

# PETAL PUSHER

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“... to promote the enjoyment, preservation, conservation, restoration, and study of the flora native to Missouri.”

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## The Composites

by Rick Gray

### Introduction

The “Composites” are members of the Asteraceae, commonly known as the aster or sunflower family, one of the largest (second only to the Orchidaceae) and most diverse plant families in the world. In Missouri, the Asteraceae is the largest plant family with at least 108 genera and 450 species from 12 tribes represented.

The defining character of the Composites is the inflorescence which, while at distance might appear to be a single, sometimes large, flower, is actually a tight cluster or “composite” of many tiny flowers. While many plants aggregate their flowers into showy clusters, the Composites do it in a very particular, and often extravagant, manner.

Composite flower clusters, or heads, are tightly packed, indeterminate (bloom from the outside in), and subtended by one or more series of bracts (phyllaries) collectively referred to as an involucre. The individual flowers, or florets, are sessile and attached to a flat or sometimes convex receptacle. These florets have petals that are connected at least at



*Rudbeckia hirta*. A “radiate” flower head contains both ray florets (yellow) and disc florets (dark purple). Note that the disc florets always open from the outside inward and, in this case, only the florets around the edge of the disc have opened revealing the dark, long exerted, connate anthers capped with yellow pollen pushed out by the forked stigma. Photo by Rick Gray.



*Cichorium intybus*. A “ligulate” flower head contains only ray florets which are positioned not only around the edge of the flower head but also in the interior, the disc, as well. Note the dark blue, connate anthers and forked stigmas protruding from their tips. Ligulate flower heads are unique to plants of the Cichorieae tribe. All such plants also have colored sap. Photo by Rick Gray.

the base (i.e., tubular corollas with up to five lobes). Those florets with five free lobes are typically radially symmetric and are termed disc florets; those with (usually) a single, large lobe (actually due to fusion and elongation of five lobes) are bilaterally symmetric and are termed ray florets.

Stamens, when present, are usually five and bear anthers fused in a tubular ring which ultimately release pollen inside the tube. The pollen is then pushed out by the growing style, like a plunger, which, once free of the anther tube, forks to expose its inner stigmatic tip. Sometimes the stigmas have long, showy, sterile appendages which give the florets a whiskery appearance.

The floret calyces, or sepals, are highly modified and are either lacking entirely or reduced to awns, scales, or, most conspicuously, to a “pappus” of hairs which aid in seed dispersal. The ovaries are inferior, meaning that the fruit, an achene, is positioned below all of the other flower parts.

Composite flower heads may contain either disc florets, ray florets, or both. Those with only disc florets are called “discoid” (ex. *Liatris*, Joe Pye Weed, etc.),

those with only ray florets are called “ligulate” (ex. Dandelion, Wild Lettuce, etc.), and those with both, with disc florets in the middle and ray florets around the edge, are called “radiate”. Radiate flowers are iconic of the family and are borne by some of the most charismatic genera such as the asters, sunflowers, and daisies.

Composite flower heads may contain florets that are perfect, staminate (male), pistillate (female), or sterile. In some species, such as the Ragweeds (*Ambrosia*), the flower heads are either all staminate or all pistillate. Most Composites are monoecious though a few Missouri genera are dioecious (ex. *Antennaria* [Pussy Toes]).

Finally, Composites bear their flower heads in a variety of ways from single heads to arrays of few to hundreds of heads in every conceivable inflorescence type.

These common elements aside, the diversity within the Composites can be bewildering to both amateur and experienced botanists alike. Flower heads vary widely in structure, size, color, smell, and arrangement. This family is virtually impossible to characterize vegetatively as members express nearly every possible leaf, stem, and growth form. The diversity extends to secondary chemistry as well: some are edible, some toxic; some with clear sap, some with variously colored latex; some aromatic, some odorless. In addition, they grow in every conceivable habitat: dry to mesic to aquatic, deep shade to full sun.

## Identifying Composites in the Field

Initially, identification of Composites in the field may seem daunting, particularly in late summer when so many yellow-flowered species are in simultaneous bloom. The following thoughts are intended to provide some advice and encouragement for those wanting to play at this game.

The Composites that grow in Missouri, while diverse, do conform to some helpful generalizations. All are either annual or perennial terrestrial herbs. Only one species grows as a vine. None are woody shrubs or trees. None grow as submerged aquatics and very few as emergent aquatics. Most grow in partial to full sun and most bloom in the summer through fall. And while Composite leaves are highly variable, they (almost) never have stipules.

The first step to identifying Composites is recognizing that the plant you are looking at is, in fact, a Composite. Keep in mind the previously stated limits to Composite growth forms in Missouri. Is the plant a woody shrub or a tree? If so, then it is not a Composite. Are you looking at a single flower or a flower cluster? If it is a cluster, look for a distinct involucre and either of the previously described disc or ray petals above the ovary, sessile and tightly packed on a receptacle, without leafy sepals, with connate anthers, forked stigmas, and a single fruit per floret. If these criteria are met, then you are, indeed, looking at a Composite.

What next? When dealing with any unknown plant in the field, the key is to break it down into discrete characters. In the case of Composites, start with the flower head(s) noting what type of flower heads are present (radiate, ligulate, discoid), whether the flower heads are large or small, are borne singly or in clusters, the general shape of the clusters, the color of the ray and/or disc florets, the shape of the ray florets, the shape of the disc, and anything notable about the involucral bracts. Next, consider the arrangement of the leaves (basal, alternate, opposite, whorled), leaf type (simple, compound), and whether the leaf margins are entire, toothed, and/or lobed. Finally, observe overall habit such as whether the stems are branched and to what extent and whether the plant appears to be rhizomatous.



*Liatris squarrosa*. A “discoid” head contains only disc florets which, while individually inconspicuous, can be collectively very showy. Note the long, showy, sterile stigma appendages, a defining character of members of the Eupatorieae tribe. Photo by Rick Gray.

The good news is that with just a handful of characters the universe of potential Composite genera and species can be reduced to a very manageable number of candidates. From that point, it is relatively easy to determine species using memorized characters or, if needed, a pocket reference.

The tables that follow (pp. 4-6) illustrate a way to organize the Composite genera, and selected species, commonly seen in Missouri based upon, for the most part, characters easily observable in the field.

Enjoy!

