shaped lower leaves with a rough texture help to differentiate this species from the other asters in the region

### Where it is found

- upland prairies and woodlands

### What it means

Sky blue aster is a solid indicator of prairie or woodland quality and stability. In woods, it often indicates that the site was more open historically and that the site has not been damaged beyond repair.



Photo: Turner



Photo: Turner



Photo: Aaron

# *Taenidia integerrima*

## Yellow Pimpernel

C-value = 7

### Key Characters

- medium sized plants with compound leaves
- leaves gray-green, waxy, and with a pleasant spiced odor when crushed
- small widely-spaced yellow flowers in umbrella-spoked clusters
- hairless stems are usually purple-tinged

### Look alikes

- none

### Where it is found

- woodlands and woodland-prairie edges

### What it means

Yellow pimpernel is often indicative of excellent quality remnant woodlands. It usually forms loose colonies under variable aged timber often interspersed with eastern red cedar and other forbs like woodland sunflower and elm-leaved goldenrod.



Photo: Gunnar



Photo: Turner



Photo: Turner



Photo: Turner

# *Tephrosia virginiana*

## Goat's Rue

C-value = 7

### Key Characters

- small to medium sized plants
- silvery hairy leaves comprised of many pinnate leaflets
- vibrant and showy flowers with yellow and pink petals
- fruit are long hairy pods that are held horizontally

### Look alikes

- leadplant (*Amorpha canescens*)
- grows taller and the leaflets are shorter and rounder than goat's rue
- flowers are purple spikes

### Where it is found

- upland prairies and woodlands

### What it means

Goat's rue is usually an excellent indicator of stability in woodland remnants and prairies. It prefers a dry and acidic soil where it can tolerate considerable shade. When found in woods, it is often an indicator that the site may have had a more open tree canopy.



Photo: Hadle



Photo: Turner



Photo: Turner



Photo: Hadle



Photo: Hadle

# *Thalictrum dasycarpum*

## Purple Meadow Rue

C-value = 4

### Key Characters

- tall perennial with compound leaves of small, waxy leaflets
- large clusters of numerous, drooping white flowers
- purple stem

### Look alikes

- none

### Where it is found

- mesic forests and woodlands, especially wet to moist edges, thickets, and openings

### What it means

Purple meadow rue is indicative of a system that has been somewhat destabilized but that is recovering or that has the potential to recover. It is often found in wet to moist thickets and edges that are by their nature transitional. It will not be found in woods that have been damaged beyond repair.



Photo: Kroeker



Photo: Hadle



Photo: Kroeker



Photo: Hadle



Photo: Hadle

# *Trillium sessile*

## Toadshade Trillium

C-value = 7

### Key Characters

- three fleshy leaves spreading from a single stem
- conspicuous maroon to purple petals

### Look alikes

- none

### Where it is found

- mesic to dry-mesic forests and woodlands

### What it means

Toadshade trillium is a classic spring wildflower of forests and woodlands. It prefers rich soils with some accumulated organic matter. It does well in shade and increases as woods are opened up with dormant season fire or thinning. It does not tolerate spring burning well. It indicates a high probability of intact ecological stability.



# *Viburnum prunifolium*

## Blackhaw

C-value = 6

### Key Characters

- medium to large shrub, or small tree
- opposite, elliptical to rounded leaves with very small teeth along margins
- flat-topped inflorescences of small, five petaled white flowers in the spring
- flat-topped clusters of dark purple fruits in the summer

### Look alike

- rusty blackhaw (*Viburnum rufidulum*)
- buds and undersurface of leaves are covered in small, rusty-colored scales
- leaves blunt-tipped and glossy

### Where it is found

- mesic to upland forests and woodlands

### What it means

Blackhaw is a good indicator of remnant quality and one of only a few native understory shrubs. Where it is found, other species of quality should be sought.



Photo: Stamey



Photo: Turner



Photo: Turner



Photo: Marcum



Photo: Turner

# *Woodsia obtusa*

## Blunt-Lobed Cliff Fern

C-value = 6

### Key Characters

- central stem of leaf (rachis) usually with scales and round tipped hairs
- leaflets (pinnae) are rounded and curl upwards as they unfurl

### Look alikes

- lowland brittle fern (*Cystopteris protrusa*)
- central stem (rachis) is smooth (no scales or hairs)
- leaflets (pinnae) are more sharply pointed

### Where it is found

- woodland and forests

### What it means

Blunt-lobed cliff fern is one of our more resilient ferns, colonizing damaged landscapes at about mid-maturity and persisting. It is an indicator of both substantial past impacts and the potential for maturation. It is particularly fond of sandy soils and sandstone outcrops.



