

Monocotyledons 1

Revised 13 July 2015

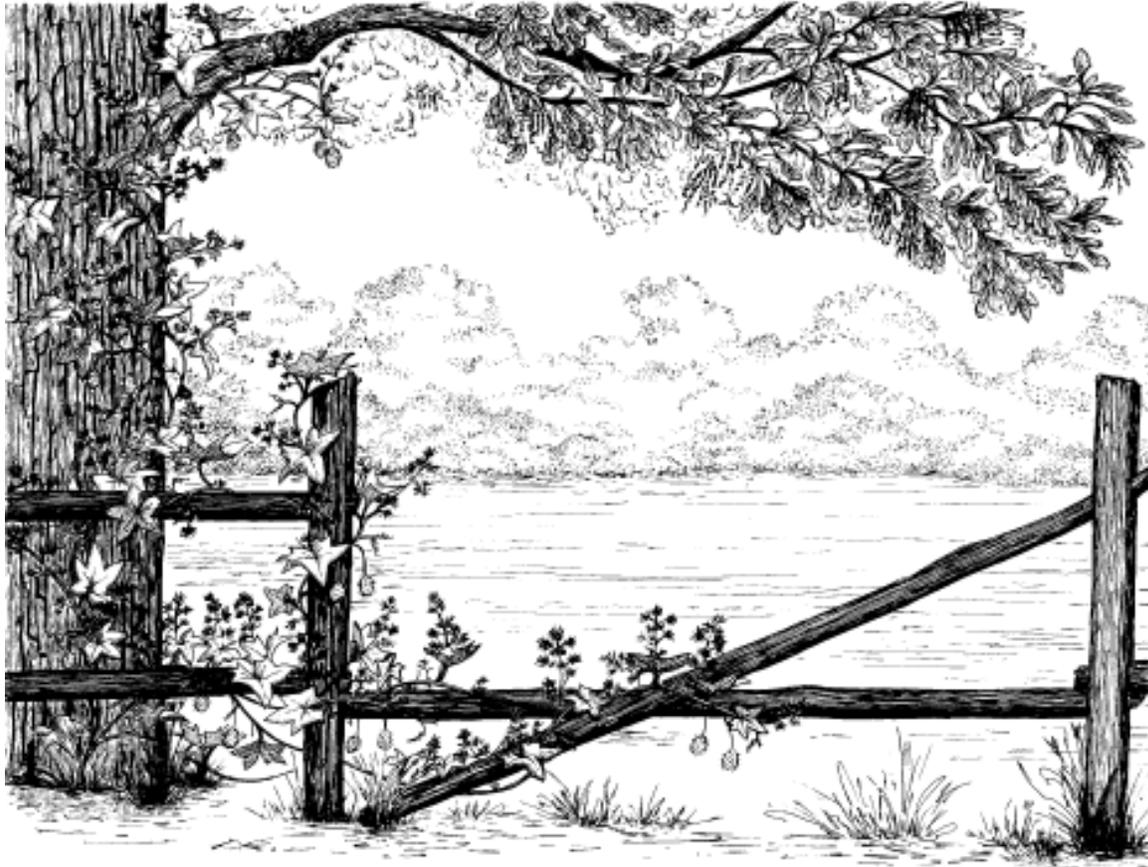


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Monocotyledons n (ancient Greek *μονο-*, *mono*, alone, only, sole, & Latin *cotylēdon*, the plant navelwort or pennywort, from Greek *κοτυληδών*, *kotyledōn*, from *κοτύλη*, *kotyle*, a hollow thing, a small vessel, referring to the often spoon- or bowl-shape of the seed leaves) a class of angiosperms having an embryo with only one cotyledon, part of the flower usually in threes, leaves with parallel veins, & scattered vascular bundles; having one cotyledon or seed leaf. “A flowering plant with an embryo bearing a single cotyledon (seed-leaf); a member of the *Monocotyledoneae* (also *Monocotyledonae* or *Monocotyledones*), the smaller of the two major divisions traditionally recognized among angiosperms, comprising such plants (now often called *Liliopsida* or *Liliidae*)” (oed). One of two major groups of the angiosperms distinguished by the presence of only one leaf (cotyledon) in the embryo. Other typical characteristics are parallel leaf venation, floral organs usually organized in whorls of three, scattered vascular bundles, a rudimentary primary root, which is soon replaced by lateral adventitious roots

(ie roots formed by the stem), & the lack of secondary thickening, which is why most Monocotyledons are herbaceous plants (if secondary thickening is present, as in *Agave*, *Aloe*, *Dracaena*, *Xanthorrhoea* & others, then it is different from Dicots). Monocotyledons include grasses, sedges, rushes, lilies, orchids, bananas, aroids, palms, & their relatives. (sk08).

Angiosperms have traditionally been split into monocotyledons & dicotyledons, or plants with one or two seed leaves respectively. Monocotyledons are flowering plants that typically have a single cotyledon. A cotyledon is the central portion of a seed embryo to which the epicotyl, or immature shoot, & radicle, immature root, are attached. Monocots typically have one cotyledon, floral parts in threes, parallel leaf veins, pollen grains with one pore of furrow, & vascular bundles throughout the stems ground tissue. Eudicots typically have two cotyledons, floral parts in fours or fives, netlike leaf veins, pollen grains with three pores of furrows, & vascular bundles arranged in a ring.

ACORACEAE Martinov 1820 **CALAMUS FAMILY** Consists only of *Acorus*. “Although traditionally treated as part of the *Araceae*, a wide variety of morphological, anatomical, and embryological evidence supports the segregation of the *Acoraceae* (Grayum 1987), a segregation additionally supported by molecular studies (Duvall et al 1993, Chase et al 1993). The spathe in *Acorus* is not morphologically equivalent to the spathe of the *Araceae*.” (w12)

ACORUS Linnaeus 1753 **SWEET FLAG** *Acorus* (classically A-ko-rus, or a-KO-rus) New Latin, from Latin, an aromatic plant (perhaps sweet flag), from Greek *ακορος*, *akoros*, or *akoron*, a classical name for *Iris pseudoacorus*; or *akoron*, presumed name of an ancient plant; from Dioscorides, name for an iris, Greek, *ακορον*, *akoron*, from *a*, without, & *core*, the pupil of the eye, referring to the plants use in treating eye diseases, particularly cataracts. A genus of rush like herbs 3-6 (2-4) spp widespread in the temperate Northern Hemisphere, high elevations in tropical Asia, & sporadically introduced in South America, with the flowers in a close spadix, sometimes separated from the *Araceae*. The spathe in *Acorus* is not morphologically equivalent to the spathe in *Araceae*. Morphological, anatomical, embryological, & molecular studies support this separation (we07, Thompson fna 2000). DNA studies indicate *Acorus* is a sister taxon to all other monocots, meaning it is not closely related to *Araceae*. Fruit is a berry, 1- to few seeded, with the seeds embedded in mucilage. $x = 12$.

A americanus has the midvein & 1-5 additional veins mostly equally raised, while *A calamus* has only the midvein prominently raised. The fragrance & the glossy bright green color of the fresh plants are distinctive. As both *A americanus* & *A calamus* have been used to refer all North AMERICAN SWEETFLAG as a single sp, literature references to either name are confusing at best. Because of the confusing nomenclature, the distribution of this genus in North America is yet to be determined. Some consider our sp as part of a single variable sp, with diploids known from east Asia (Mongolia & central Siberia) & North America, triploids typical for Europe, southwest Asia, India (Himalayan region), & eastern North America, & tetraploids from India, east Siberia, & Japan, with a more or less continuous series of leaf width & spadix variability. The tetraploids probably originated as hybrids between the diploids & tetraploids in the Himalayan region, & were carried to Sakhalin (an east Russian island), then Turkey, then to Europe, & finally to eastern North America.

Acorus has sticky pollen & is probably insect-pollinated. Pieces of rhizomes & seeds are dispersed by water along streams & rivers. Seeds may also be transported in mud on waterfowl.

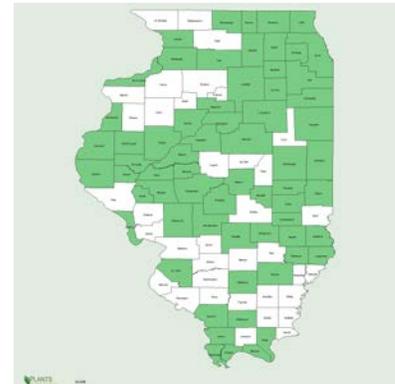
Additional common names include *ACORE CALAME* (F), *ACORE ODORANT* (F), *ACORE VRAI* (F), *CALAMO* (I), *CALAMÍS* (SP), *CALAMO AROMATICO*, *CALAMUS*, *CÁLAMO AROMÁTICO* (SP), *FLAGROOT*, *KALMEOS* (AF), *KALMUS* (G), *KALMUS* (SW), *MYRTLE-FLAG*, *SWEET CALAMUS*, *SWEET-FLAG*, & *SWEETFLAG*.



Seed photo Steve Hurst USDA-NRCS PLANTS Database. - Not copyrighted image

Acorus americanus (Rafinesque) Rafinesque *PA AMERICAN CALAMUS, aka *BELLE-ANGÉLIQUE* (FC), CALAMUS, CALAMUS ROOT, FLAG ROOT, MUSKRAT ROOT, SWEET CALOMEL, SWEET SEDGE, SWEETFLAG, WILD CALAMUS, *Wiken'*, *nabuguck'*, something flat, or *Muckosija'bosigun*, hay purgative (Ojibwa).

Habitat: Obligate seasonally inundated areas, wet meadows, low, marshy muddy areas. Tolerates fresh or soft water & acid soils. Swamps, marshes, along streams, borders of quiet waters, ditches. In northwest Illinois, this is a plant that grows in 1.0-2.0" of water in seeps & prairie fens, not in deeper water. In se USA, "Marshes, wet meadows, other wet areas, limey seeps" (w12). **distribution/range:** Because of the confusing taxonomy, the distribution of this sp is to be determined, or at least refined. It is generally native to the north half of North America, with the Peoria, Illinois region at the southern limit of the sp Midwestern range. The distribution of the native sp is said to coincide with the original distribution of the Native American tribes that had ethnobotanical uses for the plant. According to m02, apparently confined to the north ¼ of Illinois. Known from but not mapped from Bureau & Stark counties.

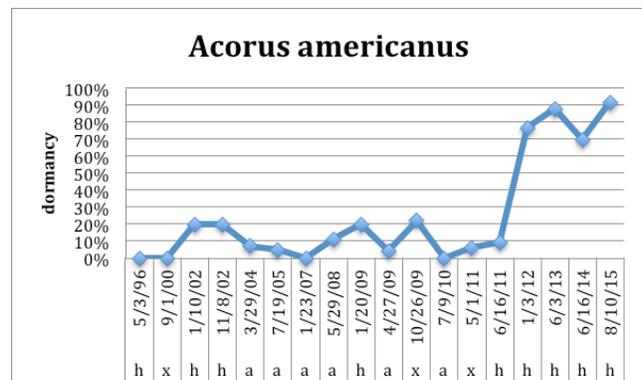


Culture: ① "Good germination (90%) after 60-90 days moist cold stratification; moist cold treatment, or fall sow. Very light cover" (mfd93). ② 60 days cold moist stratification (pm09). ③ Sow seeds just below moist soil surface at 70°F for 1 month. Move to 20°F for 1 month, then bring back to 50°F. (ew11) ④ Sow at 18-22°C (64-71°F) for 2-4 wks, move to -6 to -7°C (19-21°F) for 4-6 wks, move to 5-12°C (41-53°F) for germination, or sow outdoors immediately after harvest (tchn). ⑤ Special Care: 20°C x 4 weeks, then -7°C x 6 weeks, then 10°C, seed very poisonous, wash hands after handling (orghp). 70,000 (ecs); 88,845 (gna05); 98,803 (gna04); 105,600 (pm); 108,800 (ew11); 110,489 (gna06); 112,000 (jfn04, aes); 148,166 (gnh11); 189,640 (gnh01) seeds per pound. Plant 0.006 - 0.25 lb pls per acre (usda 1997) or if you live in the real world, sow 0.031 to 0.063 lbs pls per acre. Seed is said to have been successfully stored for 9 months to 2 years & longer. Plugs, rhizomes (root cuttings) & seed commonly available.

cultivation: Plant on 1.0-3.0' centers to allow room for rhizomes to spread. Species tolerates seasonal inundations, but may be killed by flooding of 1.0' for prolonged periods. One source badly advises 6-20" preferred water depth. No drought tolerance, low nutrient load tolerance, no or low salt tolerance, low siltation tolerance. Partial to full sun. pH 5.9-8.8 or 5.6-7.2 (ecs). Rhizomes & transplants more successful than seeding. Rhizomes planted 2" deep with well-placed roots below shoot. Newly planted rhizomes & plugs are not flood tolerant, drawdown must be maintained until planting is established (18" tall). Survival rates as high as 100% are known (us97). Plant 1000 roots or plugs per acre (Anon).

Caveat emptor. Commercial rhizomes may be of the following sp!

bottom line: Field sow spring or dormant.



Some years the seed may have 20-22% dormant seed, but some lots have been non-dormant. Our experience has shown good greenhouse crops were produced with no pretreatments, but 30-60 days cold moist stratification has been required of late. Flipflop species. Crossover species, strongly dormant since 2011 crop. Germ 60.8, 70.5, 73, sd 27.8, r4.0-94 (94)%. Dorm 25.1, 10, 0.0, sd 31.4, r0.0-92 (90)%. Test 38, 28, na, r21-46 days. (#26)**

Description: Erect perennial, emergent, semi-aquatic, native forb, sweet smelling when crushed; roots long, aromatic, reddish rhizomes, minimum depth 10"; stems to 6" tall; leaves sweetly aromatic, crowded at the base, long, narrow, sword-like, midvein & 1-5 additional veins mostly equally raised; flowers yellow to brown (golden-brown) 6(3)-merous, inflorescence a 2"-4" dense, thick, cylindrical spadix, protruding from the side of sympodial leaf, a spathe-like structure (a sword-form, leaf-like scape); fruit is a dry brown berry, obpyramidal, 4.0-6.0 mm, light brown to reddish with darker streaks; seeds (1-)6(-14) per fruit, seeds embedded in mucilage; $N 2n = 24$. key features: Midvein of the leaves not well developed, about as prominent as the lateral veins. Produces fertile seed. "In this sp, the true spathe is absent, scape is prolonged & leaf-like; aromatic, especially the rhizome (Ilpin).

Comments: status: Endangered in Pennsylvania. phenology: Blooms 4,5-6. C3. Aggressive, rhizomatous, forming a mat in upper 4-8" soil. Useful in landscaping, moist rain gardens, clean, moist swales, edges of bog gardens, or use in lower shoreline zones. Aromatic, especially the rhizome. The native plant is a fertile diploid. Seed source nursery production, originally from Princeton & Red Oak, Bureau County, Somonauk, DeKalb County, & Spring Hill, Whiteside County. This sp is badly overused in deep, dirty water in Chicago metro wetland restoration.

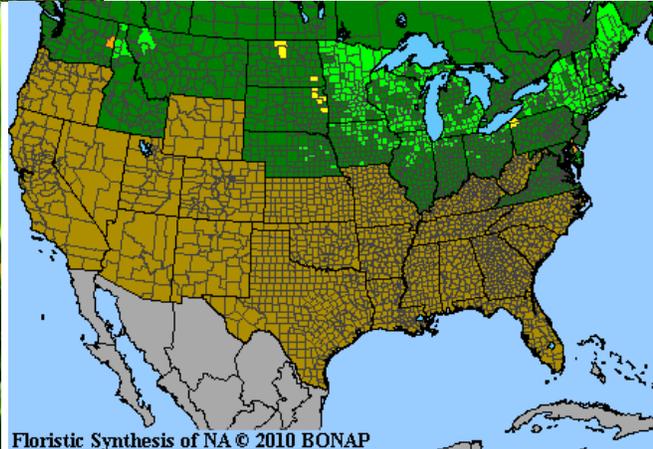
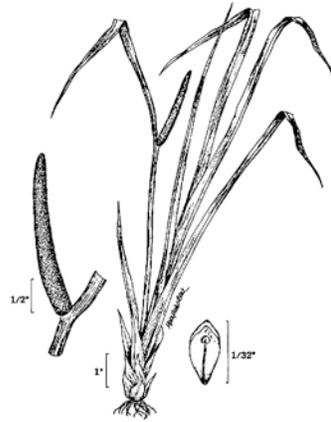
"More common on small streams in prairie areas than in river bottoms. Kent, Willow, & Coon Creeks." (ewf55)

Recent studies of morphology, essential oil chemistry, cytology, & isozymes show the existence of two sp of *Acorus* in North America. The local, native, fertile element, a fertile diploid, has basal leaves with 2 to several veins, while the Old World, sterile element, a sterile triploid introduced from Europe, has basal leaves with a single strong vein. In what we have propagated from seed & root cuttings at our nursery, we have noted two very distinct types over the years. As fertile *A calamus* in North America is unknown, all viable *Acorus* seed & all seed-grown SWEETFLAG are *A americanus*.

Associates: Provides waterfowl habitat. Waterfowl eat the seeds & use the cover for nesting. Wood ducks eat seeds. Aquatic furbearers use the entire plant for food & cover. Muskrats eat rhizomes. Reported to be deer resistant. But also reported to attract hummingbirds! Walnut tolerant. Sp is susceptible to infection by *Uromyces sparganii* (Uredinales) (Thompson in fna)

ethnobotany: Roots & crushed leaves are fragrant; some say the odor resembles tangerines. The root is said to have antibacterial properties, & is aromatic, stimulant, & tonic. The distribution of Native American tribes who have ethnobotanical uses for SWEETFLAG correspond to the range of the native sp, all who lived near it used the plant. Species was used for numerous medical conditions, from a panacea to a prophylactic. Root used as medicinal plant by Ojibwa, Menominee & Pottawatomie (sm23, 32, 33). Used as a cold medicine by Ojibwa (dn28); also used for fevers & coughs. Species also used technologically, with the leaves used for thatching wigwams by Menominee (sm23). Used as a fishing medicine on net by Ojibwa (sm32). Root used for dying, beverages, charms, perfume, & as part of a smoking mixture. Dry fruits were strung as beads.

VHFS: [*Acorus calamus* auct non L, *A calamus* L var *americanus* (Raf) H Wulff, *A calamus* L var *americanus* Raf (basionym)]



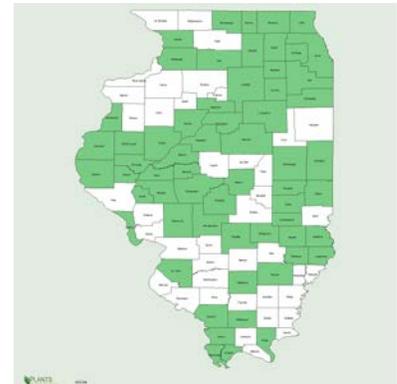
Acorus americanus fen, Stark County, Illinois, & nursery stock

Line drawing Mark Mohlenbrock, USDA-NRCS PLANTS Database / USDA NRCS *Wetland flora: Field office illustrated guide to plant spp.* Illinois map courtesy of ILPIN. North America map courtesy of BONAP (2010).

Acorus calamus Linnaeus SWEET FLAG, aka CALAMUS, EUROPEAN CALAMUS, SWEET RUSH, (*calamus*, *calami*, from Dioscorides, from Latin *calamus*, *calami* m, reed, reed-like, cane; reed pen; reed or pan pipe; arrow; fishing pole; stalk; sweet flag; branch; arm; branch of a candelabrum, for the foliage, also applied to sedges & grasses, from Greek κάλαμος, *kalamos*, reed, cane; alternately *calamo* may be from Greek mythological figure *Kalamos*, the son of *Maiandros* (*Meander*), god of the Meander River, or in one source, Latin, *calamus* of the shops.) obligate

Habitat: Similar to the above, but more often in less conservative habitats. Shallow ponds & marshes, in water less than 20". **distribution/range:** Native of Eurasia, but introduced into North America by early European settlers. According to M (2002), occasional to common throughout Illinois. Compare with the above Illinois map.

Culture: This taxa in North America is a sterile triploid. No seed in North America means no seed culture.



Bearing in mind this sp produces fertile seed in Europe & Asia, Kew Royal Botanic Garden notes Storage Behaviour: Uncertain; Thousand Seed Weight: 3.720g;

“The sp has been shown to form a transient soil seed bank, with seeds persisting in the soil for <1 year (Thompson et al 1997). Although this may suggest that seeds of the sp are short-lived under ambient conditions, & perhaps recalcitrant or intermediate, a number of factors may have resulted in the inclusion of orthodox seeds within this category (see Thompson et al 1997 for further detail). Further research is necessary before the storage behaviour of the taxon can be reliably classified.”

<http://data.kew.org/sid/SidServlet?Source=epic&ID=713&Num=wxy>

cultivation: Plugs & rhizomes (root cuttings) commonly available. Rhizomes planted 2-5" deep with well-placed roots below shoot. Plant on 1-3' centers to allow room for rhizomes to spread. Newly planted

rhizomes & plugs are not flood tolerant; drawdown must be maintained until planting is established. Survival rates as high as 100% are known (usda 1997). Plant 1000 roots or plugs per acre (anon 1981).