## Society Award winners

We are happy to announce the three recipients of our 2019 Missouri Native Plant Society Awards:

1. **James Trager** received the Erna Eisendrath Memorial Education Award, which recognizes individuals who, through teaching, writing, or other activity have conveyed to others a significant appreciation and knowledge of Missouri’s native flora. Dr. James Trager is an entomologist and ant taxonomist who worked as a naturalist, educator and ecological restoration steward at the Missouri Botanical Garden’s Shaw Nature Reserve (SNR) outside St. Louis, MO. In addition to many other contributions, during his career at SNR James worked with over 50 researchers to advance the study of numerous taxa and was heavily involved in many Bio-blitz events at the Nature Reserve, Emmenegger Nature Park, Principia High School, Forest Park and for the Missouri Prairie Foundation. Since 1991, he



has led wildflower identification and ecology walks, taught many courses including Reading the Land, Trees of SNR, Winter Tree Identification, and Wetland Ecology and has led countless tours, hikes and nature study outings for student groups and the public.

**Graphical Key to the Common Composite Genera of Missouri**

Author: Rick Gray

Version: 2019-06-10.001

**Composites with Discoid (or apparently so) Heads**

Heads large and/or distinct Single/numerous in open inflorescences						
Disc Color	Leaf Arrangement	Other Characters		Genus	Tribe	Distinguishing Characters
Pink or Purple	Alternate	Leaves and involucre bracts spine tipped	Leaf undersides whitened	<i>Cirsium (native sp.)</i>	<i>Cardueae</i>	Native thistles; leaves not decurrent; stems not winged
			Leaf undersides green	<i>Cirsium vulgare</i>	<i>Cardueae</i>	An exotic thistle; heads generally upright at maturity; spreading portion of involucre bracts needle like; leaf bases long decurrent; stems with spine-margined wings
				<i>Carduus nutans</i>	<i>Cardueae</i>	An exotic thistle; heads generally nod at maturity; spreading portion of involucre bracts with broad bases; leaf bases long decurrent; stems with spine-margined wings;
		Leaves and involucre bracts otherwise	<i>Centaurea stoebe</i>	<i>Cardueae</i>	Involucre bracts with fringed margins	
			<i>Elephantopus carolinianus</i>	<i>Vernoniaea</i>	Heads with four deeply lobed, zygomorphic disc florets (appearing radiate from a distance);	
			<i>Palafoxia</i>	<i>Heliantheae</i>	Inflorescence branches with stalked, tack-shaped glands; leaves linear	
White			<i>Erechtites</i>	<i>Senecioneae</i>	Involucre bracts in a single series; involucre cylindrical with a swollen base; plants of disturbed habitats	
Yellow				<i>Matricaria discoidea</i>	<i>Anthemideae</i>	Leaves finely, pinnately dissected; foliage smells like pineapple when crushed
	Opposite	Phyllaries dimorphic		<i>Bidens</i>	<i>Heliantheae</i>	Leaves simple or compound with marginal teeth

Heads large and/or distinct Numerous in showy spikes or racemes						
Disc Color	Leaf Arrangement	Other Characters		Genus	Tribe	Distinguishing Characters
Pink or Purple	Alternate			<i>Liatris</i>	<i>Eupatorieae</i>	Stigma branches with long, showy sterile appendages

Heads large and/or distinct Involucres bur-like, phyllaries with hooked tips						
Disc Color	Leaf Arrangement	Other Characters		Genus	Tribe	Distinguishing Characters
Pink or Purple	Alternate			<i>Arctium</i>	<i>Cardueae</i>	Phyllaries free, ascending with hooked tips; large basal leaves (edible); plants of disturbed areas
Green - indistinct	Alternate			<i>Xanthium</i>	<i>Heliantheae</i>	Heads unisexual, only pistillate heads with phyllaries fused and covered with hooked prickles; plants of floodplains, pond margins, other wet areas

Heads small and/or indistinct generally in clusters Clusters with tops flat or dome shaped						
Disc Color	Leaf Arrangement	Other Characters		Genus	Tribe	Distinguishing Characters
Cream	Alternate			<i>Brickellia</i>	<i>Eupatorieae</i>	Stigma branches with long, showy sterile appendages
Pink or Purple or Lavender	Alternate	Corollas pink		<i>Pluchea camphorata</i>	<i>Pluceaeae</i>	Heads actually radiate; ray florets numerous but with very fine, short rays; very unpleasantly aromatic
			Corollas purple	<i>Elephantopus carolinianus</i>	<i>Vernoniaea</i>	Heads with four deeply lobed, zygomorphic disc florets (appearing radiate from a distance);
		<i>Vernonia</i>		<i>Vernoniaea</i>	Disc florets numerous; corolla tubes long, deeply lobed, actinomorphic; hybrids common	
	Opposite	Leaves triangular with truncate bases		<i>Conoclinium coelestinum</i>	<i>Eupatorieae</i>	Stigma branches with long, showy sterile appendages; corollas usually lavender; receptacles conic; heads with at least 35 florets; plants common south of Mo. River
		Leaves heart-shaped with cordate bases		<i>Fleischmannia incarnata</i>	<i>Eupatorieae</i>	Stigma branches with long, showy sterile appendages; corollas pink or lavender; receptacles flat; heads with no more than 25 florets; plants uncommon in SE/S Mo.
	Whorled		Corollas sometimes pale or white, sometimes appearing pale lavender		<i>Eutrochium</i>	<i>Eupatorieae</i>
White	Alternate	Leaves primarily basal, colonial		<i>Antennaria</i>	<i>Gnaphalieae</i>	Leaves primarily basal; plants dioecious; spring flowering
		Leaves basal and stem, not colonial		<i>Arnoglossum</i>	<i>Senecioneae</i>	Involucre bracts in a single series; usually large basal leaves
	Opposite	A twining vine		<i>Mikania</i>	<i>Eupatorieae</i>	Missouri's only twinning composite; restricted to SE Mo.
		Free-standing herbs	Corollas bright white		<i>Ageratina altissima</i>	<i>Eupatorieae</i>
Corollas off-white			<i>Eupatorium</i>	<i>Eupatorieae</i>	Stigma branches with long, showy sterile appendages; only one uncommon species with whorled leaves (4 per node)	

Heads small and/or indistinct generally in clusters Clusters in spikes, racemes, other						
Disc Color	Leaf Arrangement	Other Characters		Genus	Tribe	Distinguishing Characters
Yellow (ish)	Alternate	Leaves pinnately dissected, fern like		<i>Artemisia annua</i>	<i>Anthemideae</i>	Stem and leaves glabrous/glabrate; strongly aromatic
		Leaves pinnately lobed		<i>Artemisia ludoviciana</i>	<i>Anthemideae</i>	Stem and leaves densely woolly/felty pubescent, appearing white/grey
Green - indistinct	Opposite basally, becoming alternate	Heads with staminate or pistillate florets		<i>Ambrosia</i>	<i>Heliantheae</i>	Inflorescences of columnar racemes, heads not subtended by leafy bracts; wind pollinated, a major cause of allergies
		Heads with staminate and pistillate florets		<i>Iva annua</i>	<i>Heliantheae</i>	Inflorescences of columnar racemes, heads subtended by leafy bracts; wind pollinated, a major cause of allergies
White with purple tips	Alternate	Inflorescence inconspicuous; flowers spring to early summer		<i>Gamochaeta purpurea</i>	<i>Gnaphalieae</i>	Stem and lower leaf surface densely woolly pubescent;
White		Inflorescence showy; flowers mid-summer to fall		<i>Pseudognaphalium obtusifolium</i>	<i>Gnaphalieae</i>	Stem and lower leaf surface densely woolly pubescent; strongly aromatic