# Zizia aurea

## Golden Alexanders

C-value = 5

### Key Characters

- sharply divided compound leaves with toothed, whitened margins
- small yellow flowers radiating from tips of branches (singly compound)
- stem and leaves are hairless

### Look alikes

- prairie parsley (*Polytaenia nuttallii*)
- inflorescences are doubly compound
- minutely hairy stem

### Where it is found

- open forests and woodlands as well as prairies

### What it means

Although golden alexanders is not particularly indicative of extreme maturity and complexity, its presence is a good sign that the complex, stable system has not been completely lost and that there is likely potential for restoration.



Photo: Turner



Photo: Turner



Photo: Turner

## Literature Cited

- 1 Atchison, R. et al. Kansas forest action plan, Kansas State University, August 2020.
- 2 Freeman, Craig C. 2014. Coefficients of conservatism for Kansas vascular plants and selected life history attributes. Kansas Biological Survey and R.L. McGregor Herbarium, University of Kansas.
- 3 Lauver, C. L., K. Kindscher, D. Faber-Lanendoen, & R. Schneider. 1999. A classification of the natural vegetation of Kansas. *The Southwestern Naturalist*: 44(4) 421-443.
- 4 Swink, F., and G. Wilhelm. 1994. *Plants of the Chicago region*: 4th ed. Indiana Academy of Science for Morton Arboretum. Indianapolis, IN. 921 pp.

# Appendix

Table 1: Native Forest Vegetation Types; reproduced with permission from Lauver et al., 1999.

