

# North Dakota vascular plants: manual to the Compositae

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November 3, 2016

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Keys are compiled from multiple sources, mainly from the “Flora of North America”, from Ackerfield’s (2015) “Flora of Colorado” and Lesica’s (2012) “Manual of Montana Vascular Plants”.

## Group Key

1. Shrubs or subshrubs; woody above-ground stems present . . . . . **Group A**
  - Plants herbaceous . . . . . 2.
2. White-wooly herbs with discoid heads; upper portion of involucre bracts papery . . . . **Group B**
  - Plants not as above . . . . . 3.
3. Heads ligulate; disk flowers absent . . . . . 4.
  - Heads with disk flowers . . . . . 5.
4. Flowers yellow or orange . . . . . **Group C**
  - Flowers white, pink, blue or purple . . . . . **Group D**
- 5 (3). Heads discoid; ray flowers absent . . . . . 6.
  - Heads radiate; both ray flowers and disk flowers present . . . . . 7.
6. Corollas conspicuously yellow or orange . . . . . **Group E**

- Corollas green, green-brown, green-yellow, white, pink, purple (rarely yellow at the base) . . . .  
 ..... **Group F**
- 7 (5). Ray flowers white, blue, purple, or pink ..... **Group G**
- Ray flowers yellow or orange ..... 8.
- 8. Pappus of capillary or barbellate bristles, or of an outer series of short scales and inner series of  
 capillary bristles; receptacle naked or fimbriate ..... **Group H**
- Pappus of awns, scales, a short crown, or absent; receptacle naked, chaffy, or bristly ... **Group J**

## Group A

Shrubs and subshrubs.

- 9. Pappus of disk flowers of erose scales or absent ..... 10.
- Pappus of capillary bristles ..... 11.
- 10. Pappus of erose scales; ray flowers present ..... *Gutierrezia*
- Pappus absent; ray flowers absent. Involucral bracts in 4 to 7 unequal series; inflorescence usu-  
 ally a spike-like raceme ..... *Artemisia*
- 11. Stems usually white-tomentose, leaves not resinous ..... *Ericameria*  
 (*Ericameria nauseosa*)
- Stems glabrate; leaves resinous, many twisted ..... *Chrysothamnus*

## Group B

White-wooly herbs with discoid heads; upper portion of involucral bracts papery: tribe **Glaphalieae**.

- 12. Plants annual ..... 13.
- Plants perennial ..... 14.
- 13. Receptacle naked ..... *Gnaphalium*
- Receptacle with chaff between or surrounding the flowers (sometimes appearing to be an in-  
 volucre). Stems often branched from the base; heads clustered on branch tips ..... *Evax*  
 (*Evax prolifera*)

Mentioned for North Dakota only once, it is possible that this species does not occur in the state.

- 14 (12). Involucral bracts almost entirely papery, shiny white, glabrous ..... *Anaphalis*  
 (*Anaphalis margaritacea*)
- Mentioned for Morton county only.
- At least part of involucral bracts colored or hairy ..... 15.
- 15. Heads typically short pedunculate, with flowers of only one sex (male heads sometimes absent)  
 ..... *Antennaria*
- Heads in glomerules, with female flowers on outside and males on inside of same head .....  
 ..... *Gnaphalium*

## Group C

Heads ligulate; flowers yellow or orange: tribe **Cichorieae** (part).

- 16. Plants scapose: stems leafless (rarely 1 leaf) or absent ..... 17.
- Plants with leafy stems ..... 21.





## Group F

Heads discoid; flowers green, green-brown, green-yellow, white, pink, purple (rarely yellow at the base).

43. At least some mature involucre form spiny or hispid burs, and/or heads unisexual (sometimes, plants dicoecious) ..... 44.  
Please note that in the last case male plants of *Ambrosia* might have only bur-less inflorescences.
- Involucre not bur-forming, heads bisexual ..... 46.
44. Burs < 8 mm long ..... *Ambrosia*  
– Burs > 10 mm long ..... 45.
45. Burs ellipsoid in leaf axils ..... *Xanthium*  
– Burs globose in panicles on branch tips ..... *Arctium*
- 46 (43). Leaves with spines > 2 mm long on the margins ..... 47.  
– Leaves not spiny or spines < 1 mm long ..... 49.
47. Receptacle naked ..... *Onopordum*  
(*Onopordum acanthium*)  
– Receptacle bristly ..... 48.
48. Pappus bristles plumose ..... *Cirsium*  
– Pappus bristles barbed but not plumose ..... *Carduus*
49. Receptacle densely bristly; involucral bracts fringed or spiny ..... *Centaurea*  
– Receptacle naked or with fine scales or pubescent ..... 50.
50. Flowers white or whitish, sometimes corollas inconspicuous ..... 51.  
– Flowers not white or whitish (green, green-yellow, pink, blue, purple) ..... 58.
51. Pappus absent ..... 52.  
– Pappus of scales or bristles ..... 54.
52. Leaves opposite at least below, plants not scapose ..... 53.  
– Leaves alternate, plants scapose ..... *Adenocaulon*  
(*Adenocaulon bicolor*)
53. Heads in spikes, 1–2 per bract ..... *Iva*  
– Heads in ebracteate panicles ..... *Cyclachaena*  
(*Cyclachaena xanthifolia*)
- 54 (51). Pappus of scales ..... *Chaenactis*  
(*Chaenactis douglasii*)  
– Pappus of simple to plumose bristles ..... 55.
55. Involucre glandular. Leaves broadly lanceolate to deltoid ..... *Ageratina*  
– Involucre glabrate to pubescent but not glandular ..... 56.
56. Leaves linear (inconspicuous rays usually present) ..... *Symphotrichum*  
(*Symphotrichum ciliatum*)  
– Leaves lanceolate to deltoid ..... 57.
57. Leaves glandular-punctate beneath, venation pinnate ..... *Brickellia*  
(*Brickellia eupatorioides*)  
– Leaves white-tomentose beneath, venation palmate ..... *Petasites*  
(*Petasites frigidus*)