Description: Introduced erect, perennial, emergent, semi-aquatic herb; sweetish smell when crushed; roots long aromatic rhizomes, minimum root depth 10"; stems 2-3(-6) ft; leaves sweetly aromatic, crowded at the base, long, narrow, sword-like, only midvein prominently raised, 1 wavy margin; inflorescence 2"-4" dense thick, pointed spadix protruding from the side of leaf-like spathe; flowers yellow-green to green-brown, 6-merous; fruit dry brown berry, does not produce fertile seed in North America; $N 2n = 24, 36, 48$, *sensu lato*. $2n = 36$ *sensu stricto*. key features: Only midvein prominently raised, pointed spadix protruding from the side of leaf-like spathe. *A calamus* generally has longer & wider leaves & longer spadices than *A americanus*.

Comments: status: Introduced, naturalized. phenology: Flowers 4-5(6). Mildly aggressive, rhizomatous. Aromatic, especially the rhizome. Midvein of the leaves well developed, more prominent than the lateral veins. The size range of the leaves & spadix does overlap, but *A calamus* generally has longer & wider leaves & longer spadices. Rhizomes form mat in upper 4-8" soil.

Associates: Provides waterfowl habitat. Aquatic furbearers use the entire plant for food & cover. Muskrats eat rhizomes. Waterfowl use the cover for nesting.

♂ *Acorus calamus* is also listed as poisonous to mammals. The volatile oil beta-asarone is said to cause illness, to be carcinogenic & to cause chromosome damage. There may be more beta-asarone in the sterile triploid sp than others (Turner & von Aderkas 2009). One may find references to *Acorus* as a psychoactive agent or as a legal high.

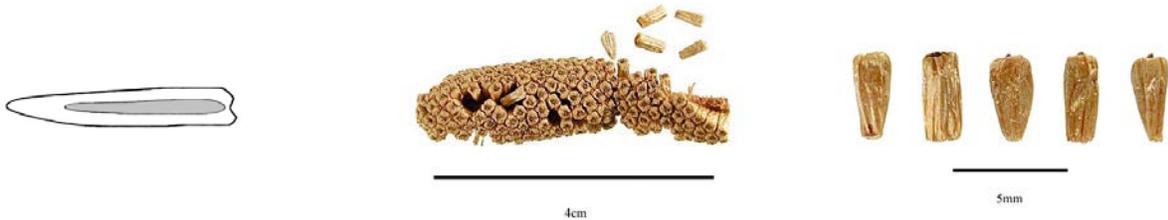
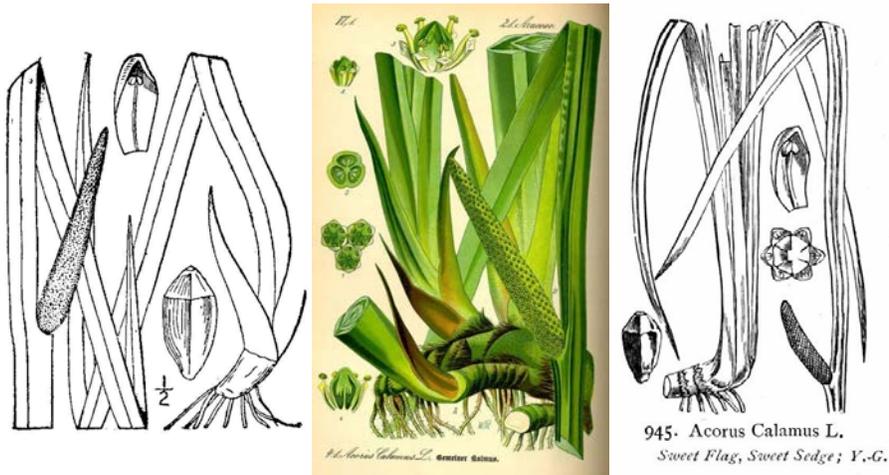
ethnobotany: This SWEET FLAG was brought from Europe by early immigrants as a useful plant. Species has medical uses ranging from an abortifacient to a vermifuge, & everything in between.

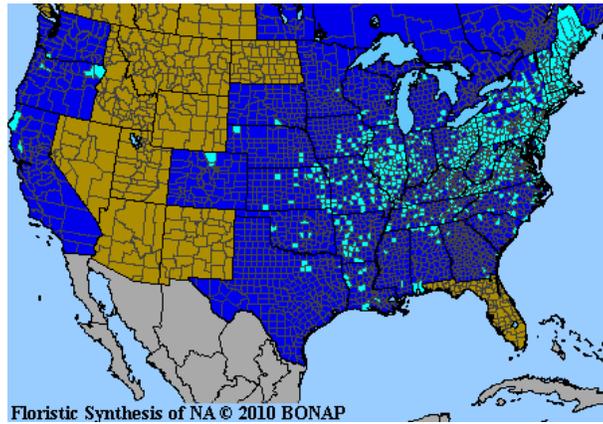
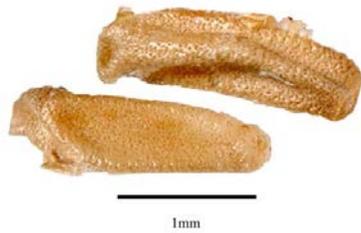
<http://www.ars-grin.gov/cgi-bin/duke/ethnobot.pl?ethnobot.taxon=Acorus%20c>

VHFS: Diploid & tetraploid populations are known from Asia.

K Thompson, JP Bakker, & RM Bekker, 1997. The Soil Seed Banks of North West Europe: Methodology, density & Longevity. Cambridge University Press, Cambridge.

OA Stevens, 1957. Weights of seeds & numbers per plant. Weeds, 5:46-55.





Acorus calamus

Line drawing Britton & Brown (1913) courtesy of Kentucky Native Plant Society. Color illustration Otto Wilhelm Thomé: *Flora von Deutschland, Österreich und der Schweiz* (1885) - Permission granted to use under GFDL by Kurt Stueber. Source: www.biolib.de. 2nd line drawing Walter Hood Fitch - *Illustrations of the British Flora* (1924) - Permission granted to use under GFDL by Kurt Stueber. Source: www.biolib.de. Illinois map courtesy of ILPIN. North America map courtesy of BONAP (2010). Embryo drawing scan, fruiting head, fruit & seed photographs by Robert J Gibbons, US National Seed Herbarium images.

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AGAVACEAE Endlicher 1841 AGAVE OR CENTURY PLANT FAMILY.

AGAVE *Agavaceae* *Agave* (ah-GA-vee) from Greek *agaue*, noble, for the stature of many spp. *Agave* was the daughter of *Cadmus*, the founder of Thebes who is credited with bringing the Phoenician alphabet to Greece. Many *Agave* live vegetatively for many years & die after flowering & maturing seeds, ie the century plant. Formerly *Amaryllidaceae*. Mohlenbrock (2014) places this in the *Lilaceae*.

Agave virginica Linnaeus See *Manfreda virginica* (Linnaeus) Rose.

MANFREDA Salisbury 1866 **TUBEROSE** *Agavaceae* formerly *Amaryllidaceae*. *Manfreda* New Latin, probably from honoring Manfredus de Monte Imperiale, fourteenth-century Italian writer on medical simples. Perennial American herbs that are closely related to & often included among those of the genus *Agave* from which they are distinguished chiefly by the bulbous stem base & annually decaying leaves. About 26 spp, primarily in the southwest United States, Mexico, & Central America.. Many *Agave* live vegetatively for many years & die after flowering & maturing seeds, ie the century plant, but not so *Manfreda*. Formerly in the genus *Agave*. $x = 30$. Mohlenbrock (2014) places this in the *Agavaceae*, others in the *Asparagaceae*. Formerly *Agave* Linnaeus sect *Manfreda* (Salisbury) Bentham & Hooker f.

Manfreda virginica (Linnaeus) Rose [or (Linnaeus) Salisbury ex Rose] * OH AMERICAN ALOE, aka AMERICAN AGAVE, FALSE ALOE, RATTLESNAKE MASTER, VIRGINIA AGAVE, VIRGINIAN AGAVE,

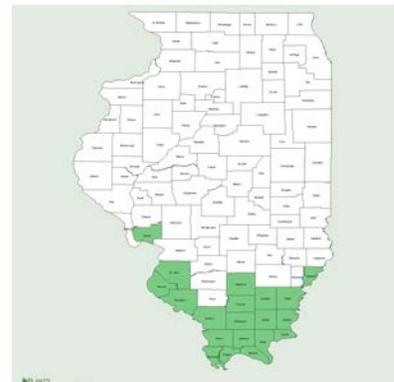
Habitat: Dry & sterile soil, sandstone outcrops, glades & dry woodlands.

distribution/range: This is the most widespread sp in the genus. Southern ¼ Illinois is the north-central limit of this sp & the genus. In our nursery, about 50% of the plants have survived a decade plus in annually-burned, well-drained, silty-sandy soil. They prosper in drought,

Culture: ①Moist cold stratify works fine, some plants flowers 3rd year in ground in sandy soils. ②Seeds exhibit physiological dormancy, with germination at 28°/18° C after cold stratification, with germination equal in light or dark (bb02).

Description: Herbaceous, perennial, native subshrub; roots; stems; leaves spreading, semi-succulent; flowers 3-merous, spidery, fragrant like EASTER LILIES; $N 2n = 60$. key features:

“Leaf shape and size in *Manfreda virginica* vary with soil type, amount of shade, length of cold period, and position of leaf in the rosette. Speckles and spots occur frequently on some leaves in most populations, and some authors have used the informal designation “forma tigrina” for such variants.” (Verhoek in fina)



Comments: status: Ohio threatened. phenology: Blooms 5-7. CAM CO2 fixation. In northern Illinois, collect seeds in October. Not monocarpic.

Great for rock gardens, xeriscaping, & green roofs. Exceptionally drought tolerant. In July 2012, sp thrived while the WSGs around it died.

This was formerly an *Agave*. All *Agave* are supposed to be, but this one, as an *Agave*, was listed as a perennial. A seed catalog from a cactus & succulent nursery in the southwest I received a few winters ago said all *Agave* are monocarpic. We shall see. Several in our planting set seed in 1997. All of these plants were marked to see if they survive parenthood. Spring 1998, several of the plants that flowered the previous fall are came back that spring. Most were still flowering in 2009, some in 2011. Our planting seems to thrive through the heat & drought of 2012 & 2013. It spreads slowly from seed in open loamy sands. Greenhouse increase is preferred. The fact that this sp is perennial may be why it is separated into a different genus.

Associates: Pollination is primarily by Sphinx moths.

ethnobotany: ☞ Sap may cause dermatitis. Definitely to your advantage to not confuse this with *Aloe vera*.

VHFS: [Formerly *Agave virginica* L, *A lata* Shinners *A tigrina* (Engelm) Cory, *A virginica* var *tigrina* Engelmann, *Allibertia intermedia* Marion, *Manfreda tigrina* (Engelm) Small, *M virginica* subsp *lata* (Shinners) O'Kennon, Diggs & Lipscomb, *M v* var *tigrina* (Engelm) Rose, *Polianthes lata* (Shinners) Shinners, *P virginica* (L) Shinners]

CC Baskin & JM Baskin, 2002. Propagation protocol for production of container *Manfreda virginica* (L) Salisb ex Rose plants; University of Kentucky, Lexington, Kentucky. In: Native Plant Network. URL: <http://www.nativeplantnetwork.org> (accessed 4 August 2011). Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.

JM Baskin & CC Baskin, (1971). The ecological life history of *Agave virginica* L in Tennessee cedar glades. Amer. Midl. Nat. 86, 449-462.



Manfreda virginica

Line drawing courtesy of Kentucky Native Plant Society. Seed photo Tracey Slotta USDA-NRCS PLANTS Database. - Not copyrighted image

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YUCCA Linnaeus 1753 **ADAM'S NEEDLE, BEARGRASS, SPANISH BAYONET, YUCCA** *Agavaceae* *Yuca* (YUK-a) New Latin *jucca*, from 15th century Carib or Taino *yuca*, or from Haitian, *yuca*, *manihot*, or *cassava*, or manioc (a genus of the *Euphorbia* family that was misapplied to these “liliaceous” evergreen shrubs or small trees with rosettes of sword-shaped leaves) because young inflorescences were sometimes roasted for food. The wood of *Yuca brevifolia* JOSHUA-TREE, fluoresces yellowish gray under ultraviolet lights. x= 25, 30.

Seeds ripen late summer, but may persist into winter in the pods. Most pods contain seeds that have been eaten by yucca moth larvae, & should be discarded. Seeds require moist cold stratification. The seed coat may be perched on the tip of the emerging cotyledon. Seedlings should be transplanted before the taproot becomes long. Code B seeds will germinate upon shifting to 70°F after 90 days of cold moist stratification at 40°F. Seedlings are somewhat slow to mature. Root cuttings are possible but not recommended. Offsets may be produced by damaging main root with a knife. (cu00)

Seed germs 1-2 weeks, with dormant seed coming up 2nd & 3rd year. Seed can be long lived, JLH reports a 6-year-old lot giving 95% germination. Some spp benefit from light scarification (jlh).

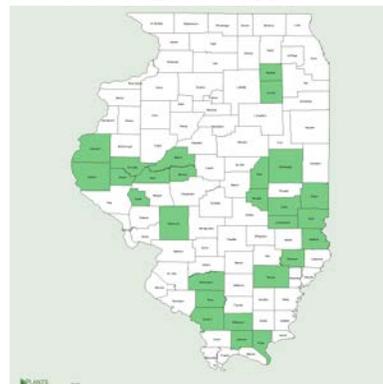
Yuca nomenclature in Illinois is confusing. According to Mohlenbrock (2014), the common escaped yucca in Illinois is *Y smalliana* Fern. *Y flaccida* is adventive in a cemetery in Jackson Co. The common escaped element is far more common than mapped. Known but not mapped from Bureau, Lee, & Whiteside cos.

Yuca filamentosa Linnaeus **ADAM'S NEEDLE, aka BEAR'S THREAD, CURLYLEAF YUCCA, SPOONLEAF YUCCA**, (*filamentosus -a -um* (fee-lah-men-TO-sus) thread-like, fibry, with filaments or thread, formed of filaments or fibers, filamentous.)

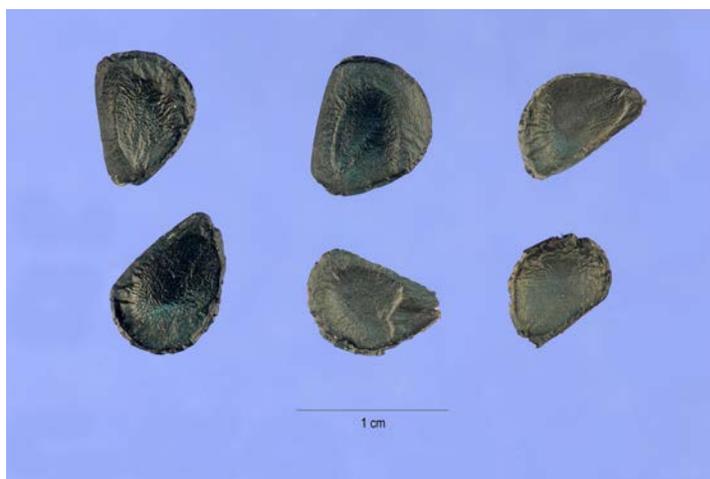
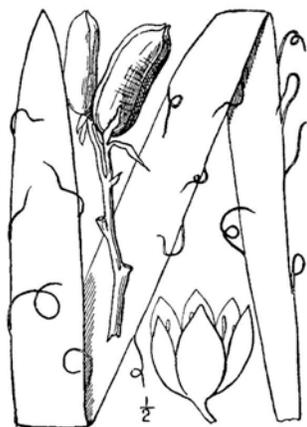
This taxon is far more common than the Illinois map indicates. FNA limits *Y filamentosa* to the se USA.

Culture: ① Sow at 22-24°C (71-75°F), germination in less than 2 weeks (tchn). ② Cold treatment improves germination, but is not necessary.

Description: Waxy white 2” flowers in large panicles, followed by stalk of brown black seed capsules; 6-8’ tall; rosette of evergreen 1-2” wide sword-like leaves to 2’ long. Zone 4.



The naturalized plants in the Midwest are treated as *Yuca filamentosa* or *Y flaccida* Haworth. Hess & Robbins (2003) in fna note “Perhaps *Yuca flaccida* should be considered a variety of *Y filamentosa*. The morphological differences are minor. The former has thinner, narrower leaves, & smaller, narrower flowers 4–5 cm long, whereas the latter has thick, rigid leaves & flowers 5–7 cm long.”





Yucca filamentosa

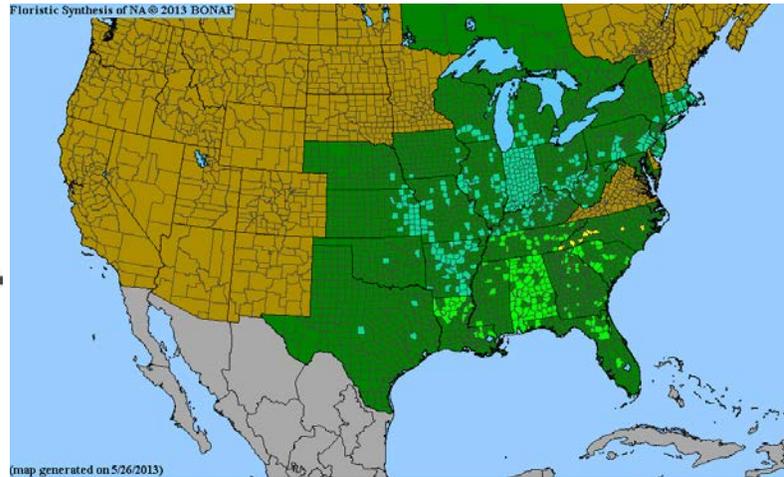
Line drawing courtesy of Kentucky Native Plant Society. Seed photo Steve Hurst, USDA-NRCS PLANTS Database. - Not copyrighted image

Yucca flaccida Haworth

In the se USA, “thin soils around rock outcrops, woodlands, roadsides, disturbed areas” (w12).

distribution/range: FNA maps *Y flaccida* from s & wc Illinois. BONAP (2013) maps only this taxon from Illinois. Adventive northward over much of its range.

“Whether or not this taxon is valid (and if so, as a variety or as a species) has been unclear; further research is needed” (w12). Our landscape plantings were severely set back by the winter of 2013-14. But, who was not?



Yucca flaccida

Yucca glauca SOAPWOOD YUCCA, aka BEAR GRASS, GREAT PLAINS YUCCA, SOAPWEED, SOAPWELL, SPANISH BAYONET, SMALL SOAPWEED, (*glaucus -a -um* (GLOW-kus) glaucous, a white powdery or waxy coating on a leaf or fruit giving a grey-green, dull green, or grayish blue appearance, as in grapes or cabbage, from Latin *glaucus -a -um* , bright, sparkling, gleaming, bluish-grayish, bluish-green, sea-blue, lavender from Greek *glaukos*.)

Habitat: Dry plains & slopes. distribution/range: Native west of our area.

Culture: ☉ No pre-treatment necessary other than cold, dry stratification (pm09). No pretreatment needed. Sow seeds just below the soil surface at 70°F. & water. (ew11) Sow at 22-24°C (71-75°F), germination in less than 2 weeks (tchn). 28,800 (pm02, ew12) seeds per pound.

cultivation: Space plants on 1.5-2.5’ centers. Dry soils, full sun. Once established, drought tolerant.

Our plants do poorly in annually burned landscapes, so plant away from fuel spp. Hardy to zone 3.

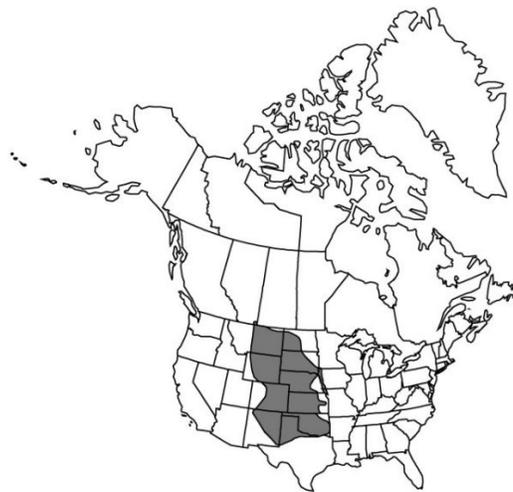
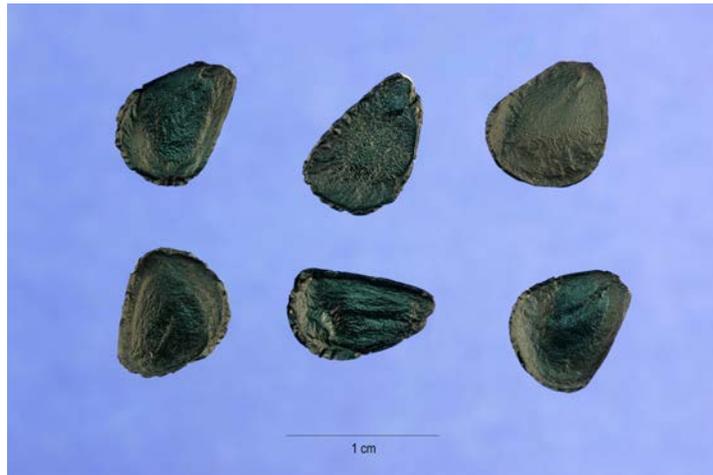
Description: Rosette of finer 0.5-1.0” stiff, pointed, spike-like, blue green leaves, terminating in a sharp point. Greenish white flowers in large spike, 2.0-5.0’, on tall solitary stalk from center of plant, followed by larger seed capsules.