**Composites with Ligulate Heads**  
**All belong to tribe Cichorieae**  
**All have either basally disposed or alternate leaves and milky sap (white or variously colored)**

Leaves lobed and/or with toothed margins Flower heads yellow or yellow-orange					
Habit	Other Characters			Genus	Distinguishing Characters
All leaves in a basal rosette; flower heads borne singly on leafless stalks	Involucral bracts all ascending when flowering			<i>Krigia virginica</i>	Annual, often diminutive; often producing many flowering stems; pappus of only five bristles and scales
	Involucral bracts dissimilar when flowering: outer reflexed, inner ascending			<i>Krigia dandelion</i>	Perennial; often producing a single flower stem; pappus of many bristles and scales
Leaves primarily basal; flower heads borne singly or few on sparsely leaved stalks	Involucral bracts all of similar length	Flowers yellow	Pappus absent	<i>Krigia caespitosa</i>	Upper stem leaves sometimes appearing to be opposite
		Flowers yellow-orange or orange	Pappus of bristles and scales	<i>Krigia biflora</i>	Often two-flowered
Plants with leafy stems	Flower heads facing upward or angled upward at flowering	Inflorescences of single/several flower heads or open panicles of many flower heads	A single series of involucral bracts	<i>Tragopogon dubius</i>	Flower stalk swollen below the involucre; leaves linear with broad, clasping bases
			Several series of involucral bracts	Involucre bell shaped	<i>Lactuca</i>
		Involucre pear shaped (the base swollen)		<i>Sonchus</i>	Pappus of hairs only, involucre swollen basally (pear-shaped); leaves with spiny margins; leaf bases conspicuously auriculate/clasping; flowers yellow
		Inflorescences of spikes or racemes	Flowers yellow; leaves clasping with two basal auriculate lobes	<i>Lactuca saligna</i>	Fruit tapered apically to a slender stalk to which pappus is attached; a plant of disturbed areas
			Flowers cream or pale yellow; leaves sessile or short-petiolate, not clasping or auriculate	<i>Prenanthes aspera</i>	Fruit apically blunt; a plant of undisturbed habitats
		Flower heads pendulous, hanging upside-down at flowering	<i>Prenanthes</i>	Inflorescence an open panicle with drooping, pendulous heads	

Leaves lobed and/or with toothed margins Flower heads blue					
Habit	Pappus			Genus	Distinguishing Characters
Plants with leafy stems	Pappus of scales			<i>Cichorium intybus</i>	Heads sessile, solitary or in clusters along thick, leafy branches; plant of disturbed areas, roadsides
	Pappus of bristles			<i>Lactuca</i>	Inflorescences terminal panicles; some species with colored sap; yellow flowers may turn blue with age

Leaves with entire margins					
Habit	Inflorescence			Genus	Distinguishing Characters
Plants with leafy stems	Few to many heads			<i>Hieracium</i>	Usually pubescent, often glandular

## Society Award winners, cont.

2. **Randy Arndt** received the Plant Stewardship award recognizing an individual or organization for the preservation of important elements of Missouri's flora through purchase, registry, and/or management practice. Randy worked for 29 years at MDC in the NW region where he discovered and nurtured some of the best prairies in the region. His work at Pawnee Prairie resulted in the only restoration to be nominated as a Natural Area. He was awarded the Employee of the Year award from MDC and Conservation Partner of the Year award from TNC in 1999 for his installation of a native seed nursery at Pawnee Prairie. After retiring from MDC, Randy went to work for TNC at Dunn Ranch Prairie. He spent 11.5 years restoring Dunn Ranch to a fully functioning tallgrass prairie. In that time span, he oversaw the restoration planting of prairie onto 2,500 acres.

Left: Randy Arndt receiving the award from MONPS member, Hilary Haley. Photo by Dana Thomas.



**Graphical Key to the Common Composite Genera of Missouri**

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**Composites with Radiate Heads**