Vegetation Alliance Common Name	Distribution	Dominant Species	Other Species	Habitat
Maple-Basswood Forest	Glaciated Region (restricted to the eastern third of this region)	<i>Acer saccharum</i> , [ <i>Acer nigrum</i> ], <i>Tilia americana</i> , <i>Quercus rubra</i> , <i>Ostrya virginiana</i>	<i>Asimina triloba</i> , <i>Carya cordiformis</i> , <i>Celtis occidentalis</i> , <i>Fraxinus americana</i> , <i>Gymnocladus dioica</i> , <i>Juglans nigra</i> , <i>Prunus serotina</i> , <i>Quercus macrocarpa</i> , <i>Staphylea triloba</i> , <i>Ulmus americana</i> , <i>Viburnum prunifolium</i>	moderate to steep slopes on uplands and valley sides
Oak-Dogwood Forest/ Ozark Forest	Ozark Plateau	<i>Quercus alba</i> , <i>Cornus florida</i>	<i>Carya cordiformis</i> , <i>C. ovata</i> , <i>Danthonia spicata</i> , <i>Euonymus atropurpureus</i> , <i>Ostrya virginiana</i> , <i>Sassafras albidum</i> , <i>Staphylea triloba</i> , <i>Vaccinium arboreum</i>	level to steep uplands
Oak-Hickory Forest	Glaciated Region, Osage Cuestas	<i>Quercus alba</i> , <i>Quercus velutina</i> , <i>Carya ovata</i> , <i>Ostrya virginiana</i>	<i>Carya cordiformis</i> , <i>Cercis canadensis</i> , <i>Fraxinus americana</i> , <i>Prunus serotina</i> , <i>Quercus rubra</i> , <i>Ulmus americana</i> , <i>Viburnum rufidulum</i>	gentle to moderately steep slopes on uplands and valley sides
Post Oak-Blackjack Oak Forest/ Cross Timbers Forest	Chautauqua Hills, Osage Cuestas	<i>Quercus stellata</i> , <i>Quercus marilandica</i> , <i>Carya texana</i>	<i>Carya cordiformis</i> , <i>Quercus prinoides</i> , <i>Quercus velutina</i> , <i>Rhus copallinum</i> , <i>Rhus glabra</i> , <i>Schizachyrium scoparium</i>	ridgetops and nearly level to steep hillsides
Pecan-Hackberry Floodplain Forest	Cherokee Lowlands, Glaciated Region, Osage Cuestas	<i>Carya illinoensis</i> , <i>Celtis occidentalis</i>	<i>Acer negundo</i> , <i>Carex grayi</i> , <i>Fraxinus pennsylvanica</i> , <i>Juglans nigra</i> , <i>Parthenocissus quinquefolia</i> , <i>Platanus occidentalis</i> , <i>Toxicodendron radicans</i> , <i>Ulmus americana</i>	nearly level floodplains along major streams and rivers
Ash-Elm-Hackberry Floodplain Forest	eastern half of Kansas	<i>Fraxinus pennsylvanica</i> , <i>Ulmus spp.</i> , <i>Celtis occidentalis</i>	<i>Juglans nigra</i> , <i>Parthenocissus quinquefolia</i> , <i>Populus deltoides</i> , <i>Quercus palustris</i> , <i>Quercus shumardii</i> , <i>Toxicodendron radicans</i> , <i>Ulmus americana</i> , <i>Ulmus rubra</i>	nearly level bottoms and terraces along major streams and rivers
Cottonwood-Sycamore Floodplain Forest	Cherokee Lowlands, Flint Hills Uplands, Glaciated Region, Osage Cuestas	<i>Populus deltoides</i> , <i>Platanus occidentalis</i>	<i>Acer negundo</i> , <i>Carya illinoensis</i> , <i>Celtis occidentalis</i> , <i>Salix nigra</i>	nearly level and undulating soils on floodplains along major rivers and streams
Cottonwood-Black Willow Floodplain Forest	statewide	<i>Populus deltoides</i> , <i>Salix nigra</i>	<i>Acer negundo</i> , <i>Acer saccharinum</i> , <i>Symphyotrichum lanceolatum</i> , <i>Bidens sp.</i> , <i>Carex sp.</i> , <i>Fraxinus pennsylvanica</i> , <i>Leersia oryzoides</i> , <i>Platanus occidentalis</i> , <i>Salix interior</i> , <i>Ulmus americana</i>	nearly level to undulating floodplains along the fronts and banks of most major rivers and streams throughout the central and southern U.S.
Mixed Oak Floodplain Forest	Glaciated Region, Osage Cuestas	<i>Quercus macrocarpa</i> , <i>Quercus shumardii</i> , <i>Carya cordiformis</i> , <i>Chasmanthium latifolium</i>	<i>Acer negundo</i> , <i>A. saccharinum</i> , <i>Carex sp.</i> , <i>Fraxinus pennsylvanica</i> , <i>Leersia oryzoides</i> , <i>Platanus occidentalis</i> , <i>Ulmus americana</i>	nearly level to undulating floodplains

Table 2: Woodland Vegetation Types; reproduced with permission from Lauver et al., 1999.