Comments: status: phenology: Blooms Great for naturalizing & xeriscaping. One of the few perennial flowers enjoyed & grown from seed by Bill Lubbs.

Associates:

ethnobotany:

VHFS:



Yucca glauca

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ALISMATACEAE Ventenat 1799 **WATER PLANTAIN** or **ARROWHEAD FAMILY**, Annual or perennial shoreline & wetland herbs, 12 genera, about 80 spp (4 genera & 34 spp in northern North America) with long-petioled, occasionally floating leaves & white flowers, nearly worldwide, primarily tropical & subtropical. Fruits are achenes or follicles. Formerly *Alismaceae*.

ALISMA Linnaeus 1753 **WATER PLANTAIN** *Alismataceae* *Alisma* New Latin, from Latin, water plantain, from Greek name for a water plant from Dioscorides. (*plantago-aquatica* is literally water plantain, the common name) A genus of about 9 spp of herbs, cosmopolitan, 5 spp in northern North America. The fresh leaves & roots are toxic but the toxic principal is destroyed by heat or by drying. $x = 7$. Family formerly known as *Alismaceae*.

For plant production, sow fresh seed in a cold frame in a flat setting in another non-perforated flat half full of water. Divisions in spring or fall.

Some consider all our water plantain to be *A plantago-aquatica* Linnaeus, with var *americanum* Roemer & Schultes, **LARGE FLOWERED WATER PLANTAIN**, & var *parviflorum* (Pursh) Torrey, **COMMON WATER PLANTAIN**. *A plantago-aquatica* Linnaeus is the **EURASIAN WATER PLANTAIN**, which is introduced in

Alaska & Washington (N 2n = 14). Illinois has *A subcordatum* & *A triviale*, with *A gramineum* native immediately southwest, west, & north of Illinois.

Alisma lanceolatum, *parviflorum*, *plantago-aquatica*, sow at 22°C (72°F) in muddy compost for 2-4 wks, move to 2°C (34°F) for 4-6 wks, after which temperature should be raised gradually (tchn).



Alisma plantago-aquatica

Seed photo Steve Hurst, USDA-NRCS PLANTS Database. - Not copyrighted image

Alisma gramineum Lejeune GRASSLEAF WATER PLANTAIN, aka *ALISMA GRAMINOIDE*, NARROWLEAF WATER PLANTAIN, (*gramineus -a -um* grassy, grass-like, relating to grain.)

Habitat: Shallow water, muddy soil. In the se USA, “in seasonally flooded areas in impoundments” (w11).

distribution/range: Circumboreal, rare in Wisconsin, Iowa, central Missouri. (distribution USDA, not fina)

Culture:

Description: Native, erect or floating-leaved, perennial, emergent aquatic; roots minimum depth; stems 4.0-8.0”; leaves basal rosette, parallel veined, usually submerged, very thin & long, when emergent, on stout stalks, lance-shaped tapering to the base, 2.5-5 times long as wide; inflorescence of 4 or more whorls of flowers per stalk, with stalk taller than the leaves; flowers white to pink, or faint purplish white, 3-merous, petals obviously longer than the sepals; fruit is dense ring of dry seeds, the ridge on the back of each seed grooved on either side; N 2n = 14. key features:

Comments: status: phenology: Blooms June - August.

Associates:

VHFS: [*Alisma geyeri* Torr, *A gramineum* Lej var *angustissimum* (DC) Hendricks, *A gramineum* Lej var *geyeri* (Torr) Lam, *A gramineum* Lej var *graminifolium* (Wahlenb) Hendricks, *A gramineum* Lej var *wahlenbergii* auct non (Holmb) Raymond & Kucyniak [misapplied], *A lanceolatum* Gray, *A plantago-aquatica* L var *americanum* JA Schultes]



Alisma gramineum

Line drawing courtesy of Kentucky Native Plant Society. Second line drawing Mark Mohlenbrock, USDA-NRCS PLANTS Database / USDA NRCS *Wetland flora: Field office illustrated guide to plant spp.* Not copyrighted image.

Alisma subcordatum Rafinesque COMMON WATER PLANTAIN, aka *ALISMA SUBCORDE*, AMERICAN WATER PLANTAIN, MUD PLANTAIN, SMALL-FLOWERED WATER PLANTAIN, SOUTHERN WATER-PLANTAIN, WATER-PLANTAIN, (Latin *subcordatum*, somewhat heart-shaped, from *sub*, below, under, almost, approaching, in botanical usage, less so than a similar plant, & *cordatum*, heart-like, from *cord-*, heart, soul, mind, & *-atus*, possessive of or likeness of something.) Obligate

Habitat: Seasonally inundated, common in agricultural wetlands & hydric soil seed banks; shallow marsh, 0-6" water depths, mudflats & shorelines that dry up at end of growing season. Marshes, quiet to slow moving streams, muddy shores. Organic or silty soils. Often present in many hydric soil seed banks. "Species is distributed in alkaline situations & ditches" (Ilpin).

distribution/range: In almost every Illinois county.

Culture: propagation: ① 30 days cold moist stratification (pm09). No pre-treatment needed(?). Sowing outdoors in the spring is the easiest method (he99). Dormant seed or moist cold stratify (30), saturated soils, alternating temperatures. Small seeds require light to germinate. Some say seeds require scarification with sandpaper. May require alternating temperatures in moist, saturated to almost subaqueous conditions. Good establishment strategy is broadcast fresh seed on wet mudflats or on shorelines in the fall to provide natural stratification. Water levels must recede in spring, exposing bare mudflats for germination. Growth rate moderate. Seedling vigor medium. Vegetative spread rate none. Seed spread rate moderate. 825,000 (usda, ecs); 897,233 (gnarh04); 960,000 (pm02); 1,122,800 (jfn04); 1,212,834 (gnh11); 1,123,200 (aes12); 1,371,601 (gnh02); 1,407,752 (gna03); 1,568,000 (wns01 *A plantago-aquatica*); 4,450,980 (gnh06) seeds per pound. In mixes plant 0.06-0.50 lb pls per acre (us97), or 1 pls lb in emergent mixes, 0.125 in wetland mixes (gni). Seed, plugs, & rootstocks available, but plugs or quarts may sell out early.



cultivation: Space plants on 1.0-1.5' centers. Best established from potted materials. Plant rootstocks or plugs 2-5" deep, or at the same soil level where they have been growing. Full sun. Tolerates periodic inundation for short periods; Upper & lower shoreline zones. Nutrient load tolerance moderate. Siltation tolerance moderate. Tolerant of medium & fine textured soils. Anaerobic tolerance high. CaCO₃ tolerance medium. Drought tolerance none to moderate. Fertility requirement medium. Salinity tolerance none or moderate, some tolerance reported by AES. (<0.5 parts per thousand salt content usda). Shade intolerant. pH 7.0-8.8, or pH 5.0-7.0 (ecs).

bottom line: This seed is strongly dormant & should be dormant seeded. Nonetheless, constructed basins should be seeded when ground conditions allow. Consistently strongly dormant. Germ 5.8, 2.0, 1.0, sd 6.2, r0.0-20 (20)%. Dorm 84.5, 86, 86, sd 7.9, r69-95 (26)%. Test 35, 30, 29, r24-49 days.**

Description: Erect or floating, herbaceous, perennial emergent aquatic, native forb; roots minimum depth; stems (0.25-)1.0-3.5'; leaves in basal rosettes, parallel veins, ovate to elliptical, long-stalked, smooth & firm, aquatic or terrestrial; inflorescence of 4 or more whorls of flowers per stalk, with stalk taller than the leaves; flowers small, white, occasionally pink or rose, 3-merous, 0.13" wide, petals only slightly longer than the sepals; fruits are a dense ring of dry seeds (achenes), each seed with 1 groove on the back; N 2n = 14. key features: flowers 0.13" wide, petals only slightly longer than the sepals, fruits with 1 groove on the back. "This variety has flowers which are smaller than those of *Alisma plantago-aquatica* L var *americana* Roem & Schultes" (Ilpin).

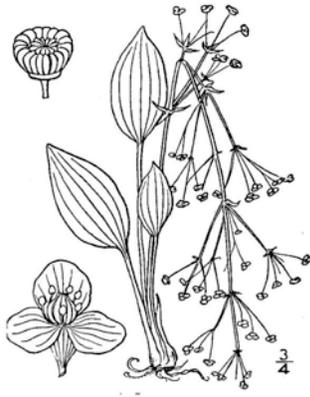
Comments: status: phenology: Blooms 7,8,9. Collect seeds July to October. Grows rapidly in early spring. Used for wetland restoration, stream bank stabilization, & permanently-wet, vegetated swales & rain gardens. Reported as salt tolerant. Abundant seed producers. Seed source restored wetlands & farmed wetlands, Green River Lowland, Tampico Twp, Whiteside Co & College of DuPage plantings, DuPage Co.

"If the size of the petals is taken as the criterion this sp is the less common. The petals are triangular & are not more than 2 mm long. The two spp grow together in a ditch in Kent Creek bottom on North Central ave. Rockford." (ewf55)

Associates: Waterfowl, songbirds, pheasants, & rodents eat achenes. Leaves are sometimes eaten by rabbits & deer. Plants provide shade & cover for fish.

ethnobotany: "In autumn or spring, when roots & solid stem bases are well filled with starch, it can be cooked as a starch vegetable" (Ilpin).

VHFS: [*Alisma parviflorum* Pursh, *A plantago-aquatica* L subsp *subcordatum* (Raf) Hultén, *A plantago-aquatica* L var *parviflorum* (Pursh) Torr]



Alisma subcordatum

Line drawing courtesy of Kentucky Native Plant Society. Second line drawing Mark Mohlenbrock, USDA-NRCS PLANTS Database / USDA NRCS *Wetland flora: Field office illustrated guide to plant spp.* Not copyrighted image.

Alisma triviale Pursh *NJ, PA LARGE-FLOWERED WATER PLANTAIN, aka *ALISMA COMMUN*, AMERICAN WATER PLANTAIN, BROAD-LEAVED WATER PLANTAIN, LARGE WATER PLANTAIN, NORTHERN WATER PLANTAIN, (*trivialis -is -e* triv-ia'lis (triv-ee-AY-lis) triv-ia'le (triv-ee-AY-lee) common, ordinary, unimportant; wayside, of crossroads, from *trivium*, a place where three ways meet; a crossroads; a place where people commonly met & made small talk, discussing common things, or trifles.)

Habitat: In muddy soil or shallow water, sloughs or temporary pools.

distribution/range: North 1/3 of Illinois, rare south, Wabash County.

Culture: ☉ 30 days cold moist stratification (pm09).

bottom line: This seed is strongly dormant & should be dormant seeded. Nevertheless, constructed basins should be seeded when ground conditions allow. Germ 3.7, 1.0, 1.0, sd 3.8, r1-9 (8.0)%. Dorm 87.3, 91, 91, sd 5.2, r80-90 m(11)%. Test 33, 30, na, r29-39 days.**

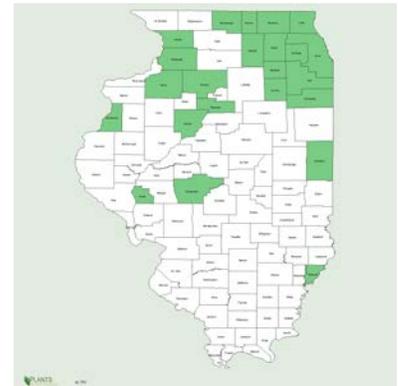
Description: Erect or floating perennial emergent aquatic, native forb; roots minimum depth; stems 4.0-40"; leaves in basal rosettes, parallel veins, linear to lance-like to widely elliptical or oval, long-stalked, smooth & firm, aquatic or terrestrial; inflorescence of 4 or more whorls of flowers per stalk, with stalk above the leaves; flowers white, 3-merous, 0.33" wide, petals half again as long as the sepals; dense ring of dry seeds, each seed with 1 groove on the back; N. **key features:** Similar to *Alisma subcordatum* whose flower is 0.13" wide, petals 1/2 again as long as the sepals, seed with one groove on the back. "Flowers larger than *A plantago-aquatica* var *parviflorum*" (Ilpin).

Comments: **status:** Endangered in New Jersey & Pennsylvania. **phenology:** Blooms June - September. C3. 974,249 (gniapm2006) seeds per pound. Seed source DeKalb Co.

"Most of our plants are of this sp having petals 3 mm or more long. The petals are rounded & the free border somewhat fluted, a very obvious feature in fresh plants." (ewf55)

Associates: **ethnobotany:** When roots & solid stem bases are well-filled with starch, cooked as a starchy vegetable" (Ilpin).

VHFS: [*Alisma brevipes* Greene, *A plantago-aquatica* L subsp *brevipes* (Greene) Sam, *A plantago-aquatica* L var *americanum* Schult, *A plantago-aquatica* L var *brevipes* (Greene) Vict]





Alisma triviale

Line drawing courtesy of Kentucky Native Plant Society.

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ECHINODORUS LC Richard ex Engelmann in A Gray 1848 **BURHEAD, MUDBABIES** *Alismataceae*
Echinodorus from Greek *echius*, rough husk, & *doros*, leathern bottle, referring to the ovaries, which in some spp are armed with persistent styles, forming prickly head of fruit, in reference to the fruiting heads of *E berteroi*. A genus of ca. 9 (26, 4 in northern North America) spp of herbs, Western Hemisphere, sub cosmopolitan. *Echinodorus berteroi* (Spreng.) Fassett has recently been found in a restored pothole wetland in Kane County & an artificial pond in Will County (unknown in ne Illinois before 1995). In northwest Illinois, it has been recorded from Bureau & Carroll counties & recently discovered in Henry & Rock Island counties. Apparently a hydric soil seedbank sp, it appeared in an early successional community in hydric soils in drowned cropland near Rock River, Rock island Co in 2008; the Kane county record is also from formerly drained agricultural land. Also, in drainage ditches on Rt. 92, north of Hoopole, Henry Co. 1,712,000 (pm11) seeds per pound. Individual colonies may be short lived. The achenes are eaten by many bird spp. Family formerly known as *Alismaceae*.

The dried root of *Echinodorus berteroi* (Sprengel) Fassett is report to have an antiepileptic & antineurotic effect.

R Van Lonkhuyzen, K Dritz, & K Johnson, 2006, *Echinodorus berteroi* ver. *lanceolatus*: A Species New to Northeastern Illinois, *Erigenia*, Number 21, Nov 2006, pp 40-43.

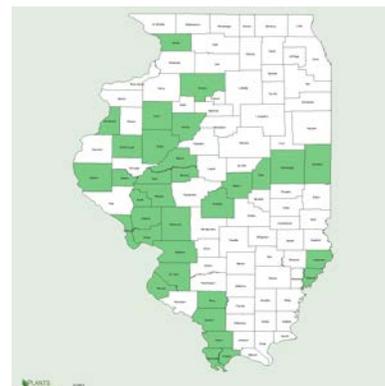
Echinodorus berteroi (Sprengel) Fassett *IN, KY, OH, TN, WI UPRIGHT BURHEAD, aka BUR-HEAD, ERECT BURHEAD, CELLOFANSVALTING (SW), TALL BUR-HEAD, UPRIGHT BURRHEAD, (*berteroi* ber'teroi (BER-ter-oy) for Carlo Guiseppe Bertero (1789-1831), Italian physician.)

Habitat: "Low wet woods, sloughs, margins of oxbow lakes, backwaters of major rivers, wet ditches, & swamp edges" (Ilpin). distribution/range: "Wet ditches, edges of swamps; scattered in the s ¾ of the state; also Bureau & Carroll cos" (m14). Northern Illinois is at the northern limit of the sp distribution. Known from Sauk County Wisconsin. North America, Mexico, South America, & the Caribbean. Scattered in southern three-fourths of Illinois, very rare elsewhere.

Culture: propagation: ① Kew Royal Botanic Garden notes Storage Behaviour: Orthodox; Thousand Seed Weight: 0.28g; 89 % viability following drying to mc's in equilibrium with 15% RH & freezing for 14 weeks at -20°C at RBG Kew, WP.

75 % germination; pre-sowing treatments = seed scarified (covering structure removed), then imbibed on 1% agar for 4 weeks at 20°C, then seed further scarified (seed coat pierced); germination medium = 1% agar; germination conditions = 20°C, 8/16; (RBG Kew, Wakehurst Place.)

89 % germination; pre-sowing treatments = seed scarified (covering structure removed), then imbibed on 1% agar for 4 weeks at 25/10°C, then seed further scarified (seed coat pierced); germination medium = 1% agar; germination conditions = 25/10°C, 8/16; (RBG Kew, Wakehurst Place.)



84 % germination; pre-sowing treatments = seed scarified (covering structure removed), then imbibed on 1% agar for 4 weeks at 25°C, then seed further scarified (seed coat pierced); germination medium = 1% agar; germination conditions = 25°C, 8/16; (RBG Kew, Wakehurst Place.)

asexual propagation:

cultivation:

bottom line:

greenhouse & garden:

Description: Native, erect, annual (annual or perennial, annual or short-lived perennial) forb; rhizomes present; achene; $N 2n = 22$. key features: “*Echinodorus berteroi* is an extremely easy sp to recognize when in fruit. The elongated beaks of the fruits project upward, giving the fruiting head an echinate appearance.” (Haynes & Hellquist in fna).

Comments: status: Extirpated in Indiana. Threatened in Kentucky. Special Concern in Wisconsin. phenology: Blooms June(July) - October. C3.

Associates:

ethnobotany: “Often sold as decorative plants for tropical fish aquaria, as "poor man's lace plant"” (Ilpin).

VHFS: [*Alisma berteroi* Sprengel (basonym), *Echinodorus berteroi* (Spreng) Fassett var *lanceolatus* (Engelm ex S Watson & JM Coult) Fassett, *E berteroi* subsp *patagonicus* (Speg) Rataj, *E rostratus* (Nutt) Engelm, *E rostratus* (Nutt) Engelm f *lanceolatus* (Engelm ex S Watson & JM Coult) Fern, *E rostratus* (Nutt) Engelm var *lanceolatus* Engelm ex S Watson & JM Coult]

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SAGITTARIA Linnaeus 1753 **ARROWHEAD** *Alismataceae* *Sagittaria* New Latin, from Latin *sagitta* arrow, & New Latin *-aria*, for the arrowhead leaves. About 25 (30, 24 northern North America) spp of perennial, rarely annual, aquatic herbs of temperate & tropical regions, primarily of the Americas, Europe & Asia, having basal often sagittate or hastate leaves & scapose flowers with 3 sepals & 3 deciduous white petals.

Lophotocarpus T Durand is often included in this genus. Marsh birds & shorebirds eat seeds. Waterfowl eat seeds, tubers, & plants. Aquatic furbearers eat tubers & plants. $x = 11$. Family formerly known as *Alismaceae*.

Sagittaria sagittifolia, sow at 22°C (72°F) in muddy compost

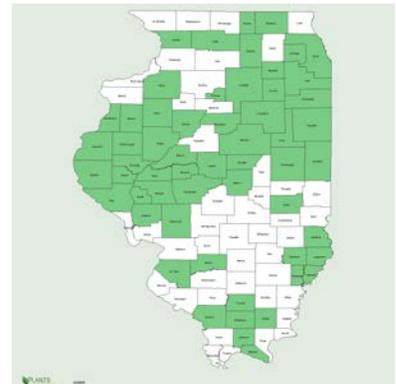
Sagittaria brevirostra Mackenzie & Bush *TN SHORTBEAK ARROWHEAD, aka ARROWHEAD, MIDWESTERN ARROWHEAD, *SAGITTARIA CUNEATA*, (*brevirostris*, *brevirostra* with short beaks.)

“Slightly basic to slightly acidic to alkaline waters of ponds, lakes, & swamps; 100—1800 m” (Haynes & Hellquist in fna).

Threatened in Tennessee.

“They are found in the same places but this & the next (*S cuneata*) are much less common than *S latifolia*. This has an erect beak, the achenes are unequally winged & the bracts are lanceolate.” (ewf55)

[*Sagittaria engelmanniana* J G Smith subsp *brevirostra* (Mackenzie & Bush) Bogin]



Line drawing Britton & Brown (1913) courtesy of Kentucky Native Plant Society. Illinois map courtesy plants.usda.gov.

Sagittaria cuneata E Sheldon *CT, MA, NH, NJ, OH ARUMLEAF ARROWHEAD, aka ARUM LEAVED ARROWHEAD, ARUM-LEAF ARROWHEAD, DUCK POTATO ARROWHEAD, NORTHERN ARROWHEAD, *SAGITTAIRE CUNÉAIRE* (F), *WAPATO*, (*cuneatus -a -um* cuneate, wedge shaped, pointed from Latin *cuneatus*, adjective, pointed, wedge shaped.)

