




























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Botany

Asteraceae: The sunflower family



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Sunflower, *Helianthus annuus* (Photo by Aldo De Bastiani, via <http://luirig.altervista.org/photos-search/index.php?title=Helianthus+annuus>)

Asteraceae, also called Compositae, is one of the largest angiospermic plant families among the dicotyledonous, based on the large number of species (1,620 genera and 23,600 species) that represent this plant family with cosmopolitan distribution (Funk et al., 2005). Constituting almost 10% of all flowering plants worldwide, Asteraceae is usually divided into 12 subfamilies (Funk et al., 2009). Except for Antarctica, the family is most abundant in the sub-tropical and temperate latitudes, occurring commonly across meadows, valleys, grassy plains, rolling plateaus, and mountainous slopes (Funk et al., 2005 ; Bayer et al., 2007). It includes edible, medicinal, noxious, invasive and endangered species (Heywood et al., 2007). The majority of plant members representing this family are herbaceous in nature, but shrubs and trees, as well as creepers and climbers, are also reported. They can easily be detected by several factors, such as fused anthers, single ovules in fruits, and their capitulum inflorescence (Garcia et al., 2010).

Physical Description

Leaf arrangement is alternate, often appearing in basal rosette formation and the leaves are devoid of stipules. The floral arrangement is unique for this plant family with a distinct head-like structure appearing as a single flower called a capitulum (Fig 1). Botanically speaking, the capitulum inflorescence is an unique collection of numerous tiny flowers arranged on a common platform (receptacle). There are two types of flowers observed within the capitulum inflorescence-ray or ligulate and disk or tubular. The central part of the capitulum is occupied by the disk florets and the periphery is arranged with the ray florets.

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Figure 1. Conspicuous capitulum inflorescence of Asteraceae family. (Saikat Basu, own work)

Flowers could be unisexual or bisexual (hermaphrodite), regular or irregular, but are usually pentamerous and sympetalous with inferior ovary. The common fruit type of Asteraceae is achenes. The specialized design of the flowers and the inflorescence are believed to promote pollination and the process of cross pollination. Androecium has five stamens united at the anthers, forming a tube-like structure around the style. Calyx is often absent in this family and are replaced by bristles or scaly structures in the form of pappus. The pappus is known to help in the widespread dispersal of matured seeds via wind. Mature seeds mostly do not have any endosperms. The wide diversity of the Asteraceae family is presented in Figures 2-3.



Figure 2. Morphological diversity of floral structures among Asteraceae members. (Saikat Basu, own work)



Figure 3. Morphological diversity of floral structures among Asteraceae members. (Saikat Basu, own work)

Importance of Family

The plant family is important economically, producing many oil products such as sunflower, safflower etc; vegetables such as artichokes, lettuce etc; ornamental members such as dahlia, zinnia, cosmos, aster, sunflowers, marigolds, chrysanthemum etc; medicinal plants such calendula, tansy, chamomile, wormwood, arnica, coltsfoot, echinacea, elecampane, milk thistle, chicory etc and weeds like dandelion, ragwort, groundsel etc (Funk et al., 2009). Asteraceae is known to be one of the most evolved among the angiospermic plant families and is comparable to Orchidaceae members among monocotyledonous for their widespread, morphological, anatomical, physiological and ecological adaptations for wide distribution, dissemination and reproductive success (Heywood et al., 2007).



Figure 4. A-J. Variations in the inflorescence (capitulum) among different members of Asteraceae. K-M. Pappus (modified calyx), a diagnostic character of the Asteraceae family associated with the floral structure. Thin and dried, they help in wide dispersal of the seeds of the plants via wind. Wide morphological variations are observed in the structure of pappus across the family. (Saikat Basu, own work)



Figure 5. Some important members of Asteraceae. A. Sunflower (*Helianthus annuus* L.) B. Dahlia sp.; C. Sunflower seeds after removal of the hard external seed coats; D. *Acmella oleracea* (L.) R. K. Jansen; E. *Dandelion* (*Taraxacum officinale* F. H. Wigg); and F. *Parthenium hysterophorus* L. (Saikat Basu, own work)



Fig 6. Weeds from Asteraceae family. (Saikat Basu, own work)

Plants representing Asteraceae members are presented in table 1.