**Heads large and/or distinct; single/numerous in open inflorescences**

Ray Color	Disc Color	Leaf Arrangement	Other Characters	Genus	Tribe	Distinguishing Characters		
Purple	Yellow	Alternate	Disc flat topped	<i>Eurybia hemispherica</i>	Astereae	Large flower heads; leaves linear, sessile; species of southwestern Missouri prairies		
				<i>Ionactis linariifolius</i>	Astereae	Typically few-flowered; stems unbranched; leaves linear, sessile, shiny		
				<i>Symphyotrichum</i>	Astereae	Typically many-flowered; stems branched; leaves various but not linear and not shiny		
	Black		Disc convex, conical, or globose	<i>Echinacea</i>	Heliantheae	Receptacle convex and armed with long, spine like bracts		
White	White	Alternate	Leaves linear	<i>Oligoneuron album</i>	Astereae	Leaves thick-textured, glabrous;		
			Leaves deltoid	<i>Verbesina virginica</i>	Heliantheae	Leaves with winged petioles; stems winged		
			Opposite	<i>Eclipta prostrata</i>	Heliantheae	Flower heads like tiny white daisies; mesic habitats		
	Yellow	Alternate	Pappus of scales or absent		<i>Boltonia asteroides</i>	Astereae	Ray and disc florets very numerous and showy; pappus of awns/scales; leaves thick and rubbery, margins entire or minutely toothed; mesic habitats	
					<i>Leucanthemum vulgare</i>	Anthemideae	Flower heads large; pappus absent; basal leaves often deeply, pinnately lobed, stem leaves coarsely toothed; rhizomatous with well-developed basal rosettes	
					<i>Matricaria chamomilla</i>	Anthemideae	Strongly aromatic; rays becoming deflexed with age; disc becoming strongly convex; pappus absent; leaves twice pinnately dissected; plants of disturbed areas	
			Pappus of bristles		<i>Conyza</i>	Astereae	Involucre shallow; rays very short and inconspicuous; prefers disturbed habitats	
					<i>Erigeron</i>	Astereae	Involucre shallow; ray and disc florets very numerous and showy; various habitats	
					<i>Oligoneuron album (Solidago ptarmicoides)</i>	Astereae	Involucre bell shaped; leaves linear, thick-textured, glabrous; disc corollas actually white, but appearing yellow or cream due to exerted yellow anthers	
					<i>Symphyotrichum</i>	Astereae	Involucre bell or urn shaped; leaves heart-shaped to lanceolate	
			Opposite		<i>Polymnia canadensis</i>	Heliantheae	Rays with margins conspicuously three-lobed; opposing leaves with "stipules" fused around the stem	
			Yellow	Black	Alternate	Disc convex, conical, or globose	<i>Echinacea paradoxa</i>	Heliantheae
	<i>Helenium flexuosum</i>	Heliantheae					Rays wedge-shaped with lobed margins; leaf bases long decurrent; stems winged	
	<i>Ratibida</i>	Heliantheae					Rays reflexed; leaves pinnately lobed/compound; receptacle without chaffy bracts	
	Disc flat topped	<i>Rudbeckia</i>				Heliantheae	Receptacle with chaffy bracts	
<i>Helianthus annuus</i>		Heliantheae				Flowers smell like chocolate; disc flat; leaves large, deltoid, toothed but not lobed; plants of roadsides		
Phyllaries dimorphic		<i>Coreopsis</i>				Heliantheae	Leaves compound or finely dissected, margins never toothed, squiggly venation	
Yellow	Alternate	Disc convex, conical, or globose		Phyllaries similar	<i>Helianthus pauciflorus</i>	Heliantheae	Flowers smell like chocolate; leaves thick and very rough, 3-nerved, toothed but not lobed/dissected; strongly rhizomatous	
						<i>Helenium</i>	Heliantheae	Rays wedge-shaped with lobed margins, often somewhat reflexed; several species with winged stems; leaves various
						<i>Rudbeckia laciniata</i>	Heliantheae	Rhizomatous; leaves compound or at least deeply lobed, upper surface smooth; prefers shaded, mesic sites
				Disc flat topped		<i>Verbesina</i>	Heliantheae	Rhizomatous; stems winged; leaf margins entire/toothed, never lobed
						<i>Amphiachyris dracunculoides</i>	Astereae	Restricted to southwestern Missouri; plants much branched from a central stem, spreading wider than tall; glabrous, sticky/resinous; a profusion of tiny flower heads
						<i>Bradburia pilosa</i>	Astereae	Disc florets with pappus of scales and bristles; stems with long hair + short gland-tipped hairs
					<i>Heterotheca</i>	Astereae	Disc florets with pappus of two type of bristles; stems with hairs and glands, but without short gland-tipped hairs; crushed foliage smells of camphor	
					<i>Grindelia</i>	Astereae	Involucre with ascending/loosely spreading, linear bracts, resinous, sticky	
					<i>Helianthus</i>	Heliantheae	Flowers smell like chocolate; phyllaries long, narrow, with pointed tips; leaves 3-nerved (except those with linear leaves), never lobed, often somewhat falcate; plants often with some lower leaves oppositely arranged	
		Opposite		Phyllaries dimorphic		<i>Packera</i>	Senecioneae	Involucral bracts in a single series, often with purple tips; stem leaves pinnately lobed
						<i>Silphium asteriscus</i>	Heliantheae	Only ray florets produce seed; leaves single nerved
						<i>Bidens</i>	Heliantheae	Leaves lobed or not, margins toothed, squiggly venation
Phyllaries similar			<i>Coreopsis</i>	Heliantheae	Leaves lobed or not, margins never toothed, squiggly venation			
			<i>Helianthus</i>	Heliantheae	Flowers smell like chocolate; phyllaries long, narrow, with pointed tips; only disc florets produce seed; leaves 3-nerved (except those with linear leaves), never lobed, often somewhat falcate; leaf venation tight			
			<i>Helopsis</i>	Heliantheae	Stems with hairs in longitudinal lines; phyllaries with broad tips; ray and disc florets produce seed; leaves 3-nerved, coarsely toothed, not falcate; leaf venation loose			
Primarily Basal	Leaves 3-nerved		<i>Silphium</i>	Heliantheae	Only ray florets produce seed; leaves single nerved, coarsely pubescent, not falcate			
			<i>Smallanthus uvedalia</i>	Heliantheae	Leaves large, palmately lobed, petiole margins winged			
	Leaves 1-nerved		<i>Helianthus occidentalis</i>	Heliantheae	Flowers smell like chocolate; phyllaries long, narrow, with pointed tips; only disc florets produce seed; leaves lanceolate, primarily basal, stems leaves opposite, small			
			<i>Silphium</i>	Heliantheae	Only ray florets produce seed; leaves either broadly deltoid or deeply divided, coarsely pubescent			

**Heads small, arranged in clusters**

Ray Color	Disc Color	Leaf Arrangement	Other characters	Genus	Tribe	Distinguishing Characters
White	White	Alternate	Ray florets Inconspicuous	<i>Parthenium</i>	Heliantheae	Ray florets few and inconspicuous; heads resemble tiny cauliflowers in appearance
			Ray florets Conspicuous	<i>Achillea</i>	Anthemideae	Flower heads in dense, flat-topped clusters; conspicuously radiate, sometime pink tinged; leaves pinnately dissected, fern-like
Yellow	Yellow		Leaves linear	<i>Euthamia</i>	Astereae	Flower heads pale yellow; clusters flat-topped; ray florets more numerous than disk florets
		Leaves various but not linear	<i>Solidago</i>	Astereae	Flower heads bright yellow; clusters flat-topped, pyramidal, axillary, terminal, various; ray florets fewer than disk florets	

## Society Award winners, cont.

3. **Rob Kennedy** received the Plant Conservation Award, recognizing an individual or organization for outstanding contributions to the conservation or preservation of native plants or plant communities in Missouri. Rob is the Sustainability Programs Coordinator at the Earthways Center where he is incredibly passionate about two programs in particular: the Project Clear Rainscaping Small Grants Program and the St. Louis Green Business Challenge.



## Dues are Due

By Ann Earley, Membership Chair

Membership renewals for the July 2019-June 2020 year are due. If you receive your newsletter by postal service delivery, please check the top line of your mailing label. If it shows the date 20190630, your dues are now payable. When renewing, please remember to include your contact information including email address, and your society and chapter dues preferences. Membership renewal online is also available via our website at [www.monativeplants.org](http://www.monativeplants.org) which offers the option of online payment via PayPal.

For those members receiving their newsletter by email without a mailing label, or for others with questions about their membership status, please contact me or your chapter representative (see back page for contact details) for information about your membership expiration date. We value our members and urge you to renew today!