- = Leaves glabrous beneath, venation pinnate ..... *Erechites*  
(*Erechites hieraciifolius*)  
The presence of this species in North Dakota is questionable.
- 58 (50). Pappus an inconspicuous crown or absent ..... 59.  
– Pappus of capillary to plumose bristles ..... 61.  
= Pappus always absent, male heads cup-shaped ..... *Ambrosia*
59. Outer involucre bracts leaf-like, longer than inner ..... *Bidens*  
– Outer involucre bracts not leaf-like ..... 60.
60. Receptacle 8–45 mm high, conical; flowers purple above ..... *Rudbeckia*  
– Receptacle much smaller; flowers greenish ..... *Artemisia*
61. Leaves in whorls ..... *Eutrochium*  
– Leaves opposite ..... *Eupatorium*  
(*Eupatorium perfoliatum*)  
= Leaves alternate ..... 62.
62. Receptacle with fine, flat scales among the flowers ..... *Acroptilon*  
(*Acroptilon repens*)  
– Receptacle naked or pubescent ..... 63.
63. Leaves glandular or punctate beneath ..... 64.  
– Leaves not glandular or punctate, tomentose beneath, basal leaves sagittate or deltoid; cordate-based ..... *Petasites*  
(*Petasites frigidus*)
64. Flowers not purple, usually pale yellow ..... *Brickellia*  
(*Brickellia eupatorioides*)  
– Flowers purple ..... 65.
65. Leaves elongate linear to lanceolate, margins entire; pappus uniform ..... *Liatris*  
– Leaves lanceolate to elliptic, margins toothed; pappus double ..... *Vernonia*

## Group G

Heads radiate; rays white, blue, purple, or pink.

66. Receptacle densely bristly ..... 67.  
– Receptacle chaffy or naked, but not densely bristly ..... 69.
67. Marginal flowers with a falsely radiate corolla; involucre bracts usually with fringed, erose, or spinose margins and tips ..... 68.  
– Marginal flowers truly radiate; involucre bracts lacking fringed, erose, or spinose margins and tips ..... *Gaillardia*
68. Achenes barrel-shaped, with entire ends ..... *Centaurea*  
– Achenes oblong, compressed, with denticulate ends ..... *Amberboa*  
(*Amberboa moschata*)
- 69 (66). Pappus of the disk flowers of capillary or barbellate bristles, sometimes also double with a series of short hairs or that of the ray flowers sometimes reduced to a crown; receptacle naked ..... 70.  
– Pappus of scales, awns, a short crown, or absent; receptacle naked or chaffy ..... 83.
70. Rays short and inconspicuous, barely surpassing the diskflowers; annuals or short-lived perennials ..... 71.

- Rays well-developed and surpassing the disk flowers; annuals or perennials ..... 73.
- 71. Involucre 4–12 mm high, the bracts mostly herbaceous with a small chartaceous base .... 72.
  - Involucre 3–5 mm high, the bracts brown or green and scarcely herbaceous. Leaves entire or some of the lower ones irregularly few-toothed, tapering to a short petiole, subglabrous to spreading-hirsute ..... *Conyza*
- 72. Achenes several-nerved; both basal and stem leaves linear ..... *Symphyotrichum*  
(*Symphyotrichum ciliatum*)
  - Achenes 2-nerved; basal leaves oblanceolate to spatulate ..... *Erigeron*  
(*Erigeron acris*, *E. lonchophyllus*)
- 73 (70). Involucral bracts nearly equal or subequal (the bracts more or less appearing to be in a single series), green and herbaceous throughout and lacking a hard, yellowish or whitish chartaceous base ..... 74.
  - Involucral bracts distinctly imbricate (clearly in 2 or more series), or with a hard, yellowish or whitish chartaceous base ..... 77.
- 74. Involucral bracts, peduncles, and upper stems and leaves densely covered in glandular hairs; stem leaves linear to oblong; found usually in moist places ..... 75.
  - Plants unlike the above in all respects, variously distributed ..... 76.
- 75. Stems villous; leaves cauline, blades 1-nerved (venation reticulate), lanceolate to elliptic; involucral bracts often purplish; cold wet soils ..... *Canadanthus*  
(*Canadanthus modestus*)
  - Stems glabrous; leaves basal and cauline, blades 3-nerved, linear; involucral bracts green; damp alkaline areas ..... *Almutaster*  
(*Almutaster pauciflorus*)
- 76 (74). Plants not colonial (stems could be clustered), stems and leaves glandular; basal leaves persistent or withering by flowering; pappus usually of outer setae or scales and inner bristles, sometimes absent ..... *Erigeron*
  - Plants colonial, stems and leaves without glands; basal leaves withering by flowering; pappus of 2–3 awns ..... *Boltonia*  
(*Boltonia asteroides*)
- 77 (73). Leaves mostly toothed to pinnatifid or pinnately dissected; involucral bracts (at least the lower) often reflexed or spreading and glandular-hairy ..... 78.
  - Leaf margins entire or sometimes just a few of the lower shallowly toothed; involucral bracts usually ascending or sometimes spreading to reflexed, sometimes glandular-hairy ..... 79.
- 78. Leaf teeth lacking spinulose tips on the margins; involucral bracts with ascending tips ..... *Symphyotrichum*
  - Leaf teeth with spinulose tips, deeply pinnatifid to bipinnatifid; heads solitary, large (the disk 6–20 mm in diam. when pressed); involucral bracts often reflexed; ray flowers blue to purple; plants densely glandular-stipitate throughout ..... *Machaeranthera*  
(*Machaeranthera canescens*)
- 79 (77). Involucral bracts with distinct scarious, ciliate-fringed margins; plants usually low, rarely exceeding 2 dm tall, often acaulescent; pappus of disk flowers of barbellate bristles or short bristle-like scales, that of ray flowers similar but usually shorter or sometimes reduced to a crown ..... *Townsendia*
  - Involucral bracts with less conspicuous scarious margins, these not ciliate-fringed; plants low to tall, caulescent or acaulescent; pappus of numerous capillary bristles or sometimes also with short outer setae or scales ..... 80.





90. Leaves simple and toothed or pinnately dissected into wider segments (not linear or filiform); achenes usually 10-ribbed; rhizomatous perennials ..... *Leucanthemum*  
(*Leucanthemum vulgare*)  
Similar (but ray flowers sterile) *Leucanthemella serotina* is sometimes cultivated in the state.
- Leaves bipinnatifid into linear or filiform segments; achenes with 2 marginal and 1 ventral, strongly thickened, almost wing-like ribs or 9–10 ribs with the furrows often gland-dotted; annuals or sometimes biennials or short-lived perennials, but not from rhizomes ..... 91.
91. Receptacle naked; achenes with 2 marginal and 1 ventral, strongly thickened, almost wing-like ribs ..... *Tripleurospermum*
- Receptacle chaffy (sometimes only in the center of the head); achenes with 9–10 ribs with the furrows often gland-dotted ..... *Anthemis*

## Group H

DYC-1: heads radiate; rays yellow or orange; pappus of capillary or barbellate bristles, or of short scales and capillary bristles