Table 1. Plants representing Asteraceae family

Ref.	Species & accepted Taxa	Genera	Family
USDA, 2014	<i>Acamptopappus sphaerocephalus</i> (Harv. & A. Gray ex A. Gray) A. Gray	<i>Acamptopappus</i> (A. Gray) A. Gray	Asteraceae
USDA, 2014	<i>Acourtia runcinata</i> (Lag. ex D. Don) B.L. Turner	<i>Acourtia</i> D. Don	
USDA, 2014	<i>Ageratina altissima</i> (L.) R.M. King & H. Rob.	<i>Ageratina</i> Spach	

USDA, 2014	<i>Amberboa moschata</i> (L.) DC.	<i>Amberboa</i> (Pers.) Less.
USDA, 2014	<i>Ambrosia artemisiifolia</i> L.	<i>Ambrosia</i> L.
USDA, 2014	<i>Anacyclus clavatus</i> (Desf.) Pers.	<i>Anacyclus</i> L.
USDA, 2014	<i>Anisocoma acaulis</i> Torr. & A. Gray	<i>Anisocoma</i> Torr. & A. Gray
USDA, 2014	<i>Aphanostephus skirrhobasis</i> (DC.) Trel.	<i>Aphanostephus</i> DC.
USDA, 2014	<i>Argyranthemum frutescens</i> (L.) Sch. Bip.	<i>Argyranthemum</i> Webb
USDA, 2014	<i>Arnoseric minima</i> (L.) Schweigg. & Körte	<i>Arnoseric</i> Gaertn.
USDA, 2014	<i>Baccharis bigelovii</i> A. Gray	<i>Baccharis</i> L.
USDA, 2014	<i>Balduina atropurpurea</i> Harper	<i>Balduina</i> Nutt.
USDA, 2014	<i>Barkleyanthus salicifolius</i> (Kunth) H. Rob. & Brettell	<i>Barkleyanthus</i> (Kunth) H. Rob. & Brettell
USDA, 2014	<i>Bebbia juncea</i> (Benth.) Greene	<i>Bebbia</i> (Benth.) Greene
USDA, 2014	<i>Berlandiera lyrata</i> Benth.	<i>Berlandiera</i> DC.
USDA, 2014	<i>Bigelowia nuttallii</i> L.C. Anderson	<i>Bigelowia</i> DC.
USDA, 2014	<i>Blepharizonia plumosa</i> (Kellogg) Greene	<i>Blepharizonia</i> Greene
USDA, 2014	<i>Borrichia arborescens</i> (L.) DC.	<i>Borrichia</i> Adans.
USDA, 2014	<i>Borrichia ×cubana</i> Britton & S.F. Blake (pro sp.)	
USDA, 2014	<i>Calendula arvensis</i> L.	<i>Calendula</i> L.
USDA, 2014	<i>Calendula officinalis</i> L.	
USDA, 2014	<i>Calycoseris parryi</i> A. Gray	<i>Calycoseris</i> A. Gray
USDA, 2014	<i>Calycoseris wrightii</i> A. Gray	
USDA, 2014	<i>Carduus crispus</i> L.	<i>Carduus</i> L.
USDA, 2014	<i>Carlquistia muirii</i> (A. Gray) B.G. Baldw.	<i>Carlquistia</i> B.G. Baldw.
USDA, 2014	<i>Carthamus leucocaulos</i> Sm.	<i>Carthamus</i> L.