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## New Members

### *Ozarks*

Suzan Campbell, Mountain View

### *St. Louis*

Sarah Wilson, Brentwood  
Gillian MacQuarrie, Manchester  
Felicia Ammann, Pacific

### *Hawthorn*

Phil Gibson, Columbia  
Ben Barnhart, Columbia  
Paul D. Smith, Columbia  
Emily Beckett, Columbia  
Linda Vogt, Jefferson City  
Diane Privitt, Columbia  
Leah Berkman, Columbia

### *Paradoxa*

Denise Luechtefeld, Vichy  
Nina Strange, Newburg

### *State Level Membership*

Kirsten McIntyre, Rolla  
Linda Sidwell, Rolla



Roxanne Stockdale at Prairie Days Bioblitz

## Chapter Events

### Kansas City

**09-09: Chapter Meeting, 7:00 P.M.**

**07-15, 08-15, 09-16: Botanical Walks, 5:30 P.M.**

Chapter meetings are held on the first Tuesday of odd-numbered months except July at the Anita B. Gordon Conservation Discovery Center, 4750 Troost Ave., Kansas City, Missouri.

2019 Botanical walks are held every third Thursday at 5:30pm, April to October. Meet at the Eddy-Ballentine Trail Head on Blue River Road, 1/2 mile North of the firefighter memorial on 87th St. Parking is limited to 2 little areas on the East side of the road and larger parking area next to the utility substation on the West side of the road.

**11-05:** Chapter meeting (7 p.m.): Guest Speakers Linda Hezel and Molly Gosnell, "Development of a Carbon Farming Plan through Assessment of Tree/Shrub Agroforestry Data for Increased Production, Resource Valuation, Carbon Sequestration and Related Ecosystem Benefits".

This presentation will share findings of a Sustainable Agriculture Research and Education (SARE) program funded study conducted on Prairie Birthday Farm LLC to "Assess Tree/Shrub Agroforestry Data for Increased Production, Resource Valuation, Carbon Sequestration and Related Ecosystem Benefits".

According to recent climate reports emphasizing rising greenhouse gases, the Midwest faces more weather extremes (heat, drought, torrential rains, humidity) with more crop diseases and pests coupled with the ongoing extinction of species. Kansas City ranks 5th of cities to be most impacted by climate change. Identification and discussion of the role of native trees are integral to mitigation of climate change impacts and food security. **Please put this on your calendar and let's have a big turnout!**

### Osage Plains

**07-33: Meet at the Clinton Library 6:00 pm.**

Program TBD. Field trip depending on weather.

Our location has changed from the MDC Office to the Clinton Library "Friends Room". Regularly scheduled meetings begin at 6:00 pm on the 4th Mondays of the month. No meetings are held during December, January or August. Please contact President Janetta Smith [jans@iland.net](mailto:jans@iland.net) or Chapter Representative Casey Burks [mobugwoman@gmail.com](mailto:mobugwoman@gmail.com) for the latest information on meetings. Sometimes change happens. Bernie Henehan [berniehenehan@yahoo.com](mailto:berniehenehan@yahoo.com) and Dan Henehan [henehandan0@gmail.com](mailto:henehandan0@gmail.com) are our trip coordinators.

### Ozarks

**06-18, 07-16, 08-20: Plant id nights**

All plant ID nights are at the MDC Regional office in West Plains, 551 Joe Jones Blvd at 6:30 p.m. Bring plants or photos in for identification. For more information, call Susan Farrington 314-402-3345.

### Paradoxa

**07-01: Walkabout, Phyllis Murphy property at 5:30 p.m.**

Phyllis Murphy lives about 10 minutes south of Rolla off Highway 72. We'll meet at her house to do a plant survey of her property.

**08-24: Field Trip, Montauk State Park at 9:00 a.m.**

Meet at the Rolla Kroger parking lot if you wish to carpool; we'll leave there at 9:00 a.m. to get to Montauk



by 10:00 a.m., where we'll meet Park Naturalist Steve Bost at his office. We'll work with Steve to locate some species of conservation concern that have been previously documented at Montauk.

Watch our chapter page on the [monativeplants.org](http://monativeplants.org) website for updates, or email us at [paradoxarolla@gmail.com](mailto:paradoxarolla@gmail.com), and ask to be added to our email list, as dates and locations may change. Workdays for the Bray CA Botanical Collection and Herbarium Project are generally held on the first and third Thursdays of the month. Please contact us at the above email if you would like to join the crew.

## Conundrum Corner

by Rick Gray

### *Heliopsis helianthoides* versus *Helianthus*

*Heliopsis helianthoides* (referred to hereafter as “*Heliopsis*”) has yellow/orange flower heads and oppositely arranged, triplinerved leaves that are variously shaped and toothed. Because this species resembles one or more species of yellow disked *Helianthus*, particularly *H. hirsutus*, it is commonly, and appropriately, known as the “false sunflower”. However, with attention to details or, rather, the right details, the “false sunflower” is easily differentiated from the “real” sunflowers (i.e. members of the genus *Helianthus*).

#### Habit

*Heliopsis* has short, if any, rhizomes and, therefore, typically grows in scattered clumps and only rarely in large stands. On the other hand, the opposite-leaved *Helianthus* with which *Heliopsis* is likely to be confused are strongly rhizomatous and generally grow in large colonies.

#### Flower Heads

An easy and, usually reliable, way to differentiate *Heliopsis* from *Helianthus* is to turn the flower head over and examine the involucre bracts. *Heliopsis* bracts are usually blunt-tipped and the outer series have widely spreading tips. *Helianthus* bracts are usually long attenuate but have, in all cases, sharply pointed tips (while *Helianthus pauciflorus* has somewhat broad and blunt-tipped bracts, they are

always strongly appressed which, along with its dark disc, will prevent confusion with *Heliopsis*).

In addition, the fertility of the ray florets is absolutely determinative. *Heliopsis* ray florets are pistillate (see photo) and produce seeds. *Helianthus* ray florets are sterile (see photo), having neither stamens nor pistils, and, accordingly, do not produce seeds.



Left: *Heliopsis helianthoides* flower head and involucre bracts. Note that the bracts are blunt-tipped and that the outer series have widely spreading tips. Photos by Rick Gray.

Right: *Helianthus hirsutus* flower head and involucre bracts. Note that the bracts are long tapered to sharp points. Upper photo by Rick Gray. Lower photo by Steve Turner.

*Heliopsis* flower heads are also quite distinctive in senescence as their rays become brown and papery but remain attached into the late summer.

#### Vegetation

*Heliopsis* and *Helianthus* leaves are quite variable with respect to shape and marginal teeth and there is enough overlap between them to make generalizations

difficult. That said, *Heliopsis* leaves are typically more coarsely toothed and have more conspicuously impressed venation than is usually seen in *Helianthus*. In addition, *Heliopsis* venation is quite a bit more open than *Helianthus*, but this is a difficult character to interpret without a point of reference. *Heliopsis* stems, however, have a subtle though very distinctive pubescence concentrated in longitudinal lines that extend some distance below the leaf nodes. *Helianthus* stems, while variously pubescent, are always uniformly so. With practice, this is a very good character to look for when struggling with a potential *Heliopsis* in vegetative condition.