92. Involucral bracts dotted with brownish translucent oil glands; ill-scented annuals; leaves pinnately dissected into narrow segments; rays inconspicuous ..... *Dyssodia*  
(*Dyssodia papposa*)
- Plants unlike the above in all respects ..... 93.
93. Leaves opposite or occasionally the uppermost alternate ..... *Arnica*
- Leaves alternate or all basal ..... 94.
94. Involucral bracts in one row and essentially equal, sometimes with some smaller, calyculate bracteoles at the base of the involucre ..... 95.
- Involucral bracts imbricate or subequal in 2 or more rows ..... 96.
95. Plants from taprooted or rhizomatous caudices with branching fibrous lateral roots; stem leaves progressively reduced distally; heads erect; involucral bracts rarely black-tipped, and if so then middle stem leaves not clasping ..... *Packera*
- Plants from button-like or lateral rhizomes with unbranched and fleshy fibrous roots; stem leaves basically equally distributed along the stem or if reduced distally then heads nodding and/or involucral bracts with black tips ..... *Senecio*
- 96 (94). Heads numerous and relatively small (the involucral bracts 2–12 mm high) in paniculate or corymbiform inflorescences; involucral bracts with a greenish or brownish tip ..... 97.
- Heads few and larger (the involucral bracts over 10 mm high) in various inflorescences; involucral bracts green ..... 99.
97. Leaves variously hairy or glabrous, but not resinous or glandular-punctate, variously shaped, sometimes linear or narrowly lanceolate throughout the stem ..... 98.
- Leaves resinous or glandular-punctate, linear or narrowly lanceolate throughout the stem. Perennial herbs from rhizomes; leaves glandular-punctate with small, dark spots; achenes hairy ...  
..... *Euthamia*
98. Inflorescence more or less flat-topped ..... *Oligoneuron*
- Inflorescence not flat-topped ..... *Solidago*
- 99 (96). Involucral bracts sticky and gummy, firm, the tips reflexed ..... *Grindelia*
- Involucral bracts not sticky and gummy, the tips reflexed or erect ..... 100.

100. Leaves and/or stems strigose-puberulent to tomentose, narrow (1–10 mm wide), pinnatifid or toothed with the teeth bristle-tipped ..... *Machaeranthera*  
(*Machaeranthera pinnatifida*)  
– Leaves simple with entire margins or if toothed then without bristle-tips ..... 101.
101. Stem leaves well-developed and not greatly reduced in size from the lower leaves ..... 102.  
– Leaves chiefly basal, stem leaves distinctly and greatly reduced in size from the lower leaves ..... 103.
102. Leaves silvery sericeous, very narrow, grass-like ..... *Pityopsis*  
(*Pityopsis graminifolia*)  
– Leaves hairy but not silvery sericous, ovate or oblanceolate ..... *Heterotheca*
103. Stems curved or decumbent at the base, usually with 5 or more reduced stem leaves; pappus usually tawny or brown ..... *Pyrocoma*  
(*Pyrocoma lanceolata*)  
– Stems erect, leafless or with fewer than 5 stem leaves; pappus white ..... *Stenotus*  
(*Stenotus armerioides*)

## Group J

DYC-2: heads radiate; rays yellow or orange; pappus of awns, scales, a short crown, or absent.

104. Involucral bracts sticky and gummy, firm, the tips reflexed; pappus of 2-several separate, firm, deciduous awns ..... *Grindelia*  
– Involucral bracts not sticky, gummy, and firm, the tips not reflexed or sometimes reflexed-spreading in age; pappus various ..... 105.
105. Involucral bracts and leaves with conspicuous yellow-brownish oil glands; annuals. Ray flowers inconspicuous (1.5–2.5 mm long); plants usually ill-scented ..... *Dyssodia*  
(*Dyssodia papposa*)  
– Involucral bracts and leaves without conspicuous yellow-brownish oil glands, although sometimes finely glandular-punctate; annuals or perennials, aromatic or not ..... 106.
106. Leaves alternate, deeply pinnatifid to lacinate, the lowermost leaves up to 4 dm long; heads several in an elongated raceme; involucral bracts all more or less the same and herbaceous; plants 4–30 dm tall ..... *Silphium*  
– Plants unlike the above in all respects, variously distributed ..... 107.
107. Involucral bracts in two distinct, dissimilar series (typically with an outer series of linear, foliaceous bracts and an inner series of oval, often membranous, striate bracts); achenes of disk flowers flattened parallel to the involucral bracts (at right angles to the radius of the head); leaves toothed to dissected or lacinate, not 3-nerved ..... 108.  
– Involucral bracts subequal or imbricate in two or more series and not conspicuously dimorphic, or if appearing dimorphic then the leaves 3-nerved (look on the abaxial side at the base) and entire to slightly toothed on the margins; achenes of disk flowers either not much flattened or flattened at right angles to the involucral bracts (parallel to the radius of the head) ..... 110.
108. Inner involucral bracts basally connate for about 1/3 of their length ..... *Thelesperma*  
(*Thelesperma subnudum*)  
– Inner involucral bracts distinct ..... 109.
109. Pappus of 2–4 retrorsely barbed awns ..... *Bidens*  
– Pappus of short teeth or absent ..... *Coreopsis*  
(*Coreopsis tinctoria*)

In gardens, one may also find *Dahlia pinnata* from that group of genera (Coreoideae).