USDA, 2014	<i>Catananche caerulea</i> L.	<i>Catananche</i> L.
USDA, 2014	<i>Centratherum punctatum</i> Cass.	<i>Centratherum</i> Cass.
USDA, 2014	<i>Chaetadelpa wheeleri</i> A. Gray ex S. Watson	<i>Chaetadelpa</i> A. Gray ex S. Watson
USDA, 2014	<i>Chaptalia nutans</i> (L.) Polak.	<i>Chaptalia</i> Vent.
USDA, 2014	<i>Chrysactinia mexicana</i> A. Gray	<i>Chrysactinia</i> A. Gray
USDA, 2014	<i>Chrysopsis godfreyi</i> Semple	<i>Chrysopsis</i> (Nutt.) Elliott
USDA, 2014	<i>Clappia suaedifolia</i> A. Gray	<i>Clappia</i> A. Gray
USDA, 2014	<i>Constancea nevinii</i> (A. Gray) B.G. Baldw.	<i>Constancea</i> B.G. Baldw.
USDA, 2014	<i>Cosmos caudatus</i> Kunth	<i>Cosmos</i> Cav.
USDA, 2014	<i>Crupina vulgaris</i> Cass.	<i>Crupina</i> (Pers.) DC.
USDA, 2014	<i>Cymophora accedens</i> (S.F. Blake) B.L. Turner & A. Powell	<i>Cymophora</i> B.L. Rob.
USDA, 2014	<i>Delairea odorata</i> Lem.	<i>Delairea</i> Lem.
USDA, 2014	<i>Dicranocarpus parviflorus</i> A. Gray	<i>Dicranocarpus</i> A. Gray
USDA, 2014	<i>Doellingeria umbellata</i> (Mill.) Nees	<i>Doellingeria</i> Nees
USDA, 2014	<i>Dysodiopsis tagetoides</i> (Torr. & A. Gray) Rydb.	<i>Dysodiopsis</i> (A. Gray) Rydb.
USDA, 2014	<i>Echinacea laevigata</i> (C.L. Boynt. & Beadle) S.F. Blake	<i>Echinacea</i> Moench
USDA, 2014	<i>Eleutheranthera ruderalis</i> (Sw.) Sch. Bip.	<i>Eleutheranthera</i> Poit. ex Bosc
USDA, 2014	<i>Enydra sessilis</i> (Sw.) DC.	<i>Enydra</i> Lour.
USDA, 2014	<i>Eriophyllum congdonii</i> Brandegee	<i>Eriophyllum</i> Lag.
USDA, 2014	<i>Eupatorium altissimum</i> L.	<i>Eupatorium</i> L.
USDA, 2014	<i>Evax prolifera</i> Nutt. ex DC.	<i>Evax</i> Gaertn.
USDA, 2014	<i>Fitchia speciosa</i> Cheeseman	<i>Fitchia</i> Hook. f.

USDA, 2014	<i>Flourensia pringlei</i> (A. Gray) S.F. Blake	<i>Flourensia</i> DC.	
USDA, 2014	<i>Flyriella parryi</i> (A. Gray) R.M. King & H. Rob.	<i>Flyriella</i> R.M. King & H. Rob.	
USDA, 2014	<i>Garberia heterophylla</i> (W. Bartram) Merr. & F. Harper	<i>Garberia</i> A. Gray	
USDA, 2014	<i>Glyptopleura setulosa</i> A. Gray	<i>Glyptopleura</i> D.C. Eaton	
USDA, 2014	<i>Guardiola platyphylla</i> A. Gray	<i>Guardiola</i> Cerv. ex Humb. & Bonpl.	
USDA, 2014	<i>Gutierrezia sarothrae</i> (Pursh) Britton & Rusby	<i>Gutierrezia</i> Lag.	Asteraceae
USDA, 2014	<i>Gynura aurantiaca</i> (Blume) DC.	<i>Gynura</i> Cass.	
USDA, 2014	<i>Haploesthes greggii</i> A. Gray	<i>Haploesthes</i> A. Gray	
USDA, 2014	<i>Hasteola suaveolens</i> (L.) Pojark.	<i>Hasteola</i> Raf.	
USDA, 2014	<i>Hedypnois cretica</i> (L.) Dum. Cours.	<i>Hedypnois</i> Mill.	
USDA, 2014	<i>Heliomeris soliceps</i> (Barneby) Yates	<i>Heliomeris</i> Nutt.	
USDA, 2014	<i>Hemizonia fasciculata</i> (DC.) Torr. & A. Gray	<i>Hemizonia</i> DC.	
USDA, 2014	<i>Heteranthemis viscidehirta</i> Schott	<i>Heteranthemis</i> Schott	
USDA, 2014	<i>Holocarpha obconica</i> (J.C. Clausen & D.D. Keck) D.D. Keck	<i>Holocarpha</i> Greene	
USDA, 2014	<i>Hymenopappus biennis</i> B.L. Turner	<i>Hymenopappus</i> L'Hér.	
USDA, 2014	<i>Hypochaeris microcephala</i> (Sch. Bip.) Cabrera	<i>Hypochaeris</i> L.	
USDA, 2014	<i>Ionactis elegans</i> (Soreng & Spellenb.) G.L. Nesom	<i>Ionactis</i> Greene	
USDA, 2014	<i>Ixeris stolonifera</i> A. Gray	<i>Ixeris</i> (Cass.) Cass.	
USDA, 2014	<i>Jamesianthus alabamensis</i> S.F. Blake & Sherff	<i>Jamesianthus</i> S.F. Blake & Sherff	