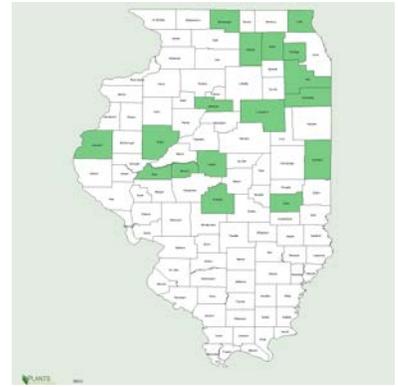
“Calcareous & muddy shores & shallow waters of rivers, lakes, ponds, pastures, & ditches, occasional in tidal waters, or in deep flowing water with slow current; 100--2500 m” (Haynes & Hellquist fna). Species occurs only in the northern ½ of Illinois.

Native, erect or floating, perennial, emergent, aquatic forb; 4"-24" tall, leaves long-stalked, arrow-shaped to long & narrow, lower lobes usually much shorter than the top lobe; inflorescence 2-10 whorls of flowers, 1 to many stalks either erect or bending & often branched; flower: white, 3-merous, 0.25-0.75" wide; fruit dry, flattened, winged achene with a small, upright beak; 2n = 22. key features: “*Sagittaria cuneata* is extremely variable. On emerged plants, the leaf petioles are often bent toward the ground. Submersed plants often grow from a basal rosette with a long flexuous petiole & a floating sagittate leaf. Plants in deep rivers often develop broad, straplike phyllodia” (Haynes & Hellquist fna).

Comments: status: Special concern in Connecticut. Threatened in Massachusetts, New Hampshire, & Ohio. Endangered in New Jersey. phenology: Blooms July-Sept. C3. “The least common arrowhead. It is found in the prairie slough at the intersection of Alpine & Sandy Hollow roads. The achene is equally winged & the bracts are lanceolate.” (ewf55) “Plants are usually monoecious, staminate or perfect at top, the lower pistillate. Species can also be dioecious.” (Ilpin).

“Root & tuber are probably edible after boiling or baking for about half an hour” (Ilpin).

[*Sagittaria arifolia* Nutt ex JG Smith]



Line drawing Britton & Brown (1913) courtesy of Kentucky Native Plant Society. Photo Robert H Mohlenbrock USDA-NRCS PLANTS Database - Not copyrighted image.

Sagittaria indianiensis D Quayle INDIANA or HOOSIER DUCK POTATOE (Endemic of Indiana)

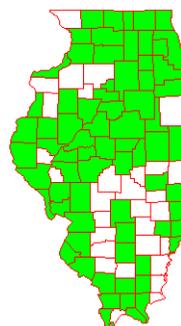


Sagittaria latifolia Willd *MI? ARROWHEAD, aka ARROWLEAF, BROADLEAF ARROWHEAD, COMMON ARROWHEAD, COMMON ARROWLEAF, DUCK POTATO, DUCK ROOT, WAPATO, WAPATOO (Chinook jargon *wapatoo*, from Cree *wapatowa*, white mushroom),

Muj`ota`buk, moose leaf (Ojibwa), (*latifolius -a -um* (la-tee-FO-lee-us) flat-leaved, wide-leaved, broad leaved, from Latin adjective, *latus*, broad, wide, *-i-*, connective vowel used by botanical Latin, & the adjective *folius*, from *folium*, leaf.)

Obligate

Habitat: Seasonally inundated areas, ponds & streams, farmed wetlands, water or wet places. Swamps, ponds, streams.



“Almost any inland water except with strong lime, alkali, or salts; rich soils of damp lowlands, mud flats, & water up to 1½ ft deep. A common & characteristic plant of the muddy, marshy edges of ponds & streams. Somewhat aggressive, forming solid stands in artificial waterways; tolerates polluted waters.” (Ilpin)
distribution/range: *S longirostra* is known from Pope, Pulaski, & Union counties in southern Illinois.

Culture: ① 60 days cold moist stratification (pm09). Dormant seed for natural stratification. Broadcast seed & cover w/ thin layer of soil. Germination may extend into 2nd year, bottom heat may help, saturated soils. Both seed & tubers must be planted in moist to saturated soils.

Clean, dry seed should be stored at 5°C for 8 weeks to allow after-ripening. Dry refrigerated seeds remain viable for three years (McIninch & Garbisch 2003). Seed can be soaked under refrigeration for 4 weeks for more consistent germination, or dry seed can be directly sown. Germination & growth are best in spring when days are warm & nights are cool. Seeds require light to germinate. Subirrigation works well; young plants require cool water. (Hunter-Cario 2007) “No pre-treatment needed. Sow seeds just below a wet, muddy soil surface at 75°F & water.” (ew12)

Spreads rapidly by rhizomes. *In situ* tubers will survive freezing & oxygen depletion. Growth rate moderate. Seedling vigor typically does not apply outside the greenhouse. 67,000 (usda); 907,200 (jfn04, aes10); 942,400 (ew12); 963,200 (wns01); 976,000 (pm01); 1,173,127 (gnarh04); 1,552,136 (gnh03), 1,669,118 (gna06); 2,025,000 (gnh11); 2,072,000 (Hunter-Cario 2007) seeds per pound. In seed mixes plant 0.12 - 0.19 lb pls per acre (usda 1997). Seeds, tubers, & bareroot & potted plants are available commercially. Tubers are seasonal only, spring & fall. Potted plants are in short supply & may sell out early summer. The plants rapidly outgrow the plug containers, making quarts the mainstay.

cultivation: Space plants 1.5-2.0' centers, 1.0 in critical areas. Prefers water depth of 6.0-20", or moist mudflats to 2.0-4.0" H2O. A member of long-lived, hydric soil seedbanks. Tolerant of some inundation for brief periods. Nutrient load tolerance moderate. Siltation tolerance low. Anaerobic tolerance high. CaCO3 tolerance high. Drought tolerance none. Fertility requirement low. Salinity tolerance none, but some tolerance reported by AES (2010). Shade intolerant partial to full sun. pH 4.7-8.6 (usda) or pH 5.9-8.8. Tubers are commonly used, but fresh, delivered bare-root material can work well. Courier shipped bare-root materials in summer are not advised. The current demand for tubers exceeds the supply. Tubers require 6-8 week cold period to break dormancy. Plant tubers 2-3", deep in spring. Plant bare root plants & tubers on 2-6' centers (usda 1997). Plant tubers on 1' intervals (Anon 1981). They must be protected from predators.

bottom line: Field establishment is best by dormant seeding, but seed when the wetland is accessible. Germ 6.6, 4.0, 4.0, sd 6.5, r0.0-21 (21)%. Dorm 82.8, 84, 84, sd 5.0, r74-91 (17)%. Test 36, 34, na, r24-48 days. (#15)**

Description: Perennial emergent or aquatic herb, 2.0-4.0', leaves 1-3', produces large white tubers, inflorescence up to 30". Spikes of white flowers.

Comments: status: Threatened in Michigan? *Sagittaria longirostra* (Micheli) JG Sm, endangered in Illinois, is placed here in synonymy by the USDA. DUCK POTATO is considered invasive in some applications in some part of the country (SWSS 1998). phenology: Blooms 7,8,9(10). C3. Wetland restoration, used in lower shoreline zones. Seed source drainage ditches, Green River Lowland, Fairfield Twp, Bureau Co, Fairfield Twp, Henry Co, & Hannaman Twp, Whiteside Co. “Plants usually monoecious, with staminate flowers above, pistillate ones below” (Ilpin). Many colonies of this plant do not appear every year, & populations vary widely from year to year. Perennates as tubers. “The common arrowhead. Bracts are ovate.” (ewf55)

Associates: Attracts waterfowl. Provides waterfowl & wildlife food. Small tubers & seeds eaten by rails, ducks, & swans esp. canvasback ducks, gadwall ducks, trumpeter swans, & whistling swans. Muskrats, porcupines, & beaver eat tubers & plants. Provides habitat for macro-invertebrates & game fish, esp. channel catfish, white bass, shiners, & shad. Provides habitat for frogs, snakes & turtles. May serve as nesting material for black terns. Canada Geese may devour newly planted rootstock.

ethnobotany: “Large starchy tubers edible after baking or boiling for about 1/2 hour-"wappeto" of natural Americans; related sp cultivated in China” (Ilpin). Tubers available in late autumn. Taken from muskrat caches when possible. Tubers used as food by Ojibwa, Pottawatomie, & Sauk-Fox (den28, sm28, 33). Dried & stored. Used as medicinal plant by Ojibwa & Pottawatomie (den28, sm33). Ojibwa medicine for indigestion (dn28).

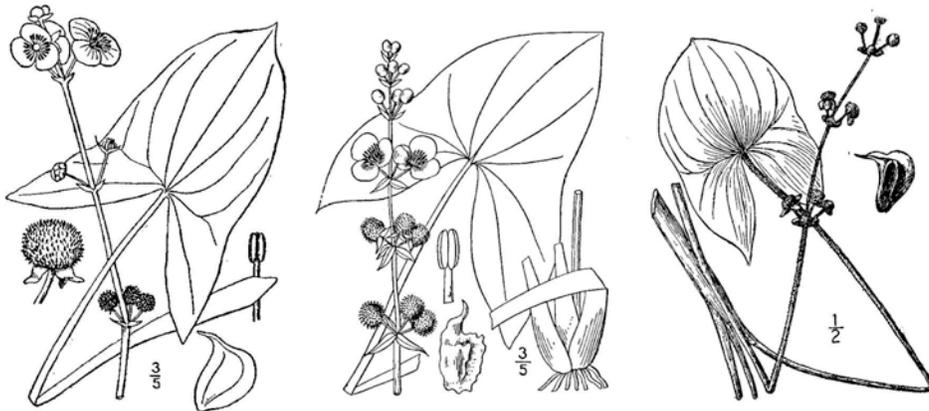
Sap may cause dermatitis in some individuals.

S cuneata Sheldon was used by Ojibwa & Menominee (sn23, 32). Indians raided tubers from muskrat

or beaver caches. Calcareous or muddy shores & shallow water, mud or water in sloughs, & along waterways. Blooms June-September.

VHFS: In Britton & Brown (1913), this is *S latifolia*, *S longirostra*, & *S pubescens*. [*Sagittaria chinensis* Pursh, *S engelmanniana* JG Sm ssp *longirostra* (Micheli) Bogin, *S esculenta* Howell, *S latifolia* Willd var *obtusata* (Muhl ex Willd) Wiegand, *S l* Willd var *pubescens* (Muhl ex Nutt) JG Sm, *S longirostra* (Micheli) JG Sm, *S obtusata* Muhl ex Willd, non Thunb, *S ornithorhyncha* Small, *S planipes* Fern, *S pubescens* Muhl ex Nutt, *S variabilis* Engelm var *obtusata* (Muhl ex Willd) Engelm, *S viscosa* C Mohr]

L Hunter-Cario, 2007, Propagation protocol for broadleaf arrowhead (*Sagittaria latifolia* Willd [*Alismataceae*]). Native Plants Journal 8(2): 80-83.



Sagittaria latifolia

Line drawings Britton & Brown (1913) *S latifolia*, *S longirostra*, & *S pubescens*, respectively, courtesy of Kentucky Native Plant Society..

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Sagittaria rigida Pursh *KY, ME, MA, OH, TN DEEP WATER DUCK POTATO, AKA DEER'S-TONGUE ARROWHEAD, *SAGITTAIRE DRESSEE*, SESSILEFRUIT ARROWHEAD, SESSILE-FRUITED ARROWHEAD, STIFF ARROWHEAD, (*rigidus* -a -um rigid, stiff, inflexible, from Latin *rigidus*, adjective stiff, hard, unbending, stern, inflexible, rigid, from the stiff leaves & erect habit.)

Habitat: “Found in almost any kind of bottomland, prefers water of slow moving streams, sloughs, large ponds, lakes from one to two & a half inches deep—for example, margins of natural upland sink-hole ponds, oxbow ponds, & artificial ponds. Also muddy borders of streams, ditches, & artificial waterways.” (Ilpin). “Calcareous or brackish shallow water & shores of ponds, swamps, & rivers, occasionally in deep water; 0--1000 m” (Haynes & Hellquist fna). distribution/range:

Culture: cultivation: ① Plant tubers on 1 foot intervals (Anon 1981).

bottom line:

greenhouse & garden:

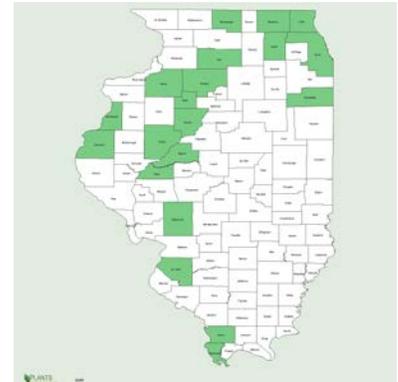
Description: Native, erect or floating, perennial, emergent aquatic forb; 0.25-2.0' tall; from stolons & corms; leaves broadly lance-shaped, sometimes with small lobes at the base; inflorescence of 2-8 whorls of flowers with 1 unbranched stalk usually shorter than the leaves & bending at the lowest node; upper male flowers large & stalked, lower female flowers smaller & stalkless; flowers white, 3-merous, 0.51.0" wide; fruit a dry, flattened, winged, stalkless achene with recurved, long beak; $N 2n = 22$. key features: Fruits stalkless, leaves usually broadly lance-shaped.

Comments: status: Endangered in Kentucky & Maryland. Threatened in Maine & Ohio. Special concern in Tennessee. phenology: Blooms July - September. C3. “The plant usually monoecious; the upper flowers staminate, lower flowers pistillate” (Ilpin).

Associates: Waterfowl & aquatic mammals eat all parts of the plant. Marshbirds & shorebirds eat seeds.

ethnobotany: Corms? edible.

VHFS: [*Sagittaria heterophylla* Pursh, *S heterophylla* Pursh f *elliptica* (Engelm) SF Blake, *S heterophylla* Pursh f *fluitans* (Engelm) SF Blake, *S heterophylla* Pursh f *rigida* (Pursh) SF Blake, *S rigida* Pursh f *elliptica* (Engelm) Fern, *S rigida* Pursh f *fluitans* (Engelm) Fern]



Sagittaria rigida

Line drawing Britton & Brown (1913) courtesy of Kentucky Native Plant Society.

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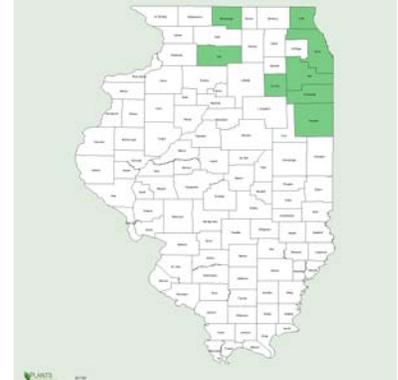
AMARYLLIDACEAE J St. Hillaire 1805 AMARYLLIS FAMILY

ALETRIS Linnaeus Sometimes placed in *Liliaceae* **COLICROOT, STARGRASS** *Amaryllidaceae* *Aletris* New Latin, from Greek, *aletris*, a female slave who ground meal, a noble Athenian maiden who prepared offering cakes, from *alien-*, *aletreuein*, to grind; from the floury appearance of the blossoms, or the mealy texture of the perianth. Apparently nothing to do with a bump-& grind maiden. A genus of 25 (30) spp of perennial herbs of North America, the Bahamas, & eastern Asia. Fruits capsular, 3-locular. Sullivan (in fna) notes “some spp of *Aletris* (e.g., *A lutea* & *A obovata*) are quickly eliminated unless habitats are occasionally burned or otherwise kept clear of undergrowth.” Flora of North America & Plants.usda.gov place this genus in the *Liliaceae*.

Weakley (2012) & Mohlenbrock (2014) place this in *Nartheciaceae* EM Fries 1846, the BOG-ASPHODEL OR NARTHECIUM FAMILY. Reznicek et al (2011) place this in *Melanthiaceae*.

Aletris farinosa Linnaeus *ME, NY, PA, RI COLICROOT, aka AGUEROOT, COLIC-ROOT, CROW-CORN, MEALY COLIC-ROOT, MEALY STARGRASS, MEALY STARWORT, NORTHERN WHITE COLICROOT, STARGRASS, UNICORN ROOT, UNICORN-ROOT, WHITE COLIC ROOT, WHITE STAR-GRASS WHITE STAR GRASS, (*farinosus -a -um* mealy, powdery, covered with farina, covered with a dusting of flour.) The complete Latin name has a somewhat tautonymic meaning mealy-mealy.

Habitat: Sandy soils. “In a moist, sandy, low prairie in Rockton Township.” (ewf55) “Under somewhat open total vegetation, as with temporary succession; more sterile sands.” (Ilpin). In Michigan, “in moist or sometimes dry, usually sandy or sandy-mucky soil, on lake shores & in swales, meadows, & other sandy openings” (rvw11). In the se USA, “Pine savannas, pine flatwoods, seepage bogs, upland woodlands, roadbanks.” (w12). “Open sites of various habitats, moist bogs, dry to mesic prairies, & dry, upland woods & thickets; 0--2000+ m” (Sullivan fna). distribution/range: Eastern North America, in spite of its open, sandy habitat, sp is absent from the Great Plains & most of the Tall Grass Prairie. North central & northeast Illinois only, absent from the rest of the state.

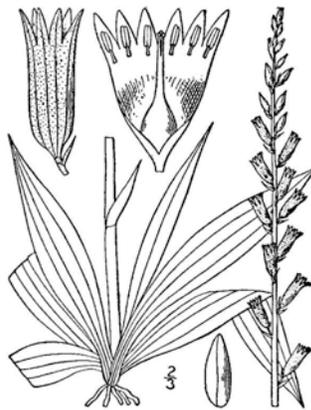


Culture: propagation: ① No pre-treatment needed, sowing outdoors in the spring is the easiest method, or seeds germinate after about 60 days of cold, moist stratification. Seeds need light to break dormancy & germinate. Plant on top of growing media & do not cover. (he99) There are no known sources of seeds or plants.

Description: Native perennial forb; 2-4' tall, flowers white, surface minutely bumpy. key features: “Flowers noted for their rough surfaces” (Ilpin).

Comments: status: Possibly extirpated in Maine. Threatened in New York. Endangered in Pennsylvania. Special Concern in Rhode Island. phenology: Blooms June-July (August), late spring to mid-summer. Collect seed August to September.

Associates: ☞ May be poisonous to humans (Ilpin).



Aletris farinosa

Line drawing Britton & Brown (1913) courtesy of Kentucky Native Plant Society.

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ARACEAE A L de Jussieu 1789 **ARUM FAMILY** A family of about 100-110 genera & about 4000 spp of herbs & reduced aquatic herbs, cosmopolitan, mostly tropical & subtropical. Many Midwest members of this family have hydrophilic seeds & require special attention in restoration. Includes *Diffenbachia* (DUMBANE), *Epipremnum* (GOLDEN POTHOS), *Philodendron*, & *Zantedeschia* (CALLA-LILY). Some authors feel the *Lemnaceae* (which see) is phylogenetically embedded in *Araceae*.

“*Araceae* contain crystals of calcium oxalate, which are often cited as causing the intense irritation experienced when handling or consuming the raw plant tissue of many genera in the family. This supposition is contradicted by the fact that although irritation generally is not produced by properly cooked plants, the crystals remain after heating. Other compounds must therefore be involved with causing this reaction. Studies of

Dieffenbachia demonstrated that a proteolytic enzyme, as well as other compounds, are responsible for the severe irritation caused by this plant & that raphides of calcium oxalate do not play a major role (J Arditti & E Rodriguez 1982). Whether irritation is caused by enzymes or crystals, that aspect of *Araceae* has resulted in aroid genera being included in many lists of poisonous plants (eg, KF Lampe & MA McCann 1985, GA Mulligan & DB Munro 1990, KD Perkins & WW Payne 1978).

ARISAEMA Martius 1831 ♂ **JACK-IN-THE-PULPIT, INDIAN-TURNIP, PREACHER JOHN** *Araceae* *Arisaema* (a-ri-SAY-ma, or a-ris-IE-ma) from Greek *aris*, a plant name used by Pliny for a kind of arum & *haima*, blood, for the spotted leaves of some spp; or from Greek ἄρον, *aron*, arum, & *haema*, blood, implying it is related to *Arum*. A genus of 150-170 spp of perennial herbs of Asia, eastern north America, east Africa, & Arabia. Some spp are cultivated as ornamentals. Formerly *Muricauda* Small. $x = 13, 14$.