- 110 (107). Ray flowers small (surpassing the disk flowers but only 1–3 mm long) or inconspicuous (shorter than or barely surpassing the disk flowers) ..... 111.
- Ray flowers longer than 3 mm, conspicuous and surpassing the disk flowers ..... 112.
111. Leaves pinnately dissected; receptacle chaffy; heads arranged in a flat-topped or dome-shaped corymbiform cyme ..... *Achillea*
- Leaves narrowly lanceolate with entire margins, 1-nerved, opposite below and alternate above; involucre bracts mostly 4, clasping the achenes such that the heads appear deeply furrowed; ray flowers 1–3 per head ..... *Madia*  
(*Madia glomerata*)
- 112 (110). Receptacle alveolate with numerous long, stiff bristles that do not individually subtend the flowers; pappus of scales, usually each with a long, prominent awn ..... *Gaillardia*
- Receptacle naked, with a few scattered bristles, or chaffy; pappus various ..... 113.
113. Receptacle naked, with a few scattered bristles, or with a single series of chaff between the ray and disk flowers near the edge of the head ..... 114.
- Receptacle chaffy, at least in the center ..... 118.
114. Leaves opposite, dissected into linear segments which are entire or dissected again or toothed, canescent, puberulent ..... *Picradeniopsis*  
(*Picradeniopsis oppositifolia*)
- Leaves alternate or mostly basal, and unlike the above ..... 115.
115. Involucre bracts and ray flowers reflexed at maturity; stem leaves well-developed ... *Helenium*  
(*Helenium autumnale*)
- Involucre bracts erect at maturity and ray flowers erect to spreading at maturity; leaves all basal or the stem leaves well-developed ..... 116.
116. Achenes polymorphic: some beaked, some winged, some arcuate, some coiled ..... *Calendula*  
(*Calendula officinalis*)
- Achenes monomorphic ..... 117.
117. Leaves simple, all basal or basal and cauline in one species, linear to narrowly oblanceolate or spatulate; plants usually with a dense tuft of brownish or white hairs at the base of the leaves ..... *Tetranneuris*
- Leaves pinnatifid or divided into 2–5 linear lobes or 3–7 segments, or if simple then oblanceolate and 10–30 cm long, basal and cauline; plants sometimes densely hairy in old leaf bases ..... *Hymenoxys*  
(*Hymenoxys richardsonii*)
- 118 (113). Plants scapose or subscapose—with the leaves essentially all basal. Leaves pinnatifid or simple but triangular-hastate; ray flowers pistillate and fertile ..... *Balsamorhiza*  
(*Balsamorhiza sagittata*)
- The presence of arrowleaf balsamroot in North Dakota is dubious.
- Plants leafy-stemmed, although the basal ones may be larger than the stem leaves ..... 119.
119. Leaves pinnately dissected or trilobed ..... 120.
- Leaves simple and not dissected, although the margins may be toothed ..... 122.
120. Leaves fern-like and pinnatifid into narrow segments (mostly 1–3 mm wide), these segments again deeply toothed or cleft; receptacle hemispheric; introduced plants ..... *Anthemis*
- Leaves pinnatifid ..... 121.
121. Leaves pinnatifid into linear, narrow segments; receptacle columnar (cone flower), 1.5–4.5 cm long and 2–4.5 times as long as wide; both the disk and ray flowers subtended by chaffy bracts ..... *Ratibida*

- 
- Leaves pinnatifid into lanceolate or elliptic, wider segments, or trilobed; receptacle hemispheric, up to 4 cm long in fruit but usually less than 2–4.5 times as long as wide (not columnar); only the disk flowers subtended by chaffy bracts ..... *Rudbeckia*
  - 122 (119). Leaves softly strigose-canescens and whitish below, deltoid-ovate, the margins toothed or subentire; achenes conspicuously wing-margined ..... *Verbesina*  
(*Verbesina encelioides*)
  - Leaves not strigose-canescens and whitish below, variously shaped; achenes not wing-margined or only thinly or slightly wing-margined ..... 123.
  - 123. Receptacle conic and elongating at maturity to about 2 cm long and 2.5 cm wide; ray flowers persistent on the achenes; leaves opposite ..... *Heliopsis*  
(*Heliopsis helianthoides*)
  - Receptacle flat, convex, or hemispheric, less than 2 cm long; ray flowers not persistent on the achenes; leaves alternate or opposite below and alternate above ..... 124.
  - 124. Pappus of 2 awns or scales, occasionally with additional smaller scales between the awns, or a crown of scales often prolonged into awns ..... 126.
  - Pappus absent ..... 125.
  - 125. Plants glaucous, leaves clasping ..... *Dracopis*  
(*Dracopis amplexicaulis*)
  - Plants hispid and rough with spreading, stiff hairs; leaves not clasping ..... *Rudbeckia*  
(*Rudbeckia hirta*)
  - 126 (124). Achenes thin-edged or slightly wing-margined; pappus of 2 persistent slender awns or scales ..... *Helianthella*  
(*Helianthella quinquerervis*)
  - Achenes not wing-margined or thin-edged; pappus of 2 early-deciduous awns with smaller scales between them ..... *Helianthus*

**Solidago L. and Oligoneuron Small. (Goldenrods)**

1. Plants long rhizomatous; basal leaves lacking; inflorescences not flat-topped ..... 2.
  - Plants with a branched caudex or short (less than 10 cm) rhizome; basal leaves present or withered; inflorescences flat-topped or not flat-topped ..... 6.
2. Leaves densely puberulent ..... *Solidago mollis*
  - Leaves glabrate or sparsely strigose to minutely ciliate but not densely hairy ..... 3.
3. Stem pubescent below the inflorescence ..... 4.
  - Stem glabrous below the inflorescence ..... 5.
4. Leaf blades narrowly lanceolate, largest usually on lower stem ..... *Solidago canadensis*
  - Leaf blades oblanceolate, largest at mid-stem ..... *Solidago velutina*  
Absent in North Dakota but might be found since occurs in neighboring states.
- 5 (3). Branches of inflorescence strongly puberulent, arched; rays ca. 13; plants > 40 cm tall ....
  - ..... *Solidago gigantea*
  - Inflorescence glabrate; branches often not arched; basal leaves sometimes present; rays ca. 8; plants often < 40 cm tall ..... *Solidago missouriensis*
- 6 (1). Leaf blades glabrous or glabrate ..... 7.
  - Leaf blades densely puberulent ..... 14.
7. Stems flexuose (hence name “zig-zag goldenrod”), inflorescence leafy, grows in woods .....
  - ..... *Solidago flexicaulis*
  - Plants with combination of characters different from the above ..... 8.
8. Basal leaf petioles long-ciliate ..... *Solidago multiradiata*
  - Petioles not ciliate or minutely ciliate ..... 9.
9. Rays white ..... *Oligoneuron album*
  - Rays yellow ..... 10.
10. Basal leaves spatulate to oblong, often rounded at the tip ..... 11.
  - Basal leaves oblanceolate to linear-oblanceolate ..... 12.
11. Inflorescence narrow, usually less than 3 cm in diameter ..... *Solidago simplex*
  - Inflorescence wider, usually more than 3 cm in diameter ..... *Solidago speciosa*
- 12 (10). Inflorescence more or less flat-topped ..... *Oligoneuron riddellii*
  - Inflorescence not flat-topped ..... 13.
13. Fascicles of small lateral branch leaves often present in axils; leaves not scented when crushed ..... *Solidago missouriensis*
  - Fascicles of small lateral branch leaves are not usually present in axils; leaves usually anise-scented when crushed ..... *Solidago odora*  
It is possible that this species is absent in the North Dakota.
- 14 (6). Involucre 5–8 mm high; involucre bracts striate ..... *Oligoneuron rigidum*
  - Involucre 4–6 mm high; involucre bracts with a midvein but not striate ..... 15.
15. Heads with as many or more rays than disk flowers ..... *Solidago nemoralis*
  - Heads with more disk flowers than rays ..... *Solidago nana*  
Absent in North Dakota but might be found since occurs in neighboring states.