USDA, 2014	<i>Jensia yosemitana</i> (Parry ex A. Gray) B.G. Baldw.	<i>Jensia</i> B.G. Baldw.
USDA, 2014	<i>Keysseria helenae</i> (Forbes & Lydgate) Cabrera	Keysseria Lauterb.
USDA, 2014	<i>Kyhosia bolanderi</i> (A. Gray) B.G. Baldw.	<i>Kyhosia</i> B.G. Baldw.
USDA, 2014	<i>Lagophylla ramosissima</i> Nutt.	<i>Lagophylla</i> Nutt.
USDA, 2014	<i>Lagophylla ramosissima</i> Nutt. ssp. <i>ramosissima</i>	
USDA, 2014	<i>Lasiospermum bipinnatum</i> (Thunb.) Druce	<i>Lasiospermum</i> M. Lagasca
USDA, 2014	<i>Leontodon hispidus</i> L.	<i>Leontodon</i> L.
USDA, 2014	<i>Leontodon taraxacoides</i> (Vill.) Mérat	
USDA, 2014	<i>Leuciva dealbata</i> (A. Gray) Rydb.	<i>Leuciva</i> Rydb.
USDA, 2014	<i>Logfia californica</i> (Nutt.) Holub	<i>Logfia</i> Cass.
USDA, 2014	<i>Lygodesmia grandiflora</i> (Nutt.) Torr. & A. Gray	<i>Lygodesmia</i> D. Don
USDA, 2014	<i>Malacothrix coulteri</i> Harv. & A. Gray	<i>Malacothrix</i> DC.
USDA, 2014	<i>Matricaria discoidea</i> DC.	<i>Matricaria</i> L.
USDA, 2014	<i>Micropus californicus</i> Fisch. & C.A. Mey.	<i>Micropus</i> L.
USDA, 2014	<i>Montanoa hibiscifolia</i> (Benth.) Standl.	<i>Montanoa</i> Llave & Lex.
USDA, 2014	<i>Nicolletia edwardsii</i> A. Gray	<i>Nicolletia</i> A. Gray
USDA, 2014	<i>Oclemena reticulata</i> (Pursh) G.L. Nesom	<i>Oclemena</i> Greene
USDA, 2014	<i>Onopordum acaulon</i> L.	<i>Onopordum</i> L.
USDA, 2014	<i>Osmadenia tenella</i> Nutt.	<i>Osmadenia</i> Nutt.
USDA, 2014	<i>Pallenis maritima</i> Greuter	<i>Pallenis</i> Cass.
USDA, 2014	<i>Pectis carthusianorum</i> Less.	<i>Pectis</i> L.
USDA, 2014	<i>Pericome caudata</i> A. Gray	<i>Pericome</i> A. Gray