Thompson (fna) recognizes 2 spp in northern North America, *Arisaema dracontium* & a highly variable sp complex *A. triphyllum*, with 3-4 ssp. *A. dracontium* is $N 2n = 28, 56$. *A. pusillum*, *A. quinatum*, & *A. stewardsonii* are diploids with $N 2n = 28$. *A. triphyllum* is tetraploid with $N 2n = 56$. Hybrid populations between ssp with $N 2n = 42$ are known. Putative hybrid populations between *A. triphyllum* & *A. dracontium* also occur naturally (LL Sanders & CJ Burk 1992)

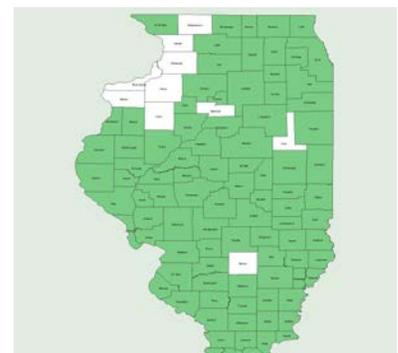
The red pulp contains germination inhibitors & painful calcium oxalate crystals (*the same chemical that is in Diffenbachia, also an aroid*). Wash pulp from seed while wearing latex or rubber gloves. Sow outdoors in fall or store dried seed in the refrigerator & sow in spring. Single leaf only first year. Code A seeds will germinate within 4 weeks sown at 70°F, or B seeds will germinate upon shifting to 70°F after 90 days of cold moist stratification at 40°F, & G chemical inhibitors. Division of corms & the small offsets while dormant in fall. Each fall the corm sheds its outer skin & roots; mature corms may be up to 12" deep. The smaller offsets should be planted at 6". Native *Arisaema* spp may get a rust disease, Asian spp are more vulnerable. Symptoms include cupped, miss-happened leaves with rusty brown spores. Remove & destroy infected plants. (cu00).

The plants cannot self-fertilize. On young or weakened plants, only the male flowers are fertile. On vigorous or older plants, only the female flowers are fertile. "The phenomenon of sex changing in *Arisaema* has been investigated by many authors (eg, P Bierzychudek 1982, K Clay 1993, E Kinoshita 1986). Smaller plants produce only staminate flowers, & larger plants produce either staminate & pistillate flowers simultaneously or pistillate flowers only. Changes in gender expression are directly correlated with size & are also influenced by the environment in which the plants are growing. Reversions in phenotypic gender have been experimentally induced by such factors as removing leaf area or changing soil nutrient levels." (Sue A Thompson fna)

Arisaema has contractile roots that pull the developing corm deeper into the ground every year until it reaches relatively stable soil temperatures. Many plants concentrate food reserves in bulbs, corms, tubers or rhizomes that in mature plants may be 6-12 inches in the soil. They generally occur at a depth that discourages many foraging animals. However, as seedlings of these sp germinate, these storage organs are formed at less than 1" depth. These plants have contractile roots that literally push the soil aside & then pull the plant deeper into the soil a little each year. Contractile roots are generally broad, fleshy, vertical, tapering, wrinkled-looking, & distinct from fine absorbent roots. Contractile roots dig deep into the soil each spring, & when firmly attached, they contract, pulling the plant downward. When a region of relatively stable soil temperatures is reached, contractile roots are no longer formed. Dig up a dandelion or chickory, & observe that the leaves appear to come from underground, but contractile roots are actually pulling the plant into the ground. Other examples of plants with contractile roots include *Allionia nyctaginea*, *Allium* spp, *Aquilegia canadensis*, *Botrychium*, *Crocus*, *Gentiana andrewsii*, *Hemerocallis*, *Hypoxis*, *Iris*, *Liatris*, *Narcissus*, *Nothoscordum*, *Oxalis incarnata*, *Plantago major*, *Scilla sibiricum*, *Symplocarpus foetidus*, *Taenidia*, *Veratrum*, *Zygadenus*.

Species with contractile roots do not do worth a rat's hairy hinny in the overly compacted "firm" seedbeds of urban built-up soils. Better living through Botany.

Arisaema dracontium (Linnaeus) Schott MA, NH, NY, VT ♂ GREEN DRAGON, aka ARISÈME DRAGON, DRAGON-ARUM, DRAGON ROOT, DRAGONROOT, GREEN-DRAGON, GREENDRAGON, *STOR KOBRAKALLA* (SW), (*dracontius -a -um* (dra-KON-tee-us) dragon like, from the resemblance of the divided leaf to a dragon's claws; or as some see it, from the long, thin



spadix protruding from the narrow green spathe, coiling like a serpent's tongue, or the flicking tongue of a lizard.)

Habitat: Moist shady places & woods, mesic & wet woods, & floodplains. "Species is usually distributed in level ground; rocky or non-rocky woodland" (Ilpin). In Michigan, "Moist forests, especially along river banks & floodplains" (rvw12). In the se USA, bottomlands & floodplains (w12), "Mesic to wet deciduous woods, thickets, & bottoms; 30--1200 m" (Thompson fna). distribution/range: Relatively rare. Tall Grass Prairie & eastward, south into eastern Mexico. Absent from much of northwest Illinois.

Culture: ① Collect fruits in fall (mid-August to early September) when the berries are red & remove the small brown seed from the pulp. Wear gloves as berry juice may irritate skin. Seeds may be sown outside in late fall, 3/4 inch deep, or the following spring with cold treatment. Stratify stored seeds by placing them in moist sphagnum moss & refrigerating 60 days before planting. Seeds should not be allowed to dry out. This sp will not flower until the second or third year after germination. (lbj)

Keep dry during winter dormancy (??). Some germinate readily, others dormant (jlh).

Kew Royal Botanic Garden notes Thousand Seed Weight: 50.115g. Commercial availability unknown to unavailable.

asexual propagation: Propagate by tuber division or seed. Divide tubers when the plant dies down in late summer. (lbj)

cultivation: Species is best in humusy, medium to wet, well-drained soils in partial to full shade; soil constantly moist & rich in organic matter. Species will not tolerate clay soils. Zones 4-9. Will naturalize. Plant with late blooming sp of rich woods that will fill the space as the plants go dormant in late summer, such as *Eurybia macrophylla* or *Solidago caesia*.

Description: Native, erect, herbaceous, perennial forb; from a corm, minimum depth; stems 1-3.0', spread 1.0-1.5'; leaves usually 1 long-stalked, divided leaf with 7-13+ leaflets; inflorescence a spadix tapering to long, thin point, flowers covering only the bottom section; flowers green (light-green), ?-merous, long, green, thin, whip-like spathe is longer than the spadix, fruit is a cluster of red berries; $N 2n = 28, 56$. key features: Divided leaf with 7-13 leaflets; flowers covering only the bottom section of the spadix; whip-like spathe is longer than the spadix. "Spadix is slender-tapering, exerted beyond the spathe; usually one leaf" (Ilpin).

Comments: status: Threatened in Massachusetts & Vermont. Endangered in New Hampshire. Exploitably Vulnerable in New York. phenology: Blooms 5,6. C3. Collect seeds mid-August to early September, Seeds mature late summer to early fall as the plants go dormant & the spadix withers. The spadix is an unbranched, thick, spike-like head covered with tiny flowers; spathe is leaf-like hood surrounding spadix. Showy flowers & fruits, shaded woodland gardens, moist conditions along streams or ponds; some suggest shaded rain gardens. Seed source Tomahawk Bluffs.

"Much less common than the preceding (*A triphyllum*) & much less common here than further south" (ewf55).

Associates: The tuberous roots & the flesh of the berries contain calcium oxalate raphides (needle-shaped crystals). Birds & small mammals eat the berries. Plant is highly deer resistant. No serious insect or disease problems.

ethnobotany: Used in sacred bundles to give power of second sight in supernatural dreams by Menominee (sm23). The corm may be dried & used for flour.

☞ All plant parts contain calcium oxalate crystals & may cause irritation & swelling.

VHFS: [*Arum dracontium* L, *Muricauda dracontium* (L) Small]





Arisaema dracontium

Line drawing Britton & Brown (1913) courtesy of Kentucky Native Plant Society. Photo Robert H Mohlenbrock USDA-NRCS PLANTS Database - Not copyrighted image. Second line drawing Mark Mohlenbrock, USDA-NRCS PLANTS Database / USDA NRCS *Wetland flora: Field office illustrated guide to plant spp.* Not copyrighted image. Seed photo Tracey Slotta USDA-NRCS PLANTS Database. - Not copyrighted image. Fruit photo Charles T Bryson, USDA Agricultural Research Service, Bugwood.org

Arisaema triphyllum (Linnaeus) Schott or *A triphyllum* (Linnaeus) Torr.? ☞ JACK IN THE HOOD, aka BROWN DRAGON, DRAGON ROOT, *DREIBLÄTTRIGER FEUERKOLBEN* (G), JACK IN THE GREEN, JACK IN THE PULPIT, JACK IN THE WOODS, INDIAN TURNIP, MARSH PEPPER, MARSH TURNIP, MEMORY ROOT, *PETIT-PRÊCHEUR* (F), SWAMP JACK-IN-THE-PULPIT, THREE-LEAVED INDIAN TURNIP; WAKE ROBIN, WILD TURNIP, (*triphyllum* -a -um (tri-FIL-lus) with three leaves, or leaflets.) The common name MEMORY ROOT is an allusion to the calcium oxalate of the raw root unforgettably burning the mouth of the uninitiated. Habitat: Mesic savannas, mesic woodlands, & rich low woods, chiefly near streams. Forests. distribution/range: In all Illinois counties.

Culture: This sp's seed is recalcitrant. ①“Upon ripening in the fall, squeeze seeds out sowing immediately for germination the following spring. Light cover. Good to fair germination.” (mfd93). ②Seeds need a cold, moist period followed by a warm, moist period followed by a 2nd cold, moist period, or sow outside & allow 2 years for germination. Plant fresh seed or keep moist. Refrigerate clean seed in a ziplock bag until planting or starting other treatment. (pm09) ③Fall plant or cold stratify at 40°F for 8 weeks. Sow just below the soil surface at 55°F & water. Slow. (ew11) ④Sow at max 5°C (41°F), germination irregular, often several months (tchn). ⑤Macerate*-dormant seed or moist cold stratify (60 days), light cover. ⑥Schultz et al (2001) recommend 2-3 months cold moist stratification, & note seed can be cold stored for up to 3 years. Some ecotypes may not germinate until 2nd year. Successional restoration. Sow seed in shade. Will come up second spring. ⑦Forms only bulb first season. Complete germination including leaf growth can be triggered the first year using gibberellin (jlh). ⑧“Collect fruits in fall when the berries are red. Approximate collection date for northern US: Late Aug. & Sep. Remove the small brown seed from the pulp. Stratify stored seeds by placing them in moist sphagnum moss & refrigerating 60 days before planting. Seeds may be sown outside in late fall, 0.75” deep, or the following spring with cold treatment. Seeds should not be allowed to dry out. The seeds may not germinate for up to two years.” (lbj) 6,800 (jfn04); 7,040 (pn02); 7,360 (ew11); 9,945 (gnapn04); 10,449 (gnam11); 10,720 (aes12); 15,860 (gnh13) seeds per pound.



⑨Kew Royal Botanic Garden notes Thousand Seed Weight: 31g; Dispersal: Animal; Diaspore is eaten intentionally, seed ingested or regurgitated; Method not stated; (Willson & Hoppes, 1986); Birds.; Diaspore = fruit. The fruit is fleshy/juicy.

asexual propagation: Propagate by root division or seed. Cormlets can be separated from the parent corm in fall.

cultivation: Space plants 1.25-1.5'. Species is best in humusy, medium to wet, well-drained soils in partial to full shade; soil constantly moist & rich in organic matter. Species will not tolerate clay soils. Clay soil (timber clay) tolerant (in one source). Tolerates wet soil & dense shade. Most plants become dormant by

midsummer. Once established, plants are best left undisturbed. Zones 4-9. Buy plants from reliable sources only. Species is 5 years from seed to flower.

bottom line: Hand plant fresh or properly stored seed under an existing overstory, or in a proper shade house. Seed testing indicates viability of cleaned seed declines quickly in dry storage, so we should probably sow fresh seed, or store seed properly in ziplocks under refrigeration until sown. Possible flipflop species. Germ 1, 1, 1, r1.0-1.0 (0.0)%. Dorm 55.7, 80, na, r80-83 (3.0)%. Test 30, 28, na, r26-36 days. (#8).**

Some commercial seed lots may be tested with high results, but many have very low viability due to improper storage, but a few firms properly handle this sp. When in doubt, buy seed from Prairie Moon. (*An unnamed northern seed company does not understand recalcitrant seeds & has sold tested, dried, & dead seed in the past, but they have a colorful catalog.*)

In restoration work, this sp should be specified as seed in dormant seedings only, as hand-seeded, raked in, new crop (6 month test) seed, well planned & implemented, on sites with an *existing* overstory, and *in situ*, living soils.. It should not be used in new construction, sun-scalded, baked-clay adobe-soil, lollypop-tree plantings.

Description: Native, erect, herbaceous, perennial forb; 1.0-1.5(3.0)'; leaves 1-2, long-stalked, divided with 3 leaflets, the side leaflets distinctly asymmetrical; inflorescence a cylindrical, rounded-tipped spadix 'Jack', with flowers covering only the lower section; greenish to reddish 4"-6" tall spathe 'hood or pulpit', is wider toward the top & arches over the spadix; flowers tiny green (green/brown, red/pink, yellow); round cluster of showy red berries, berry with 1-3(5) seeds; $N 2n = 56$. key features: "Spadix club-shaped, covered by the arching spathe; lateral leaflets strongly asymmetrical" (Ilpin). This sp is readily distinguished by its leaves with 3 leaflets & its spike of flowers protected by an arching spathe.

Comments: status: phenology: Blooms 4,5,6,7. C3. In late summer, the hood falls away, revealing the developing berries. Fruits mature early fall. Flowers are incomplete, with no petals or sepals. Useful in landscaping, woodland & shade gardens, one of the signature plants of any savanna, woodland, & forest plantings. Plant several near woodland paths to appreciate their beauty. Some suggest shaded rain gardens. The plant changes its flower from sterile to male & then to female as it develops root mass & matures. (Or. note male flowers at the top, female flowers at the bottom.) Additionally, after a stressful year, a plant may adapt its sexual strategy to its available nutrient reserves. You may see the corm called a spherical tuber. Seed source mesic savannas Princeton & Yorktown, Bureau Co & McHenry Co.

"Common in damp woods. The purple-brown streaked spathes are the more common." (ewf55)

Associates: Pollinated by thrips & midges (Rust 1980), or flies. The red berries are dispersed by critters. Berries provide food for upland game birds & wood thrush. Deer resistant. Walnut tolerant.

ethnobotany: ☞ This sp contains insoluble calcium oxalate crystals called raphites, humans & pets are in danger from ingestion. Entire plant is reported as poisonous. Some people develop dermatitis after touching the plant. Tubers are available in spring & late autumn. The fresh, raw root is poisonous, but edible after cooking (or dried & boiled). After roasting, the root is considered a delicacy (jlh). The tubers are said to provide a flour when dried & ground. Used for food by Ojibwa, Pottawatomie, & Iroquois (sm23, sm33, Parker 1910). Used as medicinal plant by Ojibwa & Menominee (sm32, de28) used for sore eyes by Ojibwa (de28). Used for headache, asthma, & rheumatism (jlh) mentioned in unofficial part of US & Kings dispensaries.

VHFS: [*A atrorubens* (Ait) Blume]

In the Chicago area *A stewardsonii* Britton & *A pusillum* (Peck) Nash, both from bogs, are reported as subsp of *A triphyllum*. *A atrorubens* is not worth separating (sw94).

"The taxa of the *Arisaema triphyllum* complex have been variously treated as sp, subsp, var, & forms. They are here treated as sp with relatively subtle morphological distinctions; they are broadly sympatric, & sometimes occur together in mixed populations with little sign of introgression or hybridization. *A quinatum* has often been treated as a full sp. *A stewardsonii* seems amply distinct in morphology, northern distribution, & boggy habitat. *A triphyllum* is tetraploid & does not produce fertile seed when crossed with the other (diploid) spp, including *A pusillum*, with which it is broadly sympatric (Treiber 1980)." (we12)

RW Rust, 1980. Pollen movement & reproduction in *Arisaema triphyllum*. Torrey Botanical Club Bulletin 107: 539-542.

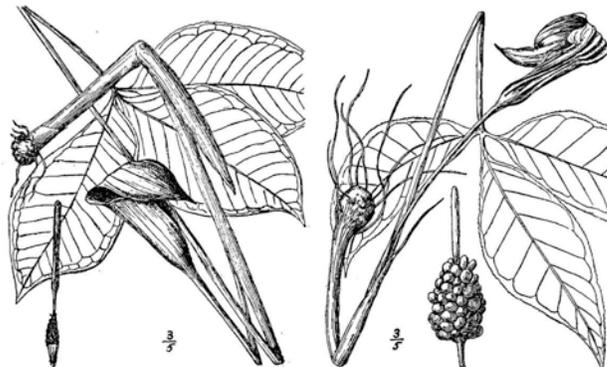
J Schultz, P Beyer, & J Williams, 2001. Propagation protocol for production of container *Arisaema triphyllum* (L) Schott plants; USDA FS - Hiawatha National Forest, Marquette, Michigan. In: Native Plant

Network. URL: [http:// www.nativeplantnetwork.org](http://www.nativeplantnetwork.org) (accessed 18 November 2012). Moscow (ID): University of Idaho, College of Natural Resources, Forest Research Nursery.



Arisaema triphyllum

Line drawing Britton & Brown (1913) courtesy of Kentucky Native Plant Society. Second line drawing Mark Mohlenbrock, USDA-NRCS PLANTS Database / USDA NRCS *Wetland flora: Field office illustrated guide to plant spp.* Not copyrighted image.



Arisaema triphyllum pusillum & *Arisaema triphyllum stewardsonii*

Line drawing Britton & Brown (1913) courtesy of Kentucky Native Plant Society.

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CALLA Linnaeus 1753 **WILD CALLA** *Araceae* *Calla* (KAL-la, or KA-la) from a name used by Pliny, Greek κάλλος, *kallos*, beauty, beautiful; alternately New Latin, modification of Greek *kallaia* rooster's wattles, perhaps from *kallos* beauty. Herbaceous wetland perennial, monospecific genus, circumboreal. x = 18.

Calla palustris Linnaeus *IL, IN, MD **WILD CALLA**, aka *ARUM D'EAU* (F), **BOG ARUM**, *MISSNE* (SW), *SCHLANGENKRAUT*, *SCHLANGENWURZ* (G), **WATER ARUM**, **WATER DRAGON**, **WILD CALLA-LILY**, (*paluster -tris -tre*, (pa-LUS-ter) marsh-living, marsh-loving, of swamps, swamp loving, of marshes, or growing in bogs, bog-loving, from Latin *paluster -tris -tre* marshy, boggy, of swampy ground, from *palus, paludis*; *palustris* is often used as a masculine ending in plant names, because botanists do not know very good Latin (Albert Hoffman).) obl

Habitat: Bogs & pond margins. In Michigan, “bogs, openings in coniferous swamps & thickets, shallow water at margins of boggy forests & in lakes & rivers” (rvw11). “Bogs, marshes, wooded swamps, & marshy shores of rivers, ponds, & lakes; 0--900 m” (Thompson fna).

distribution/range: Wet soil, very rare in Illinois, Lake County only (m14). A few counties around the south end of Lake Michigan are at the southern limit of the sp range. Circumpolar.

Culture: Seeds are hydrophilic. ①Remove brown seeds from pulp & plant immediately in standard mix. Trays must remain evenly moist. Code B* (cu00). ②60 days cold moist stratification. Plant fresh seed or keep moist. Refrigerate clean seed in a ziplock bag until planting or starting other treatment. (pm09) ③Sow at 22°C (72°F) in muddy compost for 2-4 wks, move to 0°C (32°F) for 4-6 wks, after which temperature should be raised gradually (tchn). ④“Pulp-free seeds may be planted in muck as soon as they are ripe. Seedlings will bloom in a few years. Cutting taken in July & set in a peat-muck rooting medium give fair results. Moisture must be constantly available. (lbj) Unrooted cuttings are sometimes available.

⑤Kew Storage Behaviour: Orthodox? Seeds tolerate desiccation (Guppy 1897); Thousand Seed Weight: 1.59g; Dispersal: Combination: Floating in freshwater currents; Direct or experimental observation; (Murray, 1986); Diaspore=seed. The diaspore is buoyant. water+animal, method not stated; 90 % germination; germination medium = 1% agar; germination conditions = 15°C, 8/16; (RBG Kew, Wakehurst Place.) 80 % germination; germination medium = 1% agar; germination conditions = 25°C, 8/16; (RBG Kew, Wakehurst Place.)

asexual propagation: Stem or rhizome cuttings root well in early spring & summer.

Place cuttings in pots shallowly submerged in wet beds until rooted. Sp is easy to grow in the greenhouse from cuttings, but sp must have a pristine habitat of they will perish when planted.

cultivation: Acidic waters. Shallow water or slightly acid, wet soil. A light mulch is necessary in extremely cold, snowless winters. WILD CALLA will not survive a dry spell. (lbj).

Description: Native, erect, perennial, emergent, semi-aquatic forb; from long creeping, fleshy rhizomes at or near the surface; 0.5-0.8' tall; leaves broadly oval with a pointed tip on a 2"-6" long stalk; inflorescence a 1"-2" spadix covered with flowers partially enveloped by a 2" white, open, flat, oval spathe; flowers tiny, green to white, 6 stamens; fruit a berry; N 2n = 36 or 2n = 72 (Eurasia). key features: “Rhizome bearing spaced, long-petioled leaves & solitary scapes; leaf veins not connected by crossveins & forming a network (Ilpin).