Left: *Heliopsis helianthoides*. Close-up of pistillate ray florets showing divided stigma protruding from corolla tube. These ray florets will produce seeds. Right: *Helianthus hirsutus*. Close-up of barren, sterile, ray florets. All *Helianthus* species have sterile ray florets which produce no seed. Photos by Rick Gray.

## Chapter Updates

### Osage Plains

By Casey Burks, Chapter Representative

With the overachieving rain pattern this year, several field trips have been rescheduled or cancelled. However, Wayne Morton offers his savannah as an ever-ready treat to enjoy on short notice.

On June 1st and 2nd, the Osage Plains Chapter had a table under the tent at Prairie Days which was combined with Bioblitz and the summer meeting of the Missouri Prairie Foundation. This wonderful event was held at Wayne Morton's prairie north of Cole Camp, MO. Hi-Lonesome Chapter of Master Naturalists provided samples of dishes cooked in cast iron Dutch ovens over and under coals (thanks Roxanne and crew). It was so much fun to meet people from all over Missouri who share the common bond of supporting our precious prairies. Learning activities for adults and children were led by experts. Several people set up

their tents to enjoy telescopes, sleep under the stars and be ready for a Dutch oven breakfast the next morning.

### Paradoxa

By Pam Barnabee, Chapter President

Paradoxa's April meeting was held the evening of April 25 at Doolittle Gardens Nursery with Curt Baumgartner as our host, and practice in identifying seedling plants as our purpose. Curt raises sixty species of Missouri natives and sells them at the Downtown Rolla Farmers Market. In addition to showing us the seedlings, Curt shared some tips for raising plants from seed: he finds transplanting to be more efficient when he sows a few seeds per cell rather than broadcasting in flats, and he has had good results from adding mycorrhizal inoculant to his potting soil. We finished off the evening with a tour of the Nursery's native plant beds.

Five of our members joined the MONPS Spring Field Trip to Vilander Bluff Natural Area on May 3. Great walk, great company, cool plants and scenic views - thank you for introducing us to this valuable resource not far from home.



Hawthorn Chapter educates on invasives, and those sure are some bad ones!

On May 17, the chapter visited the glade at St James City Park. Our last visit was September of 2017 and our plant list for the area is mostly from surveys done in the Fall, so we hoped to add more late Spring species to the list. We weren't disappointed, finding eleven species not previously documented - ten natives and one alien (oriental bittersweet [*Celastrus orbiculatus*]). Natives included short green milkweed (*Asclepias viridiflora*), finger coreopsis (*Coreopsis palmata*), alum root (*Heuchera* sp.), yellow star grass (*Hypoxis hirsuta*), and coral honeysuckle (*Lonicera sempervirens*). A complete plant list has been posted

on the Paradoxa Chapter page of the MONPS website.

## Saint Louis

By John Oliver

In what has become a yearly tradition, our speakers in April were Dr. Kyra Krakos of Maryville University, and her undergraduate students who shared their research, presenting “The speciation of *Oenothera* in Texas: Are you a hybrid or something brand new?” and “The pollination system of a naturalized perennial: *Penstemon cobaea*.” Kyra’s enthusiasm for scientific research and skill in nurturing young students to pursue it is infectious, and her students, most of whom showed up for the meeting are delightful. Thanks for sharing your research, Krakos Lab. Keep up the good work! (As an additional tidbit, Kyra and many of her students just spent several weeks in Ireland. Their party was joined by a former administrator of the Trinity College Dublin Botanic Garden, and director of the National Botanic Gardens of Ireland: Dr. Peter Wyse Jackson who is currently the president of the Missouri Botanical Garden and George Engelmann Professor of Botany at Washington University in St. Louis, MO.)

At our May meeting, Susie Van de Riet of St. Louis Native Plants gave a presentation titled: “Native Pollinators and Native Plants”. Susie studied horticulture at Meramec, was an assistant horticulturist for the Kirkwood Parks Department and a horticulturist with Forest Park Forever. She is an ISA Certified Arborist and a NAI Certified Interpretive Guide. She has a passion for native plants and has been landscaping with them since 2009. She now has her own company, which designs and installs native plants to benefit pollinators and other wildlife, as well as to provide aesthetic beauty for human residents. Her message focused on the native bees and other insects which are often specifically adapted to pollinate our native plants and highlighted some of those restricted combinations. As a follow-up to Susie’s talk, we took a field trip on the following Wednesday evening to the impressive “Platinum Certified” native plant installation on the suburban lot of Sue and Andy Leahy, who have been landscaping their front and back yards with natives for 12 years. There are two butterfly gardens, two rain gardens, a glade garden, a 65-foot stream, and a pond. Their plantings include over 180 native species!

## From the Editor

This year, we celebrate the 40th anniversary of the founding of MONPS, and we just elected our new society President, Dana Thomas. We thank Dana for her amazing work as Vice President, and would also like to especially thank **John Oliver** for his service as President over the last four years. In addition to all of the regular presidential things, we'd especially like to thank John for his outstanding leadership on the MONPS Facebook page. We currently have about 19,000 members seeking information and appreciation of native plants (and ways to get rid of the invasives).

Thank you also to Malissa Briggler, the Society's Secretary, who valiantly records the minutes of each meeting and who puts together the Chapter Reports and Events, and to Erin Skornia for creating the impressive template and other materials for this newsletter. Thank you to our authors, chapter representatives, and other contributors. Thank you for your time, dedication, collaboration and support!  
**-Michelle Bowe**



New (Dana Thomas, left) and past MONPS presidents at the 40th anniversary meeting in Fulton. After Dana, left to right: John Oliver, Kathy Thiele, Rex Hill, and Paul McKenzie. Photo by Michelle Bowe

# Thoughts on the Confusing Sunflowers of Missouri

by Rick Gray

## Introduction

*Helianthus* (aka the “Sunflowers”) has a somewhat well-deserved reputation for taxonomic complexity both as a genus generally and for its expression in Missouri, in particular. A genus native to North America, at least 51 species are currently recognized with at least 16 known to occur natively in Missouri. Many of the perennials are polyploids of complex hybrid origin giving rise to the possibility, if not certainty, of morphological overlap between related species.

## Problematic *Helianthus* in Missouri

The problem with *Helianthus* in Missouri is well summarized by George Yatskievych in his Flora of Missouri Volume 2: “In the Ozarks, the main problems of species-level recognition appear to center around *H. divaricatus*, *H. hirsutus*, and *H. strumosus*, although smaller plants of *H. tuberosus* also can be problematic to identify.”

It is notable that most *Helianthus* concepts and keys, including those in the aforementioned Flora of Missouri, are derived, in many cases without modification, from the work of Charles B. Heiser Jr., in particular from his 1969 “The North American Sunflowers (*Helianthus*)”.