USDA, 2014	<i>Phoebanthus grandiflorus</i> (Torr. & A. Gray) S.F. Blake	<i>Phoebanthus</i> S.F. Blake
USDA, 2014	<i>Piptocoma acevedoi</i> Pruski	<i>Piptocoma</i> Cass.
USDA, 2014	<i>Plecostachys serpyllifolia</i> (P.J. Bergius) Hilliard & B.L. Burt	<i>Plecostachys</i> Hilliard & B.L. Burt
USDA, 2014	<i>Polymnia laevigata</i> Beadle	<i>Polymnia</i> L.
USDA, 2014	<i>Prenanthes alata</i> (Hook.) D. Dietr.	<i>Prenanthes</i> L.
USDA, 2014	<i>Psathyrotopsis scaposa</i> (A. Gray) H. Rob.	<i>Psathyrotopsis</i> Rydb.
USDA, 2014	<i>Pseudogynoxys chenopodioides</i> Kunth	<i>Pseudogynoxys</i> (Greenm.) Cabrera
USDA, 2014	<i>Pulicaria dysenterica</i> (L.) Bernh.	<i>Pulicaria</i> Gaertn.
USDA, 2014	<i>Rafinesquia neomexicana</i> A. Gray	<i>Rafinesquia</i> Nutt.
USDA, 2014	<i>Ratibida pinnata</i> (Vent.) Barnhart	<i>Ratibida</i> Raf.
USDA, 2014	<i>Remya mauiensis</i> Hillebr.	<i>Remya</i> Hillebr. ex Benth.
USDA, 2014	<i>Rolandra fruticosa</i> (L.) Kuntze	<i>Rolandra</i> Rottb.
USDA, 2014	<i>Sachsia polycephala</i> Griseb.	<i>Sachsia</i> Griseb.
USDA, 2014	<i>Saussurea americana</i> D.C. Eaton	<i>Saussurea</i> DC.
USDA, 2014	<i>Scolymus hispanicus</i> L.	<i>Scolymus</i> L.
USDA, 2014	<i>Sericocarpus linifolius</i> (L.) Britton, Sterns & Poggenb.	<i>Sericocarpus</i> Greene
USDA, 2014	<i>Shinnersoseris rostrata</i> (A. Gray) S. Tomb	<i>Shinnersoseris</i> S. Tomb
USDA, 2014	<i>Silybum eburneum</i> Coss. & Durieu	<i>Silybum</i> Adans.
USDA, 2014	<i>Silybum marianum</i> (L.) Gaertn.	
USDA, 2014	<i>Simsia calva</i> (Engelm. & A. Gray) A. Gray	<i>Simsia</i> Pers.
USDA, 2014	<i>Simsia lagasceiformis</i> DC.	

USDA, 2014	<i>Smallanthus uvedalius</i> (L.) Mack. ex Small	<i>Smallanthus</i> Mack. ex Small	Asteraceae
USDA, 2014	<i>Soliva mutisii</i> Kunth	<i>Soliva</i> Ruiz & Pav.	
USDA, 2014	<i>Sphaeromeria capitata</i> Nutt.	<i>Sphaeromeria</i> Nutt.	
USDA, 2014	<i>Sphagneticola gracilis</i> (Rich.) Pruski	<i>Sphagneticola</i> O. Hoffm.	
USDA, 2014	<i>Spilanthes acmella</i> (L.) L.	<i>Spilanthes</i> Jacq.	
USDA, 2014	<i>Spiracantha cornifolia</i> Kunth	<i>Spiracantha</i> Kunth	
USDA, 2014	<i>Stenotus lanuginosus</i> (A. Gray) Greene	<i>Stenotus</i> Nutt.	
USDA, 2014	<i>Stephanomeria exigua</i> Nutt.	<i>Stephanomeria</i> Nutt.	
USDA, 2014	<i>Stokesia laevis</i> (Hill) Greene	<i>Stokesia</i> L'Hér.	
USDA, 2014	<i>Struchium sparganophorum</i> (L.) Kuntze	<i>Struchium</i> P. Br.	
USDA, 2014	<i>Stylocline intertexta</i> Morefield	<i>Stylocline</i> Nutt.	
USDA, 2014	<i>Synedrella nodiflora</i> (L.) Gaertn.	<i>Synedrella</i> Gaertn.	
USDA, 2014	<i>Tanacetum bipinnatum</i> (L.) Sch. Bip.	<i>Tanacetum</i> L.	
USDA, 2014	<i>Tetradymia filifolia</i> Greene	<i>Tetradymia</i> DC.	
USDA, 2014	<i>Thurovia triflora</i> Rose	<i>Thurovia</i> Rose	
USDA, 2014	<i>Tonestus kingii</i> (D.C. Eaton) G.L. Nesom	<i>Tonestus</i> A. Nelson	
USDA, 2014	<i>Tragopogon lamottei</i> Rouy	<i>Tragopogon</i> L.	
USDA, 2014	<i>Tridax procumbens</i> L.	<i>Tridax</i> L.	
USDA, 2014	<i>Tripolium pannonicum</i> (Jacq.) Dobrocz.	<i>Tripolium</i> Nees	
USDA, 2014	<i>Tussilago farfara</i> L.	<i>Tussilago</i> L.	
USDA, 2014	<i>Urospermum picroides</i> (L.) Scop. ex F.W. Schmidt	<i>Urospermum</i> Scop.	
USDA, 2014	<i>Vanclevea stylosa</i> (Eastw.) Greene	<i>Vanclevea</i> Greene	