**Artemisia L. (Sagebrush, Sage, Wormwood)**

- 1. Well-developed shrubs; stems woody well above ground level ..... 2.
  - Plants herbaceous or subshrubs (woody only at the base) ..... 4.
- 2. Leaves deeply divided into filiform segments > 5 mm long. Leaves green, glabrous to sparsely villous ..... *Artemisia abrotanum*  
 European *Artemisia arctica* (herbaceous, with wider leaf segments) mentioned for North Dakota but its presence in the state is dubious.
  - Leaves entire to shallowly lobed into oblong to oblanceolate lobes, mostly <5 mm long .... 3.
- 3. Some or all of the leaves entire ..... *Artemisia cana*
  - Leaves lobed. Plants > 40 cm high ..... *Artemisia tridentata*
- 4 (1). Foliage green, glabrous to sparsely villous ..... 5.
  - Leaves grayish canescent to tomentose at least on the lower surface ..... 8.
- 5. Most or all leaves entire ..... *Artemisia dracunculus*
  - Leaves lobed or divided ..... 6.
- 6. Involucre 1–2 mm long; plants annual; leaves divided into filiform segments .....  
 ..... *Artemisia annua*  
 Absent in North Dakota but might be found since occurs in neighboring states.
  - Annuals to biennials; involucre ≥2 mm long; leaf segments linear to lanceolate ..... 7.
- 7. Ultimate leaf segments dentate, sharply acute ..... *Artemisia biennis*
  - Ultimate leaf segments entire, rounded at the tip ..... *Artemisia campestris*  
*Artemisia filifolia* (shrub, stems wand-like) mentioned for North Dakota but its presence in the state is dubious.
- 8 (4). Leaves bicolor (white on the lower surface), serrate ..... *Artemisia serrata*
  - Leaves more or less the same color on both sides, not serrate ..... 9.
- 9. Heads with hairs on receptacle amongst the flowers ..... 10.
  - Receptacle without hairs ..... 12.
- 10. Ultimate leaf segments ≥2 mm wide ..... *Artemisia absinthium*
  - Ultimate leaf segments ca. 1 mm wide ..... 11.
- 11. Subshrub; involucre 2–3 mm high; inflorescence paniculate ..... *Artemisia frigida*
  - Herbaceous; involucre 3–4 mm high; inflorescence spiciform to racemose .....  
 ..... *Artemisia scopulorum*
- 12 (9). Leaves sparsely or densely hairy but not tomentose ..... *Artemisia campestris*
  - Leaf tomentose at least below ..... 13.
- 13. Plants sub-shrubs, not rhizomatous; leaves whiter beneath than above .... *Artemisia longifolia*
  - Rhizomatous; leaves about equally gray above and beneath ..... *Artemisia ludoviciana*

**Symphotrichum Nees (American Aster)**

- 1. Annuals (ray or pistillate florets in 1–5 series). Leaf and phyllary margins ciliate; plants 7–70 or more cm; leaf apices acute to short-acuminate; achenes hirsute-strigose; moist, saline areas in prairies and steppes, irrigation ditches ..... *Symphotrichum ciliatum*
  - Perennials (ray florets usually in 1 series) ..... 2.
- 2. Ray corollas usually white, sometimes purplish or pinkish-tinged ..... 3.

- Ray corollas violet, purple, blue, lavender, or pink (sometimes pale; white-rayed individuals occur in most species) ..... 8.
- 3. Stems sparsely to densely hairy, sometimes glabrescent proximally ..... 4.
- Stems glabrate to sparsely puberulent hairy in lines (at least distally) ..... 6.
- 4. Involucral bract apices spine-tipped (spines white or clear) ..... 5.
- Involucral bract apices (flat or involute or folded and green) not spine-tipped. Stems erect; disc florets yellow, lobes sometimes more or less spreading, triangular, 0.4–1.2 mm (lengths to  $\frac{1}{2}$  corollas) ..... *Symphyotrichum lanceolatum* (in part)
- 5. Involucres 2.5–4.5(–5) mm; ray florets (8–)10–18(–20), laminae 6–12(–20) mm; disc corollas 2.5–4 mm, lobes 0.5–0.6; achenes 1.2–2 mm; pappi 3–4 mm ..... *Symphyotrichum ericoides*
- Involucres (4.5–)5–8 mm; ray florets (15–)20–35, laminae (8–)18–30 mm; disc corollas 2–2.5 mm, lobes 0.7–1.2; achenes 2–2.5 mm; pappi 4.5–6 mm .... *Symphyotrichum falcatum* (in part)
- 6 (3). Basal and proximal leaf blades 15–50 mm wide, bases usually shallowly, sometimes deeply cordate to truncate or rounded (proximal sometimes attenuate), distal leaves more or less shortly winged-petiolate or sessile; array branches stiffly ascending to erect ..... *Symphyotrichum urophyllum*
- Basal and proximal leaf blades 2–20(–25) mm wide, bases attenuate or cuneate, not cordate or truncate, distal leaves sessile; array branches ascending to more or less divaricate. Involucral bract apices not involute or folded (sometimes spreading, outer involucral bracts sometimes foliaceous), obtuse to acute or acuminate ..... 7.
- 7. Cauline leaf blades lanceolate, linear, linear-lanceolate, or oblanceolate, bases more or less clasping and/or more or less auriculate, margins usually more or less revolute (usually entire, sometime sparsely serrulate); heads 1–30 or more in lax arrays. Distal leaves (40–)50–150 × 2–6 mm; boreal fens ..... *Symphyotrichum boreale* (in part)
- Cauline leaf blades ovate or elliptic to oblanceolate, lanceolate, or linear, bases attenuate or cuneate (if auriculate or clasping, blades not linear), margins usually flat, sometimes more or less revolute (then more or less serrate); heads (1–)10–100(–800 or more) in more or less dense arrays. Disc corolla lobes usually erect (lengths to  $\frac{1}{2}$  corollas); stems erect. Leaf margins flat, sparsely serrate or entire; proximal leaves sessile or subsessile (more or less decurrent), only slightly reduced distally; array branches ascending, peduncle bracts 1–3(–5), linear-oblanceolate to linear-lanceolate, foliaceous (not grading into involucral bracts) ..... *Symphyotrichum lanceolatum* (in part)
- 8 (2). Stems moderately to densely hairy ..... 9.
- Stems glabrous (usually distally hairy in lines, at least in arrays) or sparsely hairy ..... 19.
- 9. Involucral bracts more or less stipitate-glandular (at least apically) ..... 10.
- Involucral bracts eglandular ..... 13.
- 10. Proximal and distal leaf bases auriculate- or cordate-clasping, distal sometimes cuneate ... 11.
- Proximal leaf bases rounded, cuneate, or more or less clasping, not auriculate, distal cuneate to more or less clasping ..... 12.
- 11. Involucral bracts subequal, outer foliaceous, margins stipitate-glandular, faces glabrous, densely glandular; ray florets (40–)50–75(–100); disc florets 50–100 ... *Symphyotrichum novae-angliae*
- Involucral bracts unequal, not foliaceous (green zones diamond-shaped or lance-spatulate in distal  $\frac{1}{2}$ ), margins ciliate, sometimes also stipitate-glandular apically, faces more or less strigillose or cinereous-puberulent, more or less glandular; ray florets 9–24 or more; disc florets 15–50. Leaves thick, firm; involucral bracts strongly unequal, appressed to squarrose; disc corollas yellow to white, turning purplish, lobes 0.5–1 mm ..... *Symphyotrichum patens* (in part)