Comments: status: Endangered in Illinois, Indiana, & Maryland. phenology: Blooms 4,5,6,7,8 or 6-7. C3. Seeds mature late summer. All North American populations counted are N 2n = 36. Upper flowers may be staminate. Landscaping, bog gardens.

Associates:

ethnobotany: Root used as medicinal plant by Pottawatomie (sm33) & Iroquois. “The rhizomes & seeds can be used to make a bread after extensive treatments of drying, grinding, boiling, & aging. Untreated plants contain crystals of calcium oxalate, particularly in the rhizome, which if taken into the mouth cause intense irritation & a burning sensation” (Ilpin).

☠

VHFS: Several forms are known.

HB Guppy, 1897. On the postponement of germination of seeds of aquatic plants. Proceedings of the Royal Physiology Society Edinburgh, 13:344-359.





Calla palustris

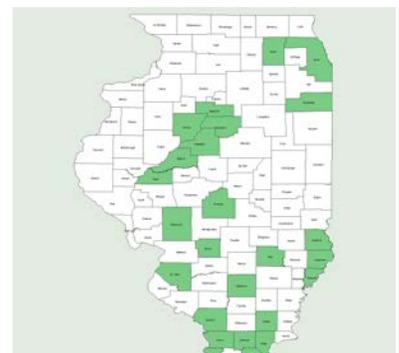
Fruit & seed images from Robert J Gibbons for Kirkbride, JH, Jr., CR Gunn, & MJ Dallwitz. 2006. Family Guide for Fruits & Seeds, vers. 1.0. URL: <http://nt.ars-grin.gov/sbmlweb/OnlineResources/frsdfam/Index.cfm>. Line drawing Britton & Brown (1913) courtesy of Kentucky Native Plant Society. Color illustration Jan Kops, F W van Eeden - Flora Batava of Afbeelding en Beschrijving van Nederlandsche Gewassen, XVI Deel. , Volume 16 (1881) - Permission granted to use under GFDL by Kurt Stueber. Source: www.biolib.de

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PELTANDRA Rafinesque 1819 **Arrow Arum** *Araceae* a New Latin, from Latin *pelta*, & New Latin *-andra*; or from *pelt-*, a shield, from classical Latin *pelta*, *peltae*, a light, often crescent-shaped shield, from ancient Greek *πέλιη*, *pelte*, a small light shield of leather & *andro-*, male-, man-, stamened-, anthered-, from Greek *ανηρ*, *ανδρ-*, *ανδρος*, *ανδρο-*, *aner*, *andr-*, *andros*, *andro-*, in reference to the shield-shaped tops of the staminate flowers. A genus of 2 (1 or 3-4) spp of herbaceous perennials endemic to eastern North America. Fossil leaves are known from the very late Paleocene to early Eocene. $x = 14$.

“Identification notes: *Peltandra* is often confused in vegetative condition with *Pontederia* & *Sagittaria*, superficially similar emergent aquatics with hastate or sagittate leaves. *Peltandra* leaves have pinnate venation, a prominent midvein, a prominent vein running parallel to the leaf margin, & the hastate lobes with rounded to acute apices. *Pontederia* leaves have parallel venation, lack a prominent midvein & a prominent vein parallel to the leaf margin, & have hastate lobes with broadly rounded apices. The leaves of sagittate spp of *Sagittaria* have parallel venation, a prominent midrib, a vein at 90 degrees to the midrib at the junction of the main blade & each of the hastate lobes that forks, with at least one fork directed apically & at least one fork directed into the basal lobe, lack a prominent vein parallel to the margin, & have hastate-sagittate lobes with acuminate apices.” (w12)

Peltandra virginica (Linnaeus) Schott *IA, NOX PR [also seen as *P virginica* (Linnaeus) Kunth.???] **ARROW ARUM**, aka **DUCK CORN**, **GREEN ARROW ARUM**, **GRÜNER PFEILARON** (G), **PELTANDRE**, **POISON ARUM**, **TUCKAHOE** (Algonquin), **VIRGINIA ARROW ARUM**, **VIRGINIA PETLANDRA**, **WAMPEE**, (*virginicus -a -um* of or from Virginia.) The common name **ARROW ARUM** is a reference to the leaf



shape. obl

Habitat: Wooded swamps, bogs, shallow water, tolerates acidic waters, occurs in acid swamps, shallow fresh water, slightly brackish water, wet ditches, & along streams. Swamps, stream & lake edges, tidal marshes (ecs). In the se USA, "Marshes, bogs, beaver ponds, pocosins, other stagnant, aquatic situations." (w12). In Michigan, "shallow water (usually not over 6 dm) & muddy banks at edges of rivers & lakes, swamps along rivers, &c. Established but presumably introduced at margins of marshes at the Seney National Wildlife Refuge, Schoolcraft Co." (rvw11) "Wetland habitats, including bogs, swamps, freshwater to low-salinity tidal marshes, & ditches, as well as along the edges of ponds, lakes, & rivers; 0--1200 m" (Thompson fna).

distribution/range: Swamps, shallow water, wet ditches; occasional the s 4/5 of the state; also Cook, Kane, & Lee cos (m14).

Since 1978, *Peltandra* has been reported as new to the floras of Iowa, Kansas, Minnesota, West Virginia, & Wisconsin; it is moving north. Global warming or duck hunters planting habitat?

Culture: ① Fresh wet seed, or seed stored in cold water. *Do not dry*, seeds are hydrophilic or recalcitrant. They must be stored in cold water. Seeds may be stored in a refrigerator, but they will mold. No additional treatment necessary. Alternately fall plant or cold stratify for up to 2 to 3 months for best results. ② Sow just below the wet soil surface at 40°F. (ew11) Like tribbles, the seeds are "born pregnant", often sprouting in cold storage. Anon 1981 says plant spring or fall, but fall seeding may duck food. ☹ Some individuals may wish to wear rubber gloves when handling the seed or plants, due to the presence of calcium oxylate. Growth rate slow. Seedling vigor medium. 378 (gna05); 600 (ecs); 640 (ew11); 672 (jfn04); 881 (gnh07) seeds per pound. Recommended seeding rate 10 lbs per acre in up to 1' (or 1") of water. Ernst Conservation Seeds recommends 1 lb per 1000 square feet.

asexual propagation: Division, root cuttings, & stem cuttings are possible, but seed is much easier.

cultivation: Space plants 1.5-2.5'. Requires wet, lime-free, humus-rich soil by the side of water or in shallow, still or slowly flowing water in a sunny position (Huxley 1992). Partial sun to woodlands, wet soils. Anaerobic tolerance high. CaCO₃ tolerance low. Drought tolerance none.

bottom line: Dormant seed late fall-early winter or early spring into water or gently press into mud. Do not dry or drill. Required storage conditions give rise naturally to cold moist stratification, hence hi dorm fall, high germ spring. Germinates during storage. ☹ Oxalic acid!! Germ 87.6, 93, na, sd 12.4, r66.5-98 (31.5)%; Dorm 7.8, 0.0, 0.0, sd 13.4, r0.0-31 (31)%. Test 17, 16, na, r13-22 days (#6)**

Description: 16" minimum root depth. Fruits brown, 1-3 seeds per fruit, enclosed in gelatinous, translucent pulp; N 2n = 112. key features: Spathe only partially covers the spadix; brown berries (fh). "Species is spathe tubular at both ends, opening at the middle; flowers covering all or most of the spadix." (Ilpin)

Comments: status: Endangered in Iowa. Noxious weed in Puerto Rico. phenology: Blooms May to June. C3. Seed heads are spathes containing several large seeds. Seeds are dispersed by water. The plant is rich in calcium oxylate, which is toxic. When consumed, it makes the mouth & digestive tract feel as though hundreds of tiny needles are being stuck into it. The calcium oxylate is easily destroyed by thoroughly cooking or drying the plant. Seed source Illinois River Valley, Marshall County & southern Wisconsin.

The fruits are berry-like with the consistency of an over-ripe wild plum surrounding a cooked garbanzo bean. (*The seeds are embedded in mucilage.*) During cold storage, the soft outer portion of the fruit may rot away, leaving the often-sprouting seed. ☹ Rubber gloves should be worn whenever handling the seeds.

Associates: Provides food & cover for wildlife. Important migratory waterfowl food. Waterfowl (esp. wood ducks), king rails, marsh birds, & shorebirds eat seeds.

"The flowers of *Peltandra virginica* are pollinated by a chloropid fly, *Elachiptera formosa* (Diptera: *Chloropidae*), which uses the inflorescence as a mating site & a larval food source. Eggs are deposited within the inflorescence, & the emerging larvae feed on the rotting male portion of the spadix. The fruits are primarily dispersed by water, although animals also play a role." (Sue A Thompson fna)

ethnobotany: ☹ The seeds, berries, spadix, & rhizomes are described as edible when properly cooked to eliminate the acrimonious principle. I know a few landscape architecture firms with acrimonious principals that could be eliminated. The perpendicular rhizome can be eaten upon roasting or prolonged drying. The seeds can be used to make a bread (Fernald et al 1958). The leaves & fruits were also eaten. *Peltandra* was probably an important food plant for Native Americans from coastal Pennsylvania to Virginia.

VHFS: [*Arum virginicum* (L), *Peltandra undulata* (Raf)] Numerous forms & varieties.



Peltandra marsh

Line drawing Britton & Brown (1913) courtesy of Kentucky Native Plant Society. Seed photo Steve Hurst USDA-NRCS PLANTS Database. - Not copyrighted image. Second line drawing Mark Mohlenbrock, USDA-NRCS PLANTS Database / USDA NRCS *Wetland flora: Field office illustrated guide to plant spp.* Not copyrighted image.

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SYMPLOCARPUS R A Salisbury ex Nuttall 1818 **SKUNK CABBAGE** *Araceae* *Symplocarpus* Greek *symploke*, a connection, *symplokos*, connected, & *καρπός*, *karpos*, fruit; the ovaries grow together to make a single fruit (infructescence). A genus of 3 (1 or 2) spp of north temperate eastern North America & northeast Asia.

“*Symplocarpus* is one of the earliest plants to flower in spring in northeastern North America, sometimes with spathes emerging through snow on the ground. Because inflorescences are developed during the previous summer, flowering can occur during any warmer than normal weather throughout winter. The spadices of both Asian & American plants produce heat during flowering & can reach temperatures up to 25°C above ambient air temperature (RM Knutson 1972; S Uemura et al 1993). These elevated temperatures probably play a role in pollination & in facilitating floral development at cold temperatures.” (Thompson in fna)

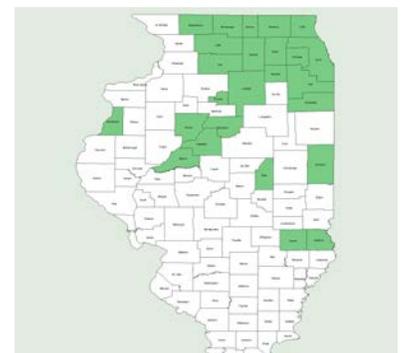
Symplocarpus foetidus (Linnaeus) Nuttall [or (Linnaeus) Salisbury ex WPC Barton in fna] **SKUNK CABBAGE**, aka BEARROOT, *CHOU PUANT*, FOETID *POTHOS*, SKUNK-CABBAGE, SKUNKCABBAGE, *TABAC-DU-DIABLE*, TICKLEWEED, *ZAZEN-SO*, (*foetidus* -a -um foetid, fetid, bad smelling, stinking, evil-smelling)

Habitat: Wet meadows, swampy woods, & thickets, swamps & other low areas.

In Michigan, “common in swamps, ravines & hollows in beech-maple forests, floodplains & bottomland, stream borders, &c., in the southern half of the Lower Peninsula. Northward, generally very local (except on islands in the Great Lakes) & often in coniferous swamps” (rvw11). In se USA, “seepage fed bogs & non-alluvial swamps” (w12). distribution/range: Occasional in n ¾ of Illinois.

Illinois is at the southwestern limit of the sp range.

Culture: ☉The marble-sized, hydrophilic seeds ripen in late summer. The ripening spongy spadix changes from pleasant smelling to putrid as the seeds



mature, in late fall when the plants are leafless. Remove the seeds from the fruit & soak for a week, then sow immediately outdoors. Germination is hypogeal, with roots & a bud the first year, & 1-3 small leaves the 2nd year. Code C*, G. (cu00)

Description: Roots fleshy, contractile; $N 2n = 60$. key features: “Spadix nearly globose & green, purplish or spotted or striped with both; malodorous; fruit consisting of enlarged spadix enclosing the seeds” (Ilpin).

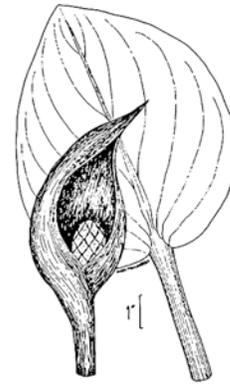
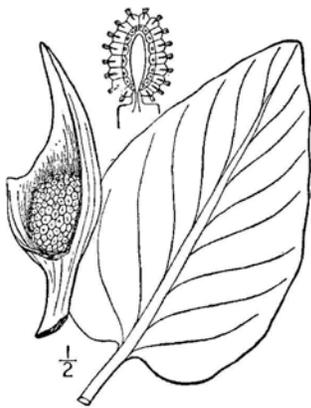
Comments: status phenology: Blooms February to March. C3. The inflorescences develop during the summer & emerge in late winter, often blooming through snow. SKUNK CABBAGE can maintain a temperature of 71.6°F (22°C) within the spathe as long as the air temperature is above freezing (Caduto 1985).

“Known in only a few places in the county. Spring Creek near Rock River; south “ledges” of Kinnikinnick Creek; Kent Creek in Page Forest & the slough west of Yale bridge. It is also found in Stephenson, Boone, Ogle, & DeKalb counties.” (ewf55)

Associates: Pollination mechanisms are unknown & of limited effectiveness, with few inflorescences developing into infructescences. The fetid aroma is said to resemble decaying flesh & attract the pollinating insects. *Diptera*, *Coleoptera*, *Hymenoptera*, & *Hemiptera* have been collected from inflorescences. Wind tunnel observations of the inflorescence suggest a capacity for wind pollination (S Camazine & KJ Niklas 1984).

ethnobotany: Rhizomes available in late autumn. Rhizomes used for food by Iroquois (Waugh 1916). Used as medicinal plant by Ojibwa & Menominee (Gilmore 1933, sm23). “Boil roots of swamp hellebore (sometimes called SKUNK CABBAGE, TICKLE WEED, BEAR ROOT (*Symplocarpus foetidus*) for two hours in water which covers them an inch deep. Soak corn grains in the warm liquor for 20 hours & plant.” Jared Elliot, 1760, Essays upon field-Husbandry in New England.

VHFS: [*Dracontium foetidum* L, *Spathyema foetida* (L) Raf]



Symplocarpus foetidus

Line drawing courtesy of Kentucky Native Plant Society. Seed photo Steve Hurst USDA-NRCS PLANTS Database. - Not copyrighted image. Second line drawing Mark Mohlenbrock, USDA-NRCS PLANTS Database / USDA NRCS *Wetland flora: Field office illustrated guide to plant spp.* Not copyrighted image.

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ASPARAGACEAE A.L. de Jussieu 1789 **ASPARAGUS FAMILY**

A monogeneric (w12) family of 170-300 species in Europe, Africa, Asia, and Australia, introduced elsewhere. Maintained by m14, w12.

BURMANIACEAE here. **Thismia**. This is a mycoheterotrophic plant family associated with arbuscular mycorrhizal fungus.

COLCHICACEAE AP de Candolle 1805 **MEADOW SAFFRON FAMILY**

Uvularia (which see) is sometimes placed in this family.

COMMELINACEAE R Brown 1810 **SPIDERWORT FAMILY** After the two Dutch botanists Johan (1629-1692) & his nephew Caspar (1667-1731). Commelin, known to Linnaeus & Charles Plumier, a French Franciscan monk, botanist & traveler who apparently named this flower. Legend has it there was a third, not so famous Commelin, hence the withered 3rd petal; some say there were three brothers, but only two were productive & published. About 40 (41) genera & 630 (650) spp of herbs, pantropical & nearly pantemperate, primarily tropical.

The flowers lack nectar & are ephemeral, lasting only a few hours, longer on cloudy days. Flowers are seldom preserved in herbarium specimens. *Commelina coelestis* & *graminifolia*, sow at 20°C (68°F) in light, germinates in less than two wks (tchn).

Commelina Linnaeus 1753 **DAYFLOWER, WIDOW'S-TEARS** *Commelinaceae* about 170 spp of herbs, cosmopolitan, mainly tropical, 9 spp in northern North America. $x = 11-15$.

Commelina communis Linnaeus DAYFLOWER, aka ASIATIC DAYFLOWER, *COMMÉLINE COMMUNE* (F), COMMON DAYFLOWER, *ERBA MISERIA ASIATICA*, *LITEN HIMMELSBLOMMA* (SW), "Common in waste ground & on railroad tracks. Apparently we have two varieties. One a robust sprawling vine that roots freely at the nodes, the other a more frail erect plant that roots but little." (ewf55) "Species is distributed on waste ground; shaded areas; often close to buildings; garden weed" (Ilpin). Introduced from Asia.

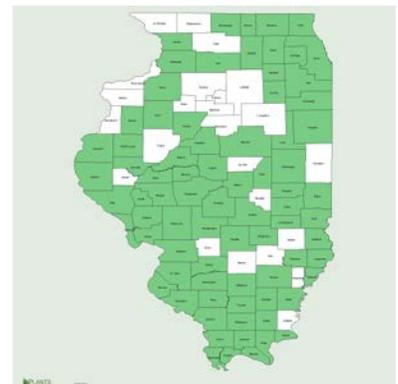
ⓄKew Storage Behaviour: Orthodox; Dry seeds (mc not reported) survive overnight in liquid nitrogen (Pence, 1991a). Thousand Seed Weight: 8.48g.

Annual; fruit is a capsule. key features: "Rooting occurs at the nodes; margins of spathes are free; seeds are black" (Ilpin).

Comments: status: This taxon is considered weedy or invasive in some parts of its range or under certain applications (Haragan 1991, Uva et al 1997, SWSS 1998). phenology: C3.

Non-mycorrhizal. Plants can be cooked & eaten as a vegetable.

VHFS: A ssp, & several varieties & forms have been named.



Commelina communis

Line drawing courtesy of Kentucky Native Plant Society. Photo Robert H Mohlenbrock USDA-NRCS PLANTS Database - Not copyrighted image. 2nd line drawing Mark Mohlenbrock, USDA-NRCS PLANTS Database / USDA NRCS *Wetland flora: Field office illustrated guide to plant spp.* USDA Natural Resources Conservation Service. Not copyrighted image.

Commelina erecta Linnaeus var **deamiana** Fernald *IA, MI, NJ, PA, WI ERECT DAYFLOWER, aka DAYFLOWER, *HIERBA DEL POLLO*, NARROW-LEAVED DAYFLOWER, SAND DAYFLOWER, SLENDER DAYFLOWER, SLENDER DAY-FLOWER, WHITE MOUTH DAYFLOWER, WHITE-MOUTH DAYFLOWER, WHITEMOUTH DAYFLOWER, WIDOW'S TEARS,

Habitat: Dry sandy soil of dunes & streambanks. "Rocky woods & hillsides, scrub oak woods, pine woods & barrens, sand dunes, hummocks, shale barrens, roadsides, railroad rights-of-way, fields, & occasionally a weed in cultivated ground" (Faden fna). distribution/range: Northern Illinois is near the northern limit of the sp range. Also known from 4 (2) counties in sw Wisconsin & Wabasha County in Minnesota, all in the Driftless Area.

Culture: ⊕USDA does not cite seed treatments, but notes ca 87% greenhouse germination.

Kew Thousand Seed Weight: 11.47g

asexual propagation: 1-3 node cuttings are successful. Transplanted tubers.

cultivation: Dry, sandy soils, partial shade

Description: Erect but becoming decumbent perennial; fibrous roots fleshy, tufted, stout (tubers in some sources); stems to 40", branching; leaves with white-haired sheaths, closed towards the base surrounding the stem; flowers blue 3-merous, 0.33-1.0" wide, with a much smaller, lower, white petal, ephemeral, folded bracts below the flower partially connected towards the base; $N 2n = 60$. key features: Perennial, lower petal much smaller & white, folded bracts below flowers partially connected towards the base, leaf sheath closed near the base (Freckmann). "Margins of spathe joined at the base; spathes & leaves highly variable" (Ilpin).

Comments: status: Threatened in Iowa. Possibly extirpated in Michigan. Endangered in New Jersey.

Extirpated in Pennsylvania. Special Concern in Wisconsin. phenology: Blooms (June)July to September.

Naturalized mass plantings in sun or shade, but it may become aggressive. Indeterminate growth form results in low seed yields. This sp can be considered a weed in rice fields.