Vegetation Alliance Common				
Name	Distribution	Dominant Species	Other Species	Habitat
Mixed Oak Floodplain Woodland	Glaciated Region, Osage Cuestas	<i>Quercus macrocarpa</i> , <i>Andropogon gerardii</i> , <i>Panicum virgatum</i>	<i>Carya illinoensis</i> , <i>Fraxinus spp.</i> , <i>Salix nigra</i> , <i>Spartina pectinata</i>	nearly level to gently sloping soils on floodplains along major rivers and streams
Oak Floodplain Woodland	Glaciated Region, north half of Osage Cuestas	<i>Quercus macrocarpa</i> , <i>Andropogon gerardii</i> , <i>Stipa spartea</i>	<i>Fraxinus sp.</i> , <i>Panicum virgatum</i> , <i>Quercus rubra</i> , <i>Schizachyrium scoparium</i> , <i>Sorghastrum nutans</i>	floodplains of rivers and streams with gentle to steep slopes
Mixed Oak Ravine Woodland	Flint Hills Uplands, Glaciated Region, Osage Cuestas	<i>Quercus muehlenbergii</i> , <i>Quercus macrocarpa</i> , <i>Andropogon gerardii</i>	<i>Cercis canadensis</i> , <i>Panicum virgatum</i> , <i>Schizachyrium scoparium</i> , <i>Ulmus spp.</i>	ravines and valleys of rivers and major streams
Post Oak-Blackjack Oak Woodland/Cross Timbers Woodland	Chautauqua Hills, Osage Cuestas	<i>Quercus stellata</i> , <i>Quercus marilandica</i> , <i>Schizachyrium scoparium</i>	<i>Andropogon gerardii</i> , <i>Celtis sp.</i> , <i>Quercus prinoides</i> , <i>Sorghastrum nutans</i>	ridgetops and gently sloping to steep hillsides
Cottonwood-Willow Floodplain Woodland	Arkansas River Lowlands, High Plains, Red Hills, Smoky Hills, Wellington-McPherson Lowlands	<i>Populus deltoides</i> , <i>Salix amygdaloides</i> , <i>Salix interior</i>	<i>Amorpha fruticosa</i> , <i>Elymus virginicus</i> , <i>Muhlenbergia ssp.</i>	nearly level floodplains along major rivers and streams
Cottonwood Floodplain Woodland	eastern third of Kansas	<i>Populus deltoides</i> , <i>Salix nigra</i> , <i>Spartina pectinata</i> , <i>Carex spp.</i>	<i>Acer negundo</i> , <i>Andropogon gerardii</i> , <i>Fraxinus pennsylvanica</i> , <i>Panicum virgatum</i> , <i>Quercus macrocarpa</i>	floodplains near the lower Missouri River and its tributaries
Cottonwood-Switchgrass Floodplain Woodland	High Plains	<i>Populus deltoides</i> , <i>Panicum virgatum</i> , <i>Schizachyrium scoparium</i>	<i>Chrysothamnus nauseosus</i> , <i>Pascopyrum smithii</i>	swales and depressions along streams



# Index

## A

*Aesculus glabra* var. *arguta* 5  
*Ageratina altissima* 6, 25, 40  
*Agrimonia parviflora* 7  
*Agrimonia pubescens* 7  
*Allium canadense* var. *canadense* 8  
*Allium mutabile* 8  
*Allium vineale* 8  
American bellflower 16  
American hazelnut 20  
American lopseed 40  
*Amorpha canescens* 9, 55  
*Amphicarpaea bracteata* 10  
*Anemone cylindrica* 11  
*Anemone virginiana* 11  
Anise root 38  
Annual bedstraw 26  
*Antennaria neglecta* 12  
*Antennaria parlinii* subsp. *fallax* 12  
*Arisaema dracontium* 13  
*Arisaema triphyllum* 13

## B

*Baptisia alba* 14  
*Baptisia australis* 14  
*Baptisia bracteata* var. *leucophaea* 14  
Blackberries and dewberries 44  
Blackhaw 58  
Black snakeroot 45  
Bladdernut 50  
Blue Phlox 39  
Blunt-Lobed Cliff Fern 59  
*Boechara canadensis* 15  
*Boechara laevigata* 15  
*Boehmeria cylindrica* 6

## C

*Campanula americana* 16  
*Cardamine concatenata* 17  
Carolina elephant's foot 23  
Carrion flower 47  
*Ceanothus americanus* 18  
*Ceanothus herbaceus* 18  
Coralberry, Buckbrush 51  
*Coreopsis palmata* 19  
*Corylus americana* 20  
Cream wild indigo 14  
Cut-Leaf Toothwort 17  
*Cystopteris protrusa* 59

## D

*Desmodium cuspidatum* 21  
*Desmodium* spp. 21

*Dicentra cucullaria* 22  
Downy agrimony 7  
Downy goldenrod 48  
Dutchman's breeches 22

## E

*Elephantopus carolinianus* 23  
Elm-leaved goldenrod 49  
*Eryngium yuccifolium* 24  
*Eupatorium serotinum* 6, 25

## F

Fragrant bedstraw 29

## G

*Galium aparine* 26, 29  
*Galium circaezans* 27, 28  
*Galium pilosum* 27, 28  
*Galium* spp. 26  
*Galium triflorum* 26, 29  
*Geum canadense* 30  
*Geum laciniatum* 30  
Goat's Rue 9, 55  
Golden Alexanders 60