- 12 (10). Stems, leaves, and peduncles eglandular, outer involucre bracts eglandular, inner distally stipitate-glandular; heads (5–)30–150 or more; achenes densely sericeous ..... *Symphyotrichum* × *amethystinum* (in part)
- Stems, leaves (usually at least distal), peduncles, and involucre bracts more or less stipitate-glandular; heads 1–30(–70); achenes usually sparsely to moderately strigose or strigillose, sometimes sparsely sericeous. Plants 10–80(–100) cm; leaves thin, apices obtuse; outer involucre bracts often broadly foliaceous, abaxial faces moderately hairy ..... *Symphyotrichum oblongifolium*
- 13 (9). Basal and proximal leaves petiolate or winged-petiolate, blades ovate to lanceolate, bases usually more or less cordate or rounded, sometimes truncate or attenuate. Cauline leaves winged-petiolate, wings wider distally and leaves more or less sessile, the wings abruptly widening at the strongly auriculate-clasping petiolar bases ..... *Symphyotrichum undulatum*
- Basal leaves petiolate or sessile, blades spatulate or oblanceolate to elliptic-lanceolate, bases (not cordate) cuneate or attenuate, proximal petiolate or sessile, blades ovate or obovate to oblong, lanceolate, or oblanceolate, bases cuneate or attenuate, sometimes auriculate- or cordate-clasping (and sessile) or subclasping. .... 14.
14. Leaf margins usually more or less serrate or crenate-serrate, sometimes entire. Plants caespitose (stems 1–5 or more), (7–)100–250 or more cm, with short, thick rhizomes or stout caudices; cauline leaves widely winged-petiolate or sessile (distal), bases more or less strongly auriculate-clasping; involucre bracts subequal, green zones linear-lanceolate to linear, outer sometimes more or less foliaceous; ray florets 20–50(–60), laminae (7–)12–18(–21) × (0.9–) 1.4–1.8 mm ..... *Symphyotrichum puniceum* (in part)
- Leaf margins entire or more or less serrulate ..... 15.
15. Proximal cauline leaf bases broadened proximal to constriction; distal leaf blades narrowly to broadly ovate, bases strongly cordate-clasping to auriculate-amplexicaul, apices usually acute, sometimes obtuse, mucronate to white-spinulose; involucre 5.5–12 mm; achenes sericeous or strigillose ..... *Symphyotrichum patens*
- Proximal cauline leaf bases tapering, rounded or subclasping (not auriculate), distal cuneate ..... 16.
16. Distal leaf apices not mucronate or spinulose; ray corollas violet. Plants colonial, 20–60 cm, long-rhizomatous; cauline leaves oblong to narrowly obovate, distal 30–70 × 4–10 mm, glabrous or strigose; arrays paniculiform ..... *Symphyotrichum ascendens*
- Distal leaf apices white-spinulose or mucronate; ray corollas blue, pink, lavender, rose-purple, or violet ..... 17.
17. Leaf faces more or less strigose; disc corollas yellow becoming brown ..... 18.
- Leaf margins piloso-silky, faces glabrous proximally, densely silky distally, proximal apices mucronate; distal leaf blades lanceolate, apices mucronate; peduncles densely sericeous-strigose; involucre bracts usually unequal, sometimes subequal, outer with expanded, more or less foliaceous distal  $\frac{1}{2}$ – $\frac{2}{3}$ , densely long-silky ..... *Symphyotrichum sericeum*
18. Plants colonial or caespitose, 10–80 cm, rhizomatous or with woody, cormoid caudices; disc corollas 2–2.5 mm, lobes 0.7–1.2 mm; achenes 2–2.5 mm, densely strigose, pappi whitish ..... *Symphyotrichum falcatum* (in part)
- Plants caespitose, 30–120 cm, caudices thick, woody; disc corollas 3–4 mm, lobes 0.5–0.7 mm; achenes 1.5–2 mm, densely sericeous, pappi tan to tawny, sometimes rose- or violet-tinged ... *Symphyotrichum* × *amethystinum* (in part)
- 19 (8). Basal and proximal cauline leaves petiolate, blades more or less ovate, bases more or less deeply cordate or rounded, proximal sometimes truncate, cuneate, or attenuate ..... 20.