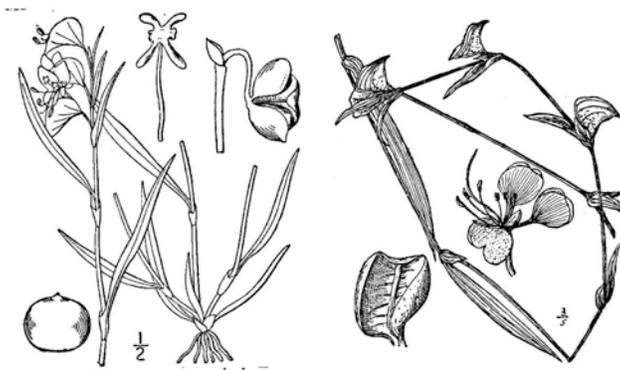
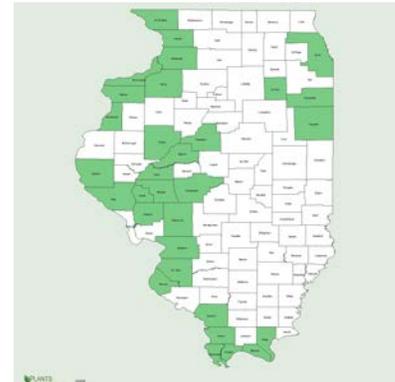
Associates: Seeds are eaten by quail & mourning doves. A preferred food of white-tailed deer. Plants are grazed by cattle.

VHFS: "This is by far the most variable sp of *Commelina* in the flora." (Faden in fna) There are at least 24 named ssp, varieties, & forms. [*Commelina angustifolia* Michx, *C crispata* Wootton, *C elegans* Kunth, *C erecta* L var *greenei* Fassett] The three varieties inter-grade; all three occur in Illinois.

C erecta var *erecta*, with larger leaves lanceolate to lanceolate-ovate, (1.5--2--4 cm wide, & spathes (2.2--2.5--3.6 cm, occurs throughout the range;

C erecta var *angustifolia* (Michx) Fern, WHITEMOUTH DAYFLOWER, aka *HIERBA DEL POLLO*, WIDOW'S TEARS, NARROWLEAF DAYFLOWER, with leaves linear to narrowly lanceolate, 0.3--1.5 cm wide, & spathes 1--2 cm, is mainly southern but extends as far north as Virginia; &

C erecta var *deamiana* Fern with leaves linear to narrowly lanceolate, 0.5--1.7 cm wide, & spathes 2--3.5 cm, occurs in Midwestern United States south to Texas. The northern-most variety.



Commelina erecta & *C. erecta* var *angustifolia* (*C. crispa*)

Line drawing Britton & Brown (1913) courtesy of Kentucky Native Plant Society.

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TRADESCANTIA Linnaeus 1753 **SPIDERWORT, WANDERING-JEW, SPIDER-LILY, ÉPHÉMÈRES**

Commelinaceae *Tradescantia* named for John Tradescant, the elder (1570–1637 (1638?) (or 1608-1662), naturalist, plantsman, traveler, & gardener to Charles I of England, or his son John Tradescant (1608-1662), also a naturalist, plantsman, traveler, & gardener. The angular leaf arrangement is said to resemble a squatting spider, hence SPIDERWORT. An American genus of about 70 spp of herbs, neotemperate & neotropical, having mostly narrow elongated leaves & large white, pink, or violet ephemeral bracteate flowers, 30 spp in northern North America. $x = 6-8$, probably others. The genus was formerly known as *Rhoeo* Hance, *Setcreasea* Schumann & Sydow, & *Zebrina* Schnizlein. Spiderwort flowers open in the morning & by midday wilt & turn into a jelly-like fluid. *Tradescantia* hybridize when grown in proximity (E Anderson & RE Woodson Jr 1935). Many selections are now commonly available at most garden centers. *Tradescantia* hybridizes in every possible combination. *T pallida* (aka *Setcreasea purpurea* or *S pallida*) is an evergreen, tropical perennial, one of the several plants called WANDERING JEW, as are *T fluminensis* & *T zebrina*. *T pallida* is exceptionally effective at improving indoor air quality by filtering out volatile organic compounds, a class of common pollutants & respiratory irritants, via a process known as phytoremediation. It may be invasive & defy control in the southern United States & parts of Australia. ☞ The sap of some spp may cause skin irritation (phytophotodermatitis) in some people & cats & dogs.

Native *Tradescantia* may have mature seeds, green seeds, & flowers at any one time. The seed clusters should be picked towards the end of the flowering season. Ripe seeds quickly shatter. Dried seed has moderate success. The seeds may be moderately hydrophilic & should be sown immediately or stored in ziplocks & refrigerated. Code B seeds will germinate upon shifting to 70°F after 90 days of cold moist stratification at 40°F & * seeds are hydrophilic, intolerant of dry storage. Plants are easily divided in spring before flowering stems appear. Single node stem cuttings are reliable. (cu00) *Tradescantia x andersoniana*, sow at -4 to +4°C (24-39°F) for 12 wks, move to 20°C (68°F) for germination (tchn).

E Anderson, 1954. A field survey of chromosome numbers in the spp of *Tradescantia* closely related to *Tradescantia virginiana*. Ann Missouri Bot Gard 41: 305--327.

E Anderson, & RE Woodson Jr, 1935. The spp of *Tradescantia* indigenous to the United States. Contr Arnold Arbor. 9: 1--132.

Tradescantia bracteata Small *IL, MI BRACTED or PRAIRIE SPIDERWORT, aka COMMON SPIDERWORT, LONG-BRACTED SPIDERWORT, SMALL SPIDERWORT, WIDOW'S TEARS, (bracted) facu-

Habitat: Dry prairies & gravelly railroad banks. Junkyards & dumps. "Prairies, spreading to thickets, roadsides, & railroad rights-of-way" (Faden fna).

distribution/range: "Prairies; scattered in the w side of the state (m14). Some populations are adventive in Illinois. Southwest Michigan, southern Wisconsin west to eastern Montana & Wyoming, southern Illinois west to central Oklahoma & northeast Colorado. In the distribution map in fna, in Illinois, the sp has a curious inverse Prairie Peninsula distribution (Faden fna), deftly avoiding its real distribution. Cf USDA map & BONAP.

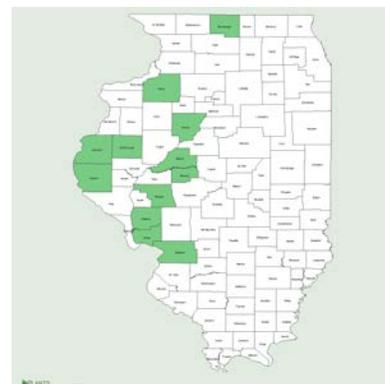
Culture: 120 days cold moist stratification. Seeds germinate most successfully in cool soil. Best planted outdoors in the fall. (pm09). "Fall plant or cold stratify for 2 to 3 months for best results. Sow seeds just below the soil surface at 60°F & water." (ew12) Dormant seed or cold stratify (120 days). Self sows. 127,774 (gnhm11); 160,000 (ew12, aes10) seeds per pound.

cultivation: Space plants on 1.0-1.25' centers. Dry soils, full sun. Tolerant of dry soil, shallow, rocky soil, & drought. Said to prefer moist acidic soils. AES (2010) reports some salt tolerance. Foliage declines after flowering as the plants go dormant.

asexual propagation: Division of mature plants in spring or after blooming. Species increases clump size rapidly in rich soils, & will need dividing to prevent overcrowding.

bottom line: Initial test data indicate dormant seeding is strongly necessary. Germ 12%. Dorm 72%. Test 34 days.**

Description: Native, erect, herbaceous, perennial forb; 0.5-1.5' tall, 1.5-2.0' spread; roots fleshy; slowly rhizomatous; arching iris-like leaves, 0.75" wide to 12" long, with clear viscous sap; flowers purple-roseate (pink, purple, rose to purple) with contrasting yellow stamens; $N 2n = 12, 24$.

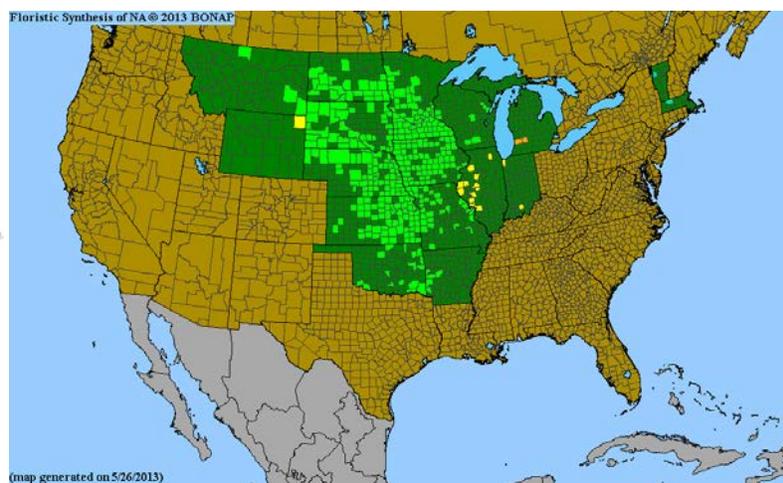
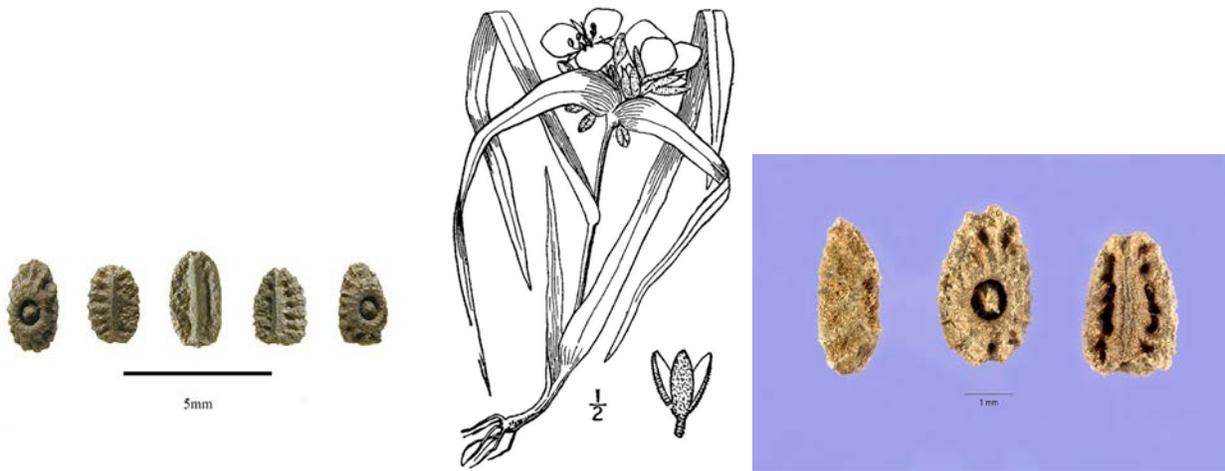


Comments: status: Threatened in Illinois. Probably extirpated in Michigan. phenology: Blooms 5,6,7
Attractive cut flowers. Each flower lasts only part of a day, but each cluster produces flowers for over a month.
Aggressive in rich soils, rhizomatous. Useful as groundcover, naturalizing, borders, & rock gardens.

“Probably not native in the northern tier of counties. We have found it in Kishwaukee River Forest Preserve in a place where planting seems probable.” (ewf55)

Associates: Attracts butterflies. No serious insect or disease problems. Snails may damage young shoots.

ethnobotany:





Tradescantia bracteata

Seed images from Robert J Gibbons for Kirkbride, JH, Jr., CR Gunn, & MJ Dallwitz. 2006. Family Guide for Fruits & Seeds, vers. 1.0. URL: <http://nt.ars-grin.gov/sbmlweb/OnlineResources/frsdfam/Index.cfm>. Line drawing Britton & Brown (1913) courtesy of Kentucky Native Plant Society. Seed photo Carol Ritchie USDA-NRCS PLANTS Database. - Not copyrighted image. National map ripped from fna,

Tradescantia occidentalis (Britton) Smyth var **occidentalis** WESTERN SPIDERWORT, aka PRAIRIE SPIDERWORT, SPIDERWORT,

Habitat: “Prairies, plains, fields, thickets, woods, roadsides, & along railroads, mostly in sandy or rocky soils” (Faden fna). distribution/range: Native north, west, & southwest of our area, Wisconsin, Iowa, Kansas, & Arkansas west.

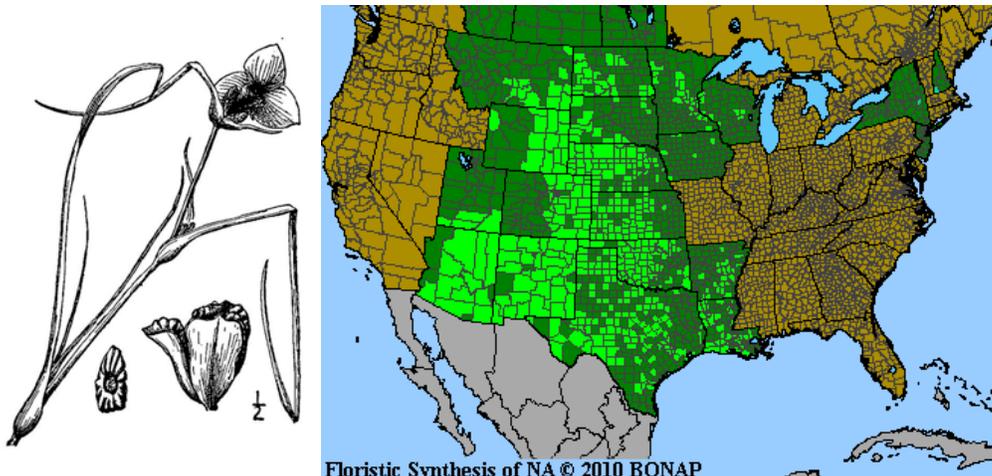
Culture: 120 days cold moist stratification. Seeds germinate most successfully in cool soil. Best planted outdoors in the fall. (pm09). “Fall plant or cold stratify for 2 to 3 months for best results. Sow seeds just below the soil surface at 60°F & water.” (ew12) 160,000 (ew12, aes10) seeds per pound.

cultivation: Space plants 1.25-1.5'. Dry soils, full sun. Reported as salt tolerant (aes10). Walnut tolerant. Protect young growth from slugs.

Description: Native erect, perennial forb; 8"-24" tall; stems slender, straight, smooth with white powdery surface, often branching; leaves firm, smooth, linear, less than 0.33" wide, edges rolled inward; inflorescence terminal cyme with 2 long, leaf-like bracts below; flowers rose to blue (bright blue to rose or magenta, pink, purple), 3-merous, 1" wide, petals alike, stalks & sepals with a few soft hairs, 6 stamens with yellow anthers; fruit a papery capsule; $N\ 2n = 12, 24$. key features: Stems branching, flowers rose to blue, petals alike, stalks & sepals with a few soft hairs, leaf edges rolled inwards (fh).

Blooms June-July. Herbaceous borders, xeriscaping & green roofs (more native than Old World sedums) Species is of special value to native bees. Nectar source. Highly deer resistant.

ethnobotany: Cooked & eaten, or eaten unprepared as a vegetable by Native Americans. Species was used medicinally as a diuretic, psychological aid, disinfectant, & as an aphrodisiac for humans & for livestock.



Tradescantia occidentalis

Line drawing Britton & Brown (1913) courtesy of Kentucky Native Plant Society.

Tradescantia ohiensis Rafinesque *PA OHIO SPIDERWORT, aka BLUE JACKET, COMMON SPIDERWORT, COW SLOBBERS, SMOOTH SPIDERWORT, WIDOW'S TEARS, (*ohiensis -is -e* of Ohio) During harvest, some Genesis Nursery employees have lovingly referred to this plant as SNOTWEED; this & many other common names are in reference to the clear, viscous sap that may be drawn into spider-like threads. Facultative Upland

Habitat: In most native systems, limited only by saturated soils & excessive shade. Wet, mesic, dry, sand, gravel, & hill prairies & savannahs. Dry to mesic sp. Moist fields, open ground. "Roadsides, railroad rights-of-way, fields, thickets, less commonly in woods, occasionally along streams" (Faden fna).

distribution/range: The most common & widespread *Tradescantia*. Throughout Illinois. Its range is expanding due to cultivation. Known as a garden waif in northern California.

Culture: "Fall sow, if you cannot, moist cold treatment for 120 days & sow early spring. Light cover. Good germination." (mfd93). 120 days cold moist stratification. Seeds germinate most successfully in cool soil. Best planted outdoors in the fall. (pm09). Sow seeds outdoors in fall, or 120 days cold moist stratification. Seeds germinate most successfully in cool soil. Sow in early winter through early spring. (he99) "Fall plant or cold stratify for 2 to 3 months for best results. Sow seeds just below the soil surface at 60°F & water. (ew12) Sow at -4 to +4°C (24-39°F) for 12 wks, move to 20°C (68°F) for germination (tchn). Easy from fresh or moist stratified seed. GA3 in greenhouse gives good results (gni). Dormant seed or moist cold stratify (120 days), germinates best in cool soils. Self sows abundantly in dry gardens & in sand. 124,304 (agre09); 128,000 (pm02, pn02, jfn04, ecs, ew12); 134,022 (gna04); 144,000 (sh94); 144,701 (gna03); 150,107 (gnh05); 163,075 (gnh06); 169,656 (gn02) seeds per pound. In mixes, plant 0.031 to 0.062 lbs pls per acre (usda 1997), or 0.031-0.125 lbs pls per acre (gni). Seed & plants are readily available, but may be in short supply at the end of their respective seasons. Seed production is vulnerable to spring & summer droughts.

cultivation: Space plants on 1.25-1.5' centers. Mesic to dry soils, full sun to partial shade. More tolerant of drought than flooding. Has some tolerance for early spring flooding for brief periods. pH not available. Nutrient load tolerance moderate, salt tolerance not available, but some tolerance reported by AES (2010). Siltation tolerance moderate.

Greenhouse grown plugs may flower the first year from seed, but they bloom later in the summer than older, established plants, & this crop shows profound vivipary (gni plugs 2012).

asexual propagation: Cuttings. Easy by division of mature plants in early spring or after flowering, with care anytime.

bottom line: Seeds are best treated as moderately hydrophilic. Dormant seeding is necessary, germination without is slight to modest. Consistently significantly to strongly dormant. Germ 9.8, 9.5, 14, sd 5.6, r2.0-24 (22)%. Dorm 64.4, 69, 58, sd 14.3, r41-85 (44)%. Test 35, 35, 34, r21-42 days. (#20)**

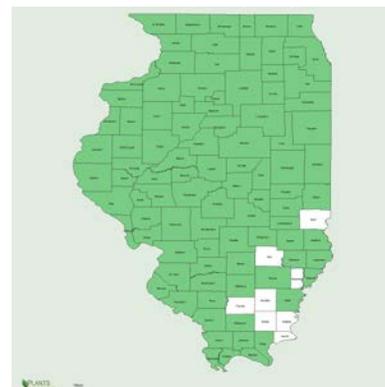
Description: Native, erect, herbaceous forb; roots minimum depth; stems 1-4'; leaves; flowers blue, purple, or rose, occasionally white, 3-merous; fruits are capsules that release seeds when ripe; N 2n = 12, 24. key features:

Comments: status: Endangered in Pennsylvania. phenology: Blooms 5,6,7, mid-May to the heat of late June, more or less. Plants are somewhat ephemeral & may die back in the heat of summer, or not. In northern Illinois, collect seeds in July. Collect seeds in se Wisconsin in August - September (he99). Landscaping, drought resistant.

9/1/2011 Bumblebees are on TRAOHI at 7 am. We have one plant on the north side of our office, in the center of the north wall right next to the wall. With the overhang, the plant gets little direct light ever, except near sunrise & sunset near the summer solstice. This specimen often blooms late in to the summer. This fall, it is also viviparous (*vide infra*), which is not uncommon.

Each flower lasts only a few hours, opening in the morning, & 'melting' in the hot noonday sun, lasting longer on cool, cloudy days. In wet years & in shade, some specimens may bloom until October.

Useful in slope stabilization. Attractive in the landscape, many ornamental spiderworts are available in garden centers. Relatively common on some older country roadsides. SPIDERWORT'S early seasonal growth has helped it escape damage from recreational mowers. As a monocot, it is not damaged by the broad leaf herbicides ♀ used on most roadsides. Sp's "cuticle" limits glyphosate absorption, enabling the chemical as a potential management tool. This sp responded to Sonic Bloom (a kelp based fertilizer) presoak winter 1996-7, & giberillic acid (GA3) in 2001. Seed source roadside & railroad prairie remnants, nursery production plots, original material from DuPage, Big Rock, Kane, & Wheatland Twp, Will County (& Horlock), C&NWRR



(now Santa Fe), Normandy, Bureau County, & Hamilton Twp Lee County, & Roger Lubbs' flowerbeds, Montmorency Twp, Whiteside County.

Bob Horlock was Seedsman for The Natural Garden in the 1980s & early 1990s, & a pioneer in this industry. We were fortunate to have a friendly business relationship with Bob during the early years of our nursery. Bob's seeds were collected in DuPage, Kane, & Will Counties. We traded back & forth with him, & several of our production plots originate from his collections. Bob passed away in the early 1990s.

"Common in sandy places, on railroads & on roadsides. Occasionally there are pure white forms."