With the concepts for this quartet of problematic *Helianthus* species now going on for 50 years, it seems an appropriate time to revisit them and the surrounding confusion with the goal of providing, perhaps, a bit of clarity, at least in the Missouri context.

## The *Helianthus strumosus* problem

In his work, Heiser appeared to have encountered significant difficulty in characterizing and differentiating *Helianthus strumosus* from *Helianthus hirsutus* stating, on the one hand that

“It seems best at present to combine all of Watson’s segregates with *H. strumosus*. Thus we are left with

what may in a sense be described as a ‘wastebasket’ species which serves to accommodate all of the eastern polyploid sunflowers that cannot be placed in any other species. ... this is and will likely continue to be the ‘rubbish heap’ of the genus.”

And on the other that

“Of the tetraploids, *H. strumosus* is certainly very closely related to *H. hirsutus*, if indeed they should be treated as separate species ... so for the present, the traditional treatment is followed by placing those plants with hirsute or densely scabrous stems in *H. hirsutus* and those with glabrous or nearly glabrous stems in *H. strumosus*.”



*Helianthus strumosus* habit. This species is a large-statured, rhizomatous plant that prefers low, mesic, lightly shaded sites. Photo by Rick Gray.

Thus, he proposed a concept of *Helianthus strumosus* wherein:

1. It is a ‘wastebasket’ or ‘rubbish heap’ of eastern, glabrate-stemmed polyploids (with 15 synonyms included within this concept)

And it includes

2. Plants with glabrous-stems that would otherwise key to *Helianthus hirsutus*

This concept calls for separating *Helianthus strumosus* from *Helianthus hirsutus* based upon the degree of stem pubescence, a character that Heiser himself admitted was suspect in his description of *Helianthus strumosus*:

“stem pubescence is a variable character and, in retrospect, it appears that a more logical arrangement than the one adopted here would be to include the tetraploids of *H. strumosus* with *H. hirsutus*.”

Given Heiser’s doubt over the significance of stem pubescence in separating these species and over the inclusion of glabrous-stemmed tetraploids within an otherwise hexaploid *H. strumosus*, what if:

1. We recalibrate our concept of *Helianthus hirsutus* to include both hirsute and glabrous expressions (i.e. Heiser’s “more logical arrangement” bringing all the tetraploids together) and

2. Figure out whether *Helianthus strumosus* exists at all and, if so, how does it express in the Missouri landscape.

### In search of *Helianthus strumosus* in Missouri

What might we be looking for?

Heiser gives us a clue in his description of *H. strumosus*:

“Much of the eastern part of the range of *H. strumosus* is occupied by a robust, glaucous-leaved hexaploid, which in its extreme form is quite distinct...”

“Plants fitting the description of *Helianthus formosus* which Watson considered a well-marked species are found in Illinois, Missouri, Arkansas, and Oklahoma. These plants are characterized by a strongly glaucous lower leaf surface and produce small but well defined tubers.”

The reference to Watson is Elba Emanuel Watson, who published his “Contribution to a monograph of the Genus *Helianthus*” in 1929 as his doctoral thesis. Heiser recognized *Helianthus formosus* E.E. Watson



The lower leaf surface of *Helianthus strumosus* is typically strongly whitened or blotchy white, glabrous except on the primary veins, and glaucous. No other *Helianthus* in Missouri has this character. Photo by Rick Gray.

as a synonym of his *H. strumosus*.

Yatskievych repeats Heiser’s account of the Missouri *H. strumosus* in his Flora of Missouri, Volume 2:

“Heiser et al. (1969) discussed a hexaploid ( $2n=102$ ) race of *H. strumosus* from Illinois, Missouri, Arkansas, and Oklahoma, which had been named *H. formosus* s. Watson. These plants were characterized as having the leaf undersurface strongly glaucous and the rhizomes with well-defined, small tubers.”

Julian Steyermark gives us additional clues in his Flora of Missouri (1963) wherein he draws upon his extensive experience with Missouri flora in his description of *H. strumosus*: “Stem glabrous ... below the inflorescence...Lower surface of leaf-blade mostly without yellow or white glands...The often gray-glaucous lower surface of the leaves distinguishes the species usually from *H. hirsutus*...[found in] Alluvial woods and thickets, open woods, along bluffs, along streams, prairies, wet meadows...” Note: Steyermark does not indicate confusion in his delineation of *H. strumosus*.

Lastly, M. L. Fernald in his “Gray’s Manual of Botany, Eighth Edition” (1950) includes the following in his description of *H. strumosus* without any indication of confusion: “Petioles of larger leaves 1-4 cm or more, slender at the base...Leaves whitish or gray beneath, usually with pubescence, thick and firm...Stems to 3 meters, often branching above, slightly scabrous to smoothish.”

In summary, note that each of the above accounts mentions the following as a distinguishing character for this species:

1. Heiser: “strongly glaucous lower leaf surface”
2. Steyermark: “gray-glaucous lower surface of the leaves”
3. Fernald: “leaves whitish or gray beneath”

**The question is: do we find a *Helianthus* in Missouri meeting this description?**

We do. In fact, what we find fits the description of *Helianthus formosus*, now *Helianthus strumosus*, published by Watson in 1929. And, just as Heiser and Watson wrote, this species is “quite distinctive” and “well-marked.”

*Helianthus strumosus* in Missouri is a large-statured, large flowered, strongly rhizomatous plant of floodplain or swale margins (usually at the edges of clearings, not often in full sun) or the adjacent, lightly shaded, mesic slopes. It has glabrate and often glaucous stems and has consistently opposite (sometimes becoming alternate in the inflorescence), lanceolate leaves (sometimes somewhat deltoid), long petioles (to 4 cm or more, winged distally), and with conspicuously whitened, blotchy, or glaucous, sparsely hairy undersides. It flowers in late summer, after *Helianthus hirsutus* but before *Helianthus tuberosus*. It occurs commonly in Missouri in counties along the Mississippi River north of St. Louis, and in counties bordering Ozark plateau to the northeast, north, and west (and into the adjacent prairies (see Map). Notably, it is absent from the northwest, northcentral, Mississippi lowlands and in the central Ozarks of Missouri.

*Helianthus strumosus* can occur alongside *Helianthus tuberosus* but, in my experience, never with *Helianthus hirsutus* or *Helianthus divaricatus*, which are exclusively upland species. The best and easiest way to recognize *Helianthus strumosus* is to look for the whitened leaf undersides. No other Missouri *Helianthus* has this character, making this species, ironically, one of the easiest to identify.

**What then, is *Helianthus hirsutus*?**

That is the question. The redefined concept, now including the glabrate stemmed tetraploids formerly included within *H. strumosus*, encompasses an unsettlingly broad morphological variation. Characters

such as plant size, number of flower heads, leaf size and shape, and petiole length vary so widely, even within clonal populations, as to be useless markers.