- Basal and proximal cauline leaves petiolate or sessile, blades ovate to lanceolate or linear, bases usually cuneate or attenuate, sometimes rounded (if cordate-clasping, then usually sessile) . . . . . 22.
- 20. Basal leaf bases shallowly cordate or rounded to attenuate, proximal cauline bases rounded to attenuate. Plants caespitose (glaucous); proximal and distal leaf margins entire (at most crenulate), distal bases auriculate and more or less clasping to rounded, margins flat; involucre bracts appressed (green zones diamond-shaped to lanceolate) . . . . . *Symphyotrichum laeve* (in part)
  - Basal leaf bases usually more or less deeply cordate, sometimes rounded or abruptly attenuate, proximal cauline bases more or less cordate, rounded, or truncate, sometimes cuneate . . . . 21.
- 21. Basal and proximal leaf bases usually more or less deeply cordate, sometimes rounded, distal blades ovate to lanceolate, bases cordate, rounded, attenuate, or cuneate, adaxial faces usually glabrous or sparsely to densely strigose, sometimes more or less scabrous, abaxial glabrous or more or less strigoso-pilose, often more or less pilose on veins; heads (5–)20–300 or more in densely paniculiform arrays, branches divaricate to ascending; involucre cylindro-campanulate to cylindrical, (3–)4.5–5(–6) mm; phyllary green zones apical, lanceolate to diamond-shaped (often red-tipped); ray laminae (5–)6–8(–10) × 1.4–1.8 mm . . . . . *Symphyotrichum cordifolium*
  - Basal leaf bases shallowly cordate to rounded, proximal subcordate or cuneate; distal blades lance-ovate to linear, bases cuneate; adaxial leaf faces glabrous, glabrate, or scabrellous, abaxial glabrate to sparsely hirsute, midveins usually densely hirsute, sometimes glabrous; heads (6–)13–50(–100 or more) in open, paniculiform arrays, branches ascending; involucre campanulate, (4–)5–6.5 mm; phyllary green zones lanceolate to linear along midnerves; ray laminae (8.3–)10–15 × 1–2.3 mm; boreal forests . . . . . *Symphyotrichum ciliolatum*
- 22 (19). Proximal cauline leaves petiolate to subpetiolate, petioles more or less narrowly winged, blades more or less ovate to lanceolate, bases rounded to attenuate (sometimes auriculate-clasping distally, then sessile). Plants caespitose (glaucous); proximal and distal leaf margins usually entire, sometimes crenulate, distal bases auriculate and more or less clasping to rounded, margins flat; involucre bracts appressed (green zones diamond-shaped to lanceolate) . . . . . *Symphyotrichum laeve* (in part)
  - Proximal cauline leaves sessile or subpetiolate, petioles widely winged, blades ovate, elliptic, oblanceolate, or lanceolate to linear, bases attenuate to cuneate, often auriculate-clasping . . . . . 23.
- 23. Proximal and distal cauline leaves ovate, obovate, elliptic, oblanceolate, or lanceolate, distal sometimes lanceolate-linear or linear . . . . . 24.
  - Proximal and distal cauline leaves narrowly lanceolate or oblanceolate or elliptic, to linear or subulate . . . . . 28.
- 24. Cauline leaf bases usually not or little clasping, sometimes slightly rounded or auriculate . . . 25.
  - Cauline leaf bases (at least some) usually cuneate, sometimes attenuate, usually more or less clasping, often more or less auriculate or rounded, margins serrate (proximal), crenate-serrate, or entire . . . . . 26.
- 25. Leaves thin, margins flat; peduncle bracts 5–12 or more; involucre bracts linear-lanceolate (outer), subequal to unequal, outer often foliaceous . . . . *Symphyotrichum lanceolatum* (in part)
  - Leaves firm, margins often recurved; peduncle bracts 1–3(–5); involucre bracts oblong-lanceolate (outer), more or less unequal, outer sometimes foliaceous. Cauline leaves progressively reduced distally, adaxial faces waxy, abaxial with well-marked, isodiametric areoles (axillary clusters often present); peduncle bracts foliaceous, distal closely subtending heads, not grading into involucre bracts; disc corollas cream to pale yellow turning pinkish; achenes 1.5–2 mm . . . . . *Symphyotrichum praealtum* (in part)

- 26 (24). Stems usually flexuous; petiole and leaf bases strongly dilated (blades sometimes panduriform); leaf margins serrate; arrays corymbo-paniculiform . . . . . *Symphyotrichum prenanthoides*  
 – Stems straight; petiole and leaf bases not dilated; leaf margins usually serrate or crenate-serrate, sometimes entire; arrays paniculiform . . . . . 27.
27. Leaf faces scabrous or glabrate, sometimes abaxially pilose on midveins. Leaf margins serrate or entire, flat; array branches more or less divaricate to ascending, remotely small-leaved; ray corollas usually blue-violet or purple, rarely pink; stream shores . . . . .  
 . . . . . *Symphyotrichum novi-belgii* (in part)  
 – Leaf faces glabrous or puberulent, sometimes abaxially villosulous on midveins. Plants caespitose, with short, thick rhizomes or caudices; leaf faces adaxially glabrate to scabrous, abaxially pilose on midveins; phyllary apices long-acuminate to caudate . . . *Symphyotrichum puniceum* (in part)
- 28 (23). Involucres cylindro-campanulate or turbinate. Distal leaves (40–)50–150 × 2–6 mm; boreal fens . . . . . *Symphyotrichum boreale* (in part)  
 – Involucres campanulate . . . . . 29.
29. Cauline leaf bases cuneate, usually more or less clasping, often more or less auriculate or rounded, margins often serrate (proximal) or crenate-serrate, distal sometimes entire . . . . .  
 . . . . . *Symphyotrichum novi-belgii* (in part)  
 – Cauline leaf bases usually not or little clasping, sometimes slightly rounded or auriculate, margins serrulate or entire . . . . . 30.
- 30 (29). Adaxial leaf faces more or less waxy, abaxial with marked, isodiametric areoles; disc corollas cream to pale yellow . . . . . *Symphyotrichum praealtum* (in part)  
 – Adaxial leaf faces not waxy, abaxial with indistinct, irregular areoles; disc corollas yellow. Arrays paniculiform (leafy), branches ascending; peduncle bracts 1–3(–5); involucre bracts usually more or less subequal, sometimes unequal, bases  $\frac{1}{4}$  –  $\frac{1}{2}$  indurate (outer often foliaceous); ray laminae 3–10(–14) × 0.5–1.3 mm; disc corollas 2.8–5.8 mm widespread . . . . .  
 . . . . . *Symphyotrichum lanceolatum* (in part)

## **Helianthus L. (Sunflower)**

1. Annuals or perennials (taprooted); leaves mostly alternate, petiolate (petiole lengths at least  $\frac{1}{5}$  blades); paleae (at least central ones) either bearded (with apical tufts of whitish hairs) or prominently 3-toothed (middle teeth relatively narrow, lengths 4 or more times width); disc corolla lobes and style branches usually reddish (rarely yellow in *H. annuus* and *H. debilis*) . . . 2.  
 – Perennials (rhizomatous or with crown buds); leaves opposite or alternate, petiolate or sessile; paleae (at least central) glabrous or more or less hispid to puberulent (not bearded) and entire or relatively weakly 3-toothed (if 3-toothed, lengths of middle teeth usually less than 4 times widths); disc corolla lobes yellow or reddish (if reddish, style branches yellow) . . . . . 3.
2. Plants 100–300 cm; leaf blades (at least larger) 10–40 cm wide, abaxial faces gland-dotted; involucre bracts ovate to lance-ovate (larger usually 5–8 mm wide), apices narrowed abruptly (acute to acuminate). Stems (leaves, involucre bracts) hispid; leaf margins usually serrate . . .  
 . . . . . *Helianthus annuus* (in part)  
 – Plants mostly 25–200 cm; leaf blades (larger) usually less than 12 cm wide (bases cuneate, truncate, or cordate), abaxial faces sometimes gland-dotted; involucre bracts usually lanceolate to lance-ovate (usually less than 4 mm, sometimes to 5 mm, wide), apices narrowed gradually. Stems (leaves, involucre bracts) densely canescent . . . . . *Helianthus petiolaris*
- 3 (1). Leaves (at flowering) mostly or all basal (cauline leaves abruptly smaller, opposite). Leaf blades lance-linear, lance-ovate, oblong-lanceolate, or rhombic-ovate, bases cuneate (onto winged petioles); achenes 5–6 mm . . . . . *Helianthus pauciflorus* (in part)