(ewf55)

Associates: Attracts butterflies. Pollinated by long-tongued bees, especially bumblebees, & Halictine bees. Syrphid flies feed on stray pollen but are not pollinators. Attracts songbirds. White-tailed deer, cottontail rabbits, box turtles & livestock eat the foliage. Species is of minor food value to large mammals & terrestrial birds. Few insect pests, though *Lema collaris* (LEAF BEETLE sp) is reported to feed on the foliage.

ethnobotany: The leaves & stems are said to be edible, cooked or fresh, but contact dermatitis is also known. Stick with the ICEBERG LETTUCE

VHFS: This is in Britton & Brown (1913) as *Tradescantia reflexa*. [*Tradescantia canaliculata* Raf, *T foliosa* Small, *T incarnata* Small, *T ohioensis* Raf var *foliosa* (Small) MacRoberts, *T reflexa* Raf] OHIO SPIDERWORT hybridizes with eight other spp (fna).





white-flowered, aberrant & viviparous *Tradescantia ohiensis*

Line drawing Britton & Brown (1913) courtesy of Kentucky Native Plant Society.

Tradescantia subaspera Ker Gawler ZIGZAG SPIDERWORT, aka WIDE-LEAF SPIDERWORT, *subasper -era -erum* somewhat rough, from *sub-*, Latin prefix under, below; somewhat, almost so, & *asper, asperi*, adjective, rough, in reference to the surface texture.

Habitat: “Species is distributed in shaded areas; usually in limestone areas; sometimes in waste places” (Ilpin). “Rich woods along streams & on slopes & bluffs, less commonly dry woods, roadsides, fields, or along railroads” (Faden in fna). distribution/range: Southern 5/8 of Illinois, rare in the northern 1/8 of the state.

Culture: This plant is rude & uncultured. May self-sow under ideal conditions.

asexual propagation: Divide when clumps become overcrowded.

cultivation: Average, medium moisture, well-drained soils, partial to full shade. Said to prefer moist acidic soils; tolerant of poor soils. Plants go dormant after flowering. Some recommend cutting back the foliage but it is important to let the carbohydrates move to the roots.

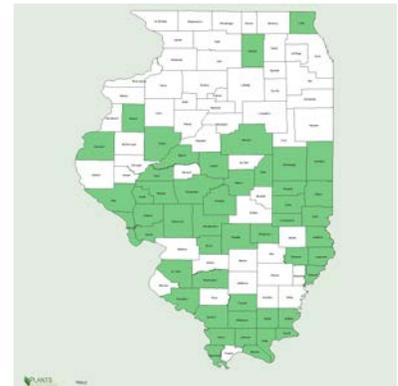
Description: Native, erect or ascending, herbaceous, perennial forb with clear, viscous sap; clump-forming; stems 1-3.0' tall, 2.0-2.5 spread, stems rarely rooting at the nodes; leaves iris-like, arching, to 2.0" wide, folded lengthwise; inflorescence terminal umbels; flowers light to dark blue flowers, rarely white (blue-violet to purple), with contrasting yellow stamens; $N 2n = 12, 24$. key features: “Principal leaf-blades are wider than the sheath” (Ilpin).

Comments: status: phenology: Blooms late spring to early summer, May - August (September). C3. Showy flowers, sp is occasionally used as an ornamental, woodland or shade gardens, naturalizing.

Associates: Sp is of special value to native bees. Sp has no serious insect or disease problems. Young shoots are susceptible to snail damage. Foliage sprawls in an unattractive manner by mid-summer as the plants go dormant.

ethnobotany:

VHFS: Illinois has two varieties; var *subaspera*; var *montana* (Shuttlew ex Britt) ES Anderson & Wood (Jackson County in sw Illinois, the northwest limit of the varieties range). Faden (fna) notes the varieties are not very meaningful. [*Tradescantia axillaris* Raf, var *subaspera* (Ker Gawler) Raf, *T montana* Shuttleworth ex Britton, *T pilosa* Lehmann, *T subaspera* Ker Gawl, *T subaspera* subsp *montana* (Shuttlew ex Small & Vail) RT Clause, *T subaspera* var *montana* (Shuttlew ex Small & Vail) ES Anderson & Woodson, *T subaspera* var *subaspera*, *T subaspera* Ker-Gawl var *typica* ES Anderson & Woods] Basionyms *Tradescantia subaspera* Ker Gawler 1813 & *Tradescantia montana* Shuttlew ex Britton 1901.





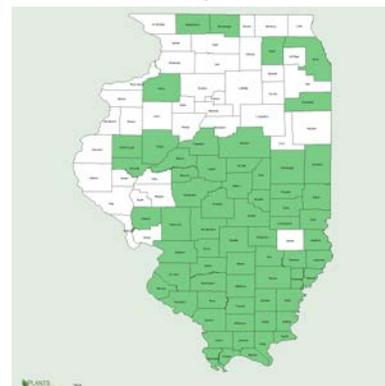
Tradescantia subspera subspera & *Tradescantia subspera montana*

Line drawings Britton & Brown (1913) courtesy of Kentucky Native Plant Society.

Tradescantia virginiana Linnaeus VIRGINIA SPIDERWORT, aka *ÄNGSTREMASTARBLOMMA* (SW), *ÉPHÉMÈRE DE VIRGINIE* (F), *ERBA MISERIA*, *FLORE D'UN GIORNO*, *GARTEN-DREIMASTERBLUME* (G), SPIDERWORT, TRADESCANTIA, WHITE SPIDERWORT, WIDOW'S-TEARS, *VIRGINISCHE DREIMASTERBLUME* (G), (*virginianus -a -um* of Virginia)

Habitat: Sand prairies, savannas, & woodlands. Moist woods & meadows. In the se USA, nutrient-rich forests & woodlands (w12). "Woods, thickets, fields, roadsides & railroad rights-of-way" (Faden fna). **distribution/range:** "The records from the northern parts of the range of *Tradescantia virginiana* may all represent garden escapes" (E Anderson 1954 in Faden fna). Species is rare in the northern 1/3 of Illinois. Not native to Wisconsin. Escaped in New England.

Culture: Sow seeds outdoors in fall, or 120 days cold moist stratification. Seeds germinate most successfully in cool soil. Sow in early winter through early spring. (he99) sow at -4 to +4°C (24-39°F) for 12 wks, move to 20°C (68°F) for germination (tchn). "The small light-green capsule, surrounded by three green bracts is mature 2-3 weeks after flowering. A few days prior to splitting, the capsule becomes dry & papery. Collecting seeds is easiest by tying a small bag around the unsplit capsule. Store in sealed, refrigerated containers. Cold moist stratify. Seeds sown fresh outdoors germinate in two weeks. Alternatively, seeds may be stored over winter & sown after a period of cold-moist treatment." (lbj) Easy from fresh seed immediately planted or moist stratified seed. Growth rate rapid. Seedling vigor high. Vegetative spread rate none.



Kew Thousand Seed Weight: 2.873g.

asexual propagation: Root division. A faster method of propagation is to divide a large clump into several pieces. Divide in early fall or very early spring.

cultivation: Anaerobic tolerance none. CaCO₃ tolerance low. Drought tolerance medium. Fertility requirement low. Salinity tolerance none. Shade tolerance intermediate. pH 4.0-8.0.

Under favorable conditions, these plants spread so rapidly by seed that they may need to be controlled. By dividing the plants every second year & by regular removal of slumping stalks (which root at the nodes when in contact with soil), the plants can be confined. Deadheading will encourage a second flowering in late summer. (lbj)

bottom Line:

greenhouse & garden:

Description: Erect or ascending, herbaceous, native forb; roots fleshy & fibrous, 4" minimum depth; stems to 2' tall, rarely rooting at the nodes; leaves stout *without* a bluish tint; flowers blue (violet-blue), purple, roseate, or white, 3-merous; N 2n = 12, 24. **key features:** Compared to *T. ohioensis*, it has hairy slender pedicles, larger bracts subtending the flowers, shorter plant with stouter leaves that do not have a blue tint. "Very variable in flower color, including deep blue, purple, pink, light pink, & pure white" (we12).

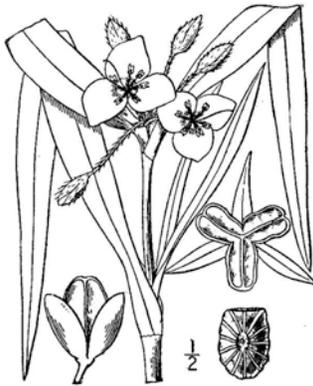
Comments: **status:** **phenology:** Blooms 4-6. Collect seeds in se Wisconsin in August - September (he99). Showy yellow stamens. Drought resistant. 175,000 (usda corrected); 352,000 (gni); 1,750,000 (usda, ecs) seeds per pound. The latter seed count is a single seed count not two, & is the result of a math error. The stated result is approximately 10X other counts for the genus, & sticks out like a sore thumb.

“Commonly attributed to this & other northern tier counties but we have not found in this county a blue *Tradescantia* with pubescent calyx & pedicle.” (ewf55)

Associates: Species is of special value to native bees & bumblebees. Primary pollinators are bumblebees. Also pollinated by long-tongued bees, short-tongued bees, honeybees, Little Carpenter bees, Halictine bees, & *Coleoptera*. Syrphid flies feed on stray pollen & are not pollinators. Attracts butterflies & bees. Attracts songbirds. White-tailed Deer, cottontail rabbits, wood tortoise, & livestock eat the foliage. Few insect pests, though *Lema collaris* LEAF BEETLE sp is reported to feed on the foliage. Juglone tolerant.

ethnobotany: “Leaves & stems sometimes are eaten as cooked vegetable or as a salad; cultivated plants have been derived from this plant” (Ilpin). Species may cause minor skin irritation if touched.

VHFS: In Britton & Brown (1913), this is listed as *T virginiana* & *T brevicaulis*. [*Ephemerum congestum* Moench, *Tradescantia brevicaulis* Raf, *T congesta* (Moench) D Don, *T rupestris* Raf, *T speciosa* Salisb, *T virginiana* f *albiflora* Britton, *T virginiana* L var *alba* Hook ex Raf, *T virginiana* L var *barbata* Raf, *T virginiana* var *drummondii* CB Clarke, *T virginiana* var *flexuosa* (Raf) S Watson, *T virginiana* var *glabra* Nutt, *T virginiana* var *occidentalis* Britton, *T virginiana* var *pilosa* (Lehm) CB Clarke, *T virginiana* var *tumida* (Lindl) CB Clarke, *T virginiana* var *villosa* S Watson, *T virginiana* f *virginiana*]



Tradescantia virginiana

Line drawing Britton & Brown (1913) courtesy of Kentucky Native Plant Society. Photo Robert H Mohlenbrock USDA-NRCS PLANTS Database - Not copyrighted image.

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DIOSCOREACEAE R Brown 1810 A family of about 3-20 genera & 600-800 spp of the tropics & warm temperate regions of the Old World & the New World.

DIOSCOREA Linnaeus 1753 **YAM, ÑAME** *Dioscoreaceae* *Dioscorea* (dee-os-KO-ree-a) after Pedanios Dioscorides, ca. 40-90, 1st century Greek herbalist, physician, & author of *De Materia Medica*. A genus of about 575-850 (600) spp of tender climbers of tropical & warm temperate regions of the New World & Old World, with 6 (7) spp in northern North America, 4 naturalized spp. The greatest diversity is in the tropics where at least 10 spp are grown for their edible tubers. The culinary *Dioscorea oppositifolia* (*D polystachya*) is scattered in southern Illinois; it is often planted as an ornamental & is potentially invasive. Many modern steroids are manufactured from plants of this genus. Many contain diosgenin, a phytoestrogen, or a plant-based estrogen, that can be chemically converted into a hormone called progesterone. *Ipomoea batatas*, SWEET POTATOES, are often referred to as “YAMS” X = 9, 10.

⚠ Skin irritation may occur from handling the uncooked tubers, or irritation & burning of the mouth, lips, tongue & throat if eaten. Toxic principal calcium oxalate crystals



Dioscorea oppositifolia (*D batatas*)

Seed photo Steve Hurst USDA-NRCS PLANTS Database. - Not copyrighted image.

Dioscorea quaternata JF Gmelin (OR (Walt) JF Gmelin) FOURLEAF YAM, aka CHINAROOT, FOUR LEAF YAM, WILD YAM, *WILDE YAMSWURZEL* (G),

Habitat: “Species is distributed in rich or rocky woods along bluffs, on talus slopes” (Ilpin). distribution/range: Native in the southern ¼ of Illinois.

Culture: propagation:

asexual propagation:

cultivation:

bottom line:

greenhouse & garden:

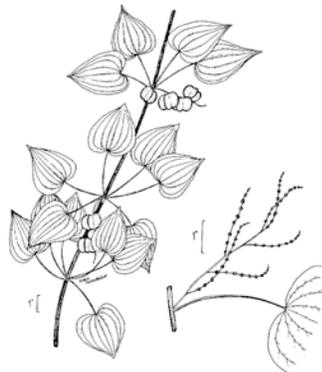
Description: Native, twining, herbaceous vine, to 10;+, from thickened tubers; lower leaves in whorls of 4-many, upper alternate; inflorescence a axillary panicle (spike); flowers yellow-green, 3-merous; fruits are 3-winged capsules; seeds winged. key features:

Comments: status: phenology: Blooms 6-7 (4-6).

Associates:

ethnobotany:

VHFS: Raz (in fina) places this in a broadly-defined *D villosa*. *D villosa* typically has 3 or less leaves at a node whereas *D quaternata* has 4 or more leaves. There are also differences in their root structure & fruit size. **List varieties.**



Dioscorea quaternata

Line drawing Mark Mohlenbrock, USDA-NRCS PLANTS Database / USDA NRCS *Wetland flora: Field office illustrated guide to plant spp.* USDA Natural Resources Conservation Service. Not copyrighted image. Photo Robert H Mohlenbrock USDA-NRCS PLANTS Database - Not copyrighted image.

Dioscorea villosa Linnaeus WILD YAM, aka *BATATA SILVESTRE* (SP), CHINAROOT, COLIC ROOT, DEVILS-BONES, DIOSCOREA, *LÄKEJAMS* (SW), *NAME SILVESTRE* (SP), RHEUMATISM ROOT, *WILDE YAMSWURZEL* (G), *ZOTTIGE YAMSWURZEL* (G), YAM ROOT, (*villosus -a -um* villo'sus (vil-OH-sus) Latin for with hairs, villous, soft-hairy, softly hairy, shaggy, from the adjective *villōsus -a -um*, shaggy, hairy, rough, from *villus, villi* m., shaggy hair, tuft of hair, & adjectival suffix noting plenitude, abundance, fullness or notable, marked development, prone to.)

Habitat: “Woods, thickets, fence rows & railroads. Common.” (ewf55) “Species is distributed in rich or rocky woods, in ravines, at bluff bases, & valleys. It is also distributed in mixed forests, especially where there has been moderate disturbance - *Celtis occidentalis*, *Fraxinus americana*, *Prunus serotina* & *P virginiana*; *Quercus alba*, *Q rubra*, *Tilia americana* - often where railroad goes through wooded area” (Ilpin). In Michigan, “an herbaceous vine in rich dense or dry open forests, fencerows, & thickets; often along pond & marsh borders, river bottoms, & railroads” (rvw11). “Borders of bogs, swamps, marshes, river & lake margins, creek bottoms, sandy or rocky



soils, moist or dry woods, hammocks, thickets, limestone or talus slopes, roadsides; 0--1500 m" (Raz in fina)
distribution/range: Primarily, of the Tall Grass prairie region & eastward. In all Illinois counties.

Culture: 60 days cold moist stratification (pm09).

Kew Thousand Seed Weight: 10.700g.

bottom line: Preliminary data suggests dormant seeding is strongly required. Germ <20%, dorm >50%. Germ 16, 16, na, sd 1.0, r15-17 (2.0)%. Dorm 67.5, 67.5, na, sd 14.5, r53-82 (29)%. Test 38, 38, na, r37-38 day. (#2).**

Description: Native, perennial, herbaceous vine; stems twining, climbing up to 18' tall; roots brownish rhizomes, shallow, horizontal, 0.25-0.50" diameter; leaves alternate, opposite & whorled, cordate, acuminate, pubescent beneath broad, heart-shaped base, 9-nerved; lateral nerves simple; inflorescence either widely-branched clusters of 1-4 male flowers per node or 2"-4" spikes of female flowers; flowers white to cream, tiny, 3-6-merous; fruits greenish-gold, turning brown, 3-winged capsule, persisting into winter, with very wide, winged seeds; N 2n = 20, 36, 54, 60. key features:

Comments: status: phenology: Blooms (5-)6-7. The 3-winged fruits are attractive in dried fall arrangements. Genetic seed source Kane County.

Associates: The winged seeds are wind dispersed.

ethnobotany: The Mesquakie used the root to ease the pain of childbirth. Wild Yam was also used to treat menstrual cramps, nausea & morning sickness, inflammation, osteoporosis, menopausal symptoms, & colic. The tubers are reported to not taste good at all.

VHFS: "Al-Shehbaz & Schubert (1989) consider *D villosa* to be a primarily Coastal Plain sp with strongly ridged stems & leaves all alternate, while recognizing our plant as *D quaternata* JF Gmel., with essentially terete stems & the lowest leaves on the stem whorled. Many, however, regard this variation as part of a broadly defined *D villosa*. Herbarium collections often do not have the lower portions of the stem, but our plants in the field may have the lowermost leaves alternate or whorled in the same population, & the stems seem slightly ridged. Hopefully further work will clarify this situation. (rvw11) **Add Illinois varieties.**

Sensu lato. [*Dioscorea cliffortiana* Lam, *D glauca* Muhl ex Bartlett, *D hexaphylla* Raf, *D hirticaulis* Bartlett, *D longifolia* Raf, *D lloydiana* EHL Krause, *D megaptera* Raf, *D paniculata* Michx, *D paniculata* var *glabrifolia* Bartlett, *D pruinosa* Kunth, *D quaternata* JF Gmel, *D quaternata* var *glauca* (Muhl ex Bartlett) Fernald, *D quinata* JF Gmelin, *D repanda* Raf, *D villosa* var *coreana* Prain & Burkill, *D villosa* subsp *floridana* (Bartlett) R Knuth, *D villosa* var *floridana* (Bartlett) HE Ahles, *D villosa* var *glabra* J Lloyd ex A Gray, *D villosa* f *glabrata* L, *D villosa* f *glabrifolia* (Bartlett) Fern, *D villosa* subsp *glabrifolia* (Bartlett) W Stone, *D villosa* var *glabrifolia* (Bartlett) W Stone, *D villosa* var *glabrifolia* (Bartlett) SF Blake, *D villosa* subsp *glauca* (Muhl ex Bartlett) R Knuth, *D villosa* subsp *glauca* (Muhl ex Beck) R Knuth, *D villosa* subsp *hirticaulis* (Bartlett) R Knuth, *D villosa* var *hirticaulis* (Bartlett) HE Ahles, *D villosa* var *laeviuscula* Alph Wood, *D villosa* subsp *paniculata* (Michx) R Knuth, *D villosa* subsp *quaternata* (JF Gmel) R Knuth, *D villosa* var *vera* Prain & Burkill, *D villosa* subsp *quaternata* (Walter) R Knuth, *D villosa* f *villosa*, *D villosa* var *villosa*, *D waltheri* Desfontaines]



Dioscorea villosa

Line drawing Britton & Brown (1913) courtesy of Kentucky Native Plant Society. Photos RW Smith & George H Brusco, courtesy of Wildflower Center Digital Library.

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HYPOXIDACEAE Brown 1814 **STARGRASS FAMILY** A family of about 9 genera & 155 spp or tuberous or rhizomatous perennial herbs, subcosmopolitan, most diverse in South Africa. Herndon in *fna* places this in the *Liliaceae*. “The recognition of *Hypoxidaceae* at the family level is supported by a variety of authors, on morphologic & molecular grounds (Kocyan et al 2011; Judd 2000)” (w12).

HYPOXIS Linnaeus 1759 **STAR-GRASS, STAR LILY, YELLOW STARS, YELLOW STAR GRASS, AFRICAN POTATO** *Amaryllidaceae* or *Hypoxidaceae* *Hypoxis* (hi-POX-is) from Greek *upoxus*, meaning subacid, an old name for a plant with sour leaves, also from *ὑπό*, *hypo*, under, beneath, below & *οξύς*, *oxys*, sharp, for the pointed base of the fruit capsule, or the pointed base of the ovaries. There are about 110 (90, 100, or 50-150) spp in Africa, North & South America, southeast Asia, & Australia, with most spp in the Southern Hemisphere. 41 spp in sub-Saharan Africa; 7 spp in northern North America. Small, perennial, scapose herbs easily recognized by having numerous hairy linear, strap-like leaves from a corm or short rootstock & umbellate, bright-yellow, star-shaped flowers with 6-parted perianth. Mature seeds are necessary for positive identification of some spp. *Hypoxis* has contractile roots. The genus has a long history of medicinal use in Africa & is currently being used in South Africa in primary health care as an immune booster for patients with HIV/AIDS. This genus is sometimes placed in *Amaryllidaceae* family or the *Liliaceae* family.