That said, *Helianthus hirsutus* is the ubiquitous sunflower of Missouri’s upland, dry woods and edges. It is highly rhizomatous, usually knee to chest high, few flowered, and has consistently opposite, petiolate, lanceolate leaves which are coarsely pubescent on the upper surface and green and softly hairy on the lower surface. But, with more sun and better soil the plant can become a monster, eight or more feet tall (sometimes becoming decumbent under its own weight), abundantly branched, and bearing many dozens of flower heads. Plants such as these might seem to warrant recognition as a species or variety in their own right. However, well-behaved clonal populations can grade into these expressions over just a few meters distance suggesting, alternatively,



*Helianthus tuberosus* var. *subcanescens* leaves are all, or mostly, opposite. This variety is quite common in Missouri and it is easily mistaken for *Helianthus hirsutus*. Photo by Rick Gray.

that this species has a great deal of phenotypic range.

Ironically, in Missouri at least, the stems of *Helianthus hirsutus* are usually glabrous becoming, at most, moderately hispid in the inflorescence. Perhaps the epithet should be interpreted to refer to the leaf undersides which are, indeed, consistently hairy.

### ***Helianthus tuberosus* in Missouri**

There is also considerable confusion surrounding *Helianthus tuberosus* in Missouri, in this case, over whether this species always, sometimes, or may never have alternately arranged leaves. In fact, *Helianthus tuberosus*, in Missouri, is highly variable with respect to leaf arrangement due to the presence, and abundance, of variety *subcanescens*, which has consistently opposite leaves often all the way into the inflorescence. As a result, keys and accounts which rely exclusively on the presence of alternate leaves for recognition of *Helianthus tuberosus* will misclassify plants described by this variety, placing them, most likely, within *Helianthus hirsutus*.

The best way to identify *H. tuberosus* in Missouri (without digging it up, that is), is to look for its stems which will be densely hispid with stiff, spreading, silvery hairs.



*Helianthus tuberosus* phyllaries, particularly the inner series, often have darkened bases. Photo by Rick Gray.

### ***Helianthus divaricatus* in Missouri**

*Helianthus hirsutus*, as previously noted, is highly variable with respect to petiole length and plants with sessile leaves are often misidentified as *Helianthus divaricatus*. *Helianthus divaricatus* leaves, however, are always sessile, even those at the base of the stem, and have broadly rounded to subcordate bases. In addition, the primary lateral veins join the midvein at the leaf base. The leaves of *Helianthus hirsutus*, on the other hand, are very rarely sessile at every node (petiole length increases towards the base of the stem, with the age of the leaf), usually have tapered bases, and have the midvein and lateral veins meet some distance above the leaf base. *Helianthus divaricatus* in Missouri is rarely taller than chest high, is single or few flowered, and, while rhizomatous, tends to grow in small, loose colonies. In Missouri, its range is restricted to the St. Francois Mountains and adjacent counties to the east.



The leaves of *Helianthus divaricatus* are sessile with rounded to subcordate bases. Most importantly, note that the central and primary lateral veins meet at the very base of the leaf. Photo by Rick Gray.

The following key is proposed in order to help resolve typical expressions of *Helianthus strumosus*, *Helianthus hirsutus*, *Helianthus tuberosus*, and *Helianthus divaricatus* that occur in Missouri.

1. Leaves with conspicuously whitened or with blotchy-white undersides which are mostly glabrous except on the primary veins .....

*Helianthus strumosus*

Habitat: plants of part-shaded floodplain margins, moist lower slopes, ditches, prairie swales.  
Range: See map

1. Plants otherwise

2. Stems densely hispid with stiff, spreading, silvery hairs; leaves with long petioles to 6 cm, often conspicuously winged for part of or their entire length; phyllaries, particularly the inner series, with darkened bases; leaves with undersides green, pubescent; plants flowering in the fall

*Helianthus tuberosus* var. *tuberosus* (leaves becoming alternate distally)

*Helianthus tuberosus* var. *subcanescens* (leaves mostly or all opposite)

Habitat: ditches, swales, floodplains, tolerates full-sun. Range: statewide

2. Stems glabrous, glabrate, at most hispid in the inflorescence; leaves with petioles to 2 cm (or so) basally, not at all or scarcely winged; phyllaries with green bases; leaves with undersides green, pubescent; plants flowering in mid to late summer

3. Leaves all sessile, bases broadly rounded to subcordate; primary lateral nerves joining the rib at leaf base

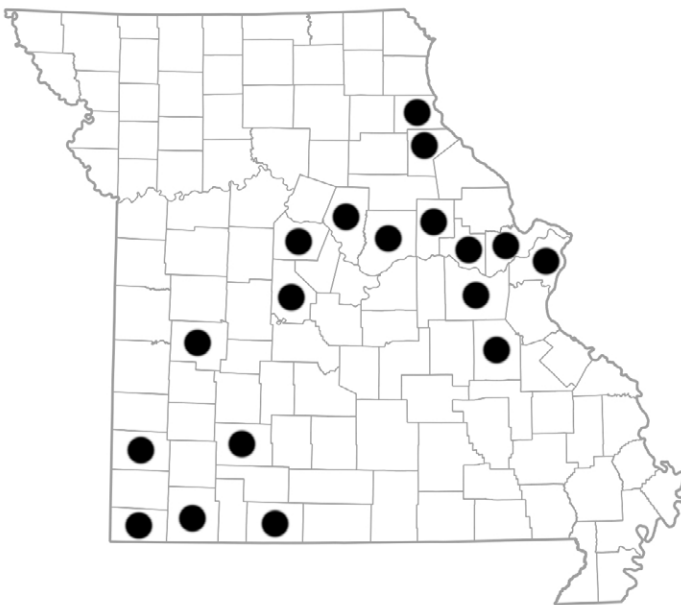
*Helianthus divaricatus*

Habitat: dry woods. Range: St. Francois Mountains and adjacent counties to the east

3. Leaves with petioles to 2 cm; sessile leaves, if present usually at the stem tip and usually with tapered bases; primary lateral nerves joining midrib some distance from the base

*Helianthus hirsutus*

Habitat: dry, upland, open woods and prairie/glade margins. Range: statewide



*Helianthus strumosus* distribution in Missouri based upon personal collections of and the redetermination of MoBOT Herbarium specimens conforming to Watson's *H. formosus* type. By Rick Gray and Justin Thomas.



*Helianthus tuberosus* stems are densely hispid with stiff, spreading, silvery hairs. Note also the broadly winged petioles. Photo by Rick Gray.



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**“A thing is right when  
it tends to preserve  
the integrity, stability,  
and beauty of the  
biotic community.  
It is wrong when it  
tends otherwise.”**

**—Aldo Leopold**