- Leaves (at flowering) mostly cauline (not abruptly smaller distally) ..... 4.
- 4. Disc corolla lobes reddish (at least at tips) ..... 5.
- Disc corolla lobes yellow ..... 6.
- 5. Involucral bracts ovate, apices acute, abaxial faces glabrate to hispid .....  
..... *Helianthus pauciflorus* (in part)
- Involucral bracts oblong-lanceolate, apices acuminate, abaxial faces usually hairy .....  
..... *Helianthus ×laetiflorus* (in part)
- 6 (4). Involucral bracts ovate to lanceolate, (3–)5–8 mm wide, apices abruptly attenuate (disc corolla throats notably bulbous at bases) ..... *Helianthus annuus* (in part)
- Involucral bracts linear to lanceolate or lance-ovate, usually 2–4 mm wide, apices gradually narrowed (disc corolla throats not notably bulbous at bases) ..... 7.
- 7. Stems glabrous or glabrate (at least proximal to arrays of heads, sometimes glaucous) ..... 8.
- Stems hairy (more or less throughout, not glaucous) ..... 12.
- 8. Involucres 5–7 or 8–9 mm diam; rays usually 5 or 8. Leaves: abaxial faces (greenish) usually tomentulose, some-times glabrate, densely gland-dotted ..... *Helianthus microcephalus*
- Involucres (8–)9–28 mm diam.; rays (8–)10–21 (at least in larger heads) ..... 9.
- 9. Anther appendages yellow ..... 10.
- Anther appendages dark or reddish brown ..... 11.
- If unsure, follow both ways!**
- 10. Leaves: petioles (1–)2–5 cm, blades 10–32 × (1.2–)4–9 cm, margins coarsely serrate .....  
..... *Helianthus grosseserratus*
- Leaves: petioles 0.5–1.5 cm, blades 4–20 × 0.8–4 cm, margins entire or shallowly serrate ....  
..... *Helianthus nuttallii* (in part)
- 11 (9). Leaves: petioles 1–3 cm, blades moderately serrate or entire, abaxial faces usually densely gland-dotted; involucral bracts (equaling or slightly surpassing discs): apices acute .....  
..... *Helianthus strumosus*
- Leaves: petioles 2–5 cm, blades (at least larger leaves) moderately to notably serrate, abaxial faces usually sparsely gland-dotted; involucral bracts (at least longer, usually surpassing discs, by > ½ their lengths): apices acuminate ..... *Helianthus decapetalus*
- 12 (7). Leaf blades usually 1-nerved, conduplicate, entire or slightly serrate; heads (1–)3–15, borne singly or racemiform or spiciform arrays ..... *Helianthus maximiliani*
- Leaf blades 3-nerved, not conduplicate, entire or prominently serrate; heads (1–)3–16, borne singly or in more or less corymbiform, not racemiform or spiciform arrays ..... 13.
- 13. Involucral bracts usually appressed, strongly unequal. Petioles 1–5 cm (lengths usually less than ½ blades); leaf blades lanceolate to lance-ovate; anther appendages dark brown or black; achenes (seldom formed)4–5 mm ..... *Helianthus ×laetiflorus* (in part)
- Involucral bracts usually loose or spreading, more or less subequal ..... 14.
- 14. Leaves petiolate, petioles 2–8 cm; blades lanceolate to ovate, 7–15 cm wide; achenes 5–7 mm (plants producing tubers, late in growing season) ..... *Helianthus tuberosus*
- Leaves sessile or petiolate, petioles 0–2 cm; blades elliptic, lance-linear, lanceolate, lance-ovate, linear, or ovate, 0.15–4(–8) cm wide; achenes 2–5 cm (plants sometimes producing tubers) ...  
..... 15.
- 15. Stems (usually reddish) erect; leaves subsessile or petiolate (petioles 0–1.2 cm, ciliate), abaxial faces scabrous or more or less hirsute; anther appendages dark brown or black .....  
..... *Helianthus giganteus*

- 
- Stems (usually yellow-brown or greenish) erect; leaves petiolate (petioles 0.5–1.5 cm, not ciliate), abaxial faces hispid to villous or tomentose; anther appendages yellow .....  
..... *Helianthus nuttallii* (in part)

**Heterotheca Cassini, false goldenaster**

1. Distal leaves strongly ascending to spreading, blades narrowly to linearly oblanceolate (rarely broader), distal margins usually long-ciliate; proximal stems often brittle, brown to dark brown; axillary fascicles of leaves often present ..... 2.
  - Distal leaves usually spreading, sometimes perpendicular, blades usually oblong, oblanceolate, or lanceolate, rarely obovate or ovate, not linear-oblanceolate, distal margins not long-ciliate; proximal stems not very brittle when fresh, green, white, or reddish to brown; axillary fascicles rare or absent ..... 3.
2. Distal stems strigoso-canescens, usually with few, long-hispid hairs; distal leaves ascending, congested, distal margins not long-hispid-strigose, margins faces very densely strigoso-canescens (90–200 hairs/mm<sup>2</sup>; silvery whitish), eglandular; long, linear-oblanceolate bracts often subtending heads ..... *Heterotheca canescens*
  - Distal stems sparsely to densely long-hispid; distal leaves usually ascending and surpassing heads, distal margins often long-hispid-strigose, faces either sparsely to moderately strigose (2–65 hairs/mm<sup>2</sup>; bright green to grayish green) and moderately stipitate-glandular or moderately strigose and eglandular ..... *Heterotheca stenophylla*
3. Cauline leaf margins sparsely serrate ..... *Heterotheca camporum*
  - Mid and distal cauline leaf margins entire, proximal sometimes with 1–2 distal teeth. Plants (5–)16–40(–70) cm; distal leaves usually lanceolate or oblanceolate to oblong, rarely ovate (if lanceolate-triangular then not revolute), faces sparsely to densely hispid-strigose, sparsely to densely stipitate-glandular; inner pappus bristles equaling or longer than corollas ..... *Heterotheca villosa*