## H

*Hackelia virginiana* 31  
Hairy bedstraw 28  
Hairy gayfeather 36  
Hairy sunflower 32  
*Helianthus hirsutus* 32  
*Helianthus* spp. 33  
*Heliopsis helianthoides* 32  
*Heliopsis helianthoides* ssp. *scabra* 33  
Hog peanut 10  
*Hylodesmum glutinosum* 34  
*Hypoxis hirsuta* 35

## J

Jack-in-the-Pulpit 13

## L

*Lamiaceae* 6  
Large-Bract Tick Trefoil 21  
Late Boneset 25  
Leadplant 9  
*Liatris hirsuta* 36  
*Liatris* spp. 36  
Licorice bedstraw 27  
*Lobelia siphilitica* 16  
*Lonicera japonica* 51

## M

*Maianthemum racemosum* 42  
Mayapple 41  
Meadow Garlic 8  
*Morus alba* 37  
*Morus rubra* 37

## N

New Jersey Tea 18

## O

*Osmorhiza longistylis* 38  
Oxeye sunflower 33

## P

*Phlox divaricata* 39  
*Phlox pilosa* 39  
*Phryma leptostachya* 40  
Plantain-Leaf Pussy's-Toes 12  
*Podophyllum peltatum* 41  
Pointed Tick Trefoil 34  
*Polygonatum biflorum* 42  
*Polytaenia nuttallii* 60  
Prairie Coreopsis 19  
*Prunella vulgaris* 43  
*Ptelea trifoliata* 50  
Purple Meadow rue 56

## R

Rattlesnake master 24  
Red mulberry 37  
*Rubus occidentalis* 44  
*Rubus* spp. 44

## S

*Sanicula canadensis* 45  
*Sanicula odorata* 45  
Self-heal 43  
*Silene stellata* 46  
Sky Blue Aster 53

*Smilax herbacea* var. *lasioneura* 47  
*Smilax hispida* 47  
Smooth Aster 52  
Smooth rockcress 15  
*Solidago petiolaris* 48  
*Solidago* spp. 48, 49  
*Solidago ulmifolia* 49  
Solomon's Seal 42  
*Staphylea trifolia* 50  
Starry Campion 46  
Stickseed 31  
*Symphoricarpos orbiculatus* 51  
*Symphyotrichum laeve* 52  
*Symphyotrichum oolentangiense* 53  
*Symphyotrichum* spp. 52, 53

## T

*Taenidia integerrima* 54  
Tall Anemone 11  
*Tephrosia virginiana* 9, 55  
*Thalictrum dasycarpum* 56  
Toadshade trillium 57  
*Trillium sessile* 57

## V

*Viburnum prunifolium* 58  
*Viburnum rufidulum* 58

## W

Western Ohio Buckeye 5  
White avens 30  
White snakeroot 6  
*Woodsia obtusa* 59

## Y

Yellow Pimpernel 54  
Yellow Star Grass 35  
*Yucca* spp. 24

## Z

*Zizia aurea* 60



## Project Coordinator

**Ryan Armbrust**

Rural Forestry Program Coordinator  
Kansas Forest Service

## Authors

**Justin Thomas**

Science Director  
NatureCITE

**Dana Thomas**

Executive Director  
NatureCITE

**Jacob Hadle**

Researcher  
Kansas State University

**Jarran Tindle**

Former Water Quality Forester  
Kansas Forest Service

**Nathan Aaron**

Research Associate  
NatureCITE



The Kansas Forest Service is an equal opportunity provider and does not discriminate based on non-merit reasons.

The Kansas Forest Service is committed to making its services, activities, and programs accessible to all participants. If you have special requirements due to a physical, vision, or hearing disability, or a dietary restriction, please contact our state office at 785-532-3300.

Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned.

Publications from Kansas State University are available at [bookstore.ksre.ksu.edu](http://bookstore.ksre.ksu.edu)

Date shown is that of publication or last revision. Contents of this publication may be freely reproduced for educational purposes. All other rights reserved. In each case, credit Ryan Armbrust, *Indicator Plants of Forest and Woodland Health in Kansas*, Kansas State University, December 2023

### **Kansas State University Agricultural Experiment Station and Cooperative Extension Service**

K-State Research and Extension is an equal opportunity provider and employer. Issued in furtherance of Cooperative Extension Work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Director of K-State Research and Extension, Kansas State University, County Extension Councils, Extension Districts.