USDA, 2014	<i>Varilla texana</i> A. Gray	<i>Varilla</i> A. Gray
USDA, 2014	<i>Venegasia carpesioides</i> DC.	<i>Venegasia</i> DC.
USDA, 2014	<i>Venidium fastuosum</i> (Jacq.) Stapf	<i>Venidium</i> Less.
USDA, 2014	<i>Verbesina alternifolia</i> (L.) Britton ex Kearney	<i>Verbesina</i> L.
USDA, 2014	<i>Verbesina aristata</i> (Elliott) A. Heller	
USDA, 2014	<i>Verbesina chapmanii</i> J.R. Coleman	
USDA, 2014	<i>Vernonia acaulis</i> (Walter) Gleason	<i>Vernonia</i> Schreb.
USDA, 2014	<i>Vernonia albicaulis</i> Pers.	
USDA, 2014	<i>Vesicarpa potentilloides</i> (A. Gray) Rydb.	<i>Vesicarpa</i> Rydb.
USDA, 2014	<i>Viguiera cordifolia</i> A. Gray	<i>Viguiera</i> Kunth
USDA, 2014	<i>Wedelia lanceolata</i> DC.	<i>Wedelia</i> Jacq.
USDA, 2014	<i>Wilkesia gymnoxiphium</i> A. Gray	<i>Wilkesia</i> A. Gray
USDA, 2014	<i>Wyethia amplexicaulis</i> (Nutt.) Nutt.	<i>Wyethia</i> Nutt.
USDA, 2014	<i>Xanthisma texanum</i> DC.	<i>Xanthisma</i> DC.
USDA, 2014	<i>Xanthium spinosum</i> L.	<i>Xanthium</i> L.
USDA, 2014	<i>Xanthium strumarium</i> L.	
USDA, 2014	<i>Xanthocephalum gymnospermoides</i> (A. Gray) Benth. & Hook. f.	<i>Xanthocephalum</i> Willd.
USDA, 2014	<i>Xylorhiza confertifolia</i> (Cronquist) T.J. Watson	<i>Xylorhiza</i> Nutt.
USDA, 2014	<i>Xylorhiza glabriuscula</i> Nutt.	
USDA, 2014	<i>Xylothamia palmeri</i> (A. Gray) G.L. Nesom	<i>Xylothamia</i> G.L. Nesom, Suh, D. Morgan & Simpson
USDA, 2014	<i>Xylothamia triantha</i> (S.F. Blake) G.L. Nesom	
USDA, 2014	<i>Yermo xanthocephalus</i> Dorn	<i>Yermo</i> Dorn

USDA, 2014	<i>Youngia japonica</i> (L.) DC.	<i>Youngia</i> Cass.
USDA, 2014	<i>Youngia thunbergiana</i> DC.	
USDA, 2014	<i>Zinnia acerosa</i> (DC.) A. Gray	<i>Zinnia</i> L.
USDA, 2014	<i>Zinnia angustifolia</i> Kunth	
USDA, 2014	<i>Zinnia anomala</i> A. Gray	
USDA, 2014	<i>Zinnia maritima</i> Kunth	
USDA, 2014	<i>Zinnia maritima</i> Kunth var. <i>palmeri</i> (A. Gray) B.L. Turner	
USDA, 2014	<i>Zinnia peruviana</i> (L.) L.	
USDA, 2014	<i>Zinnia violacea</i> Cav.	

References and Further Reading

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Citation

Basu, S., Zandi, P., Cetzal-Ix, W., & Sengupta, R. (2014). Asteraceae: The sunflower family. Retrieved from <http://www.eoearth.org/view/article/53cd57450cf2d022a359c79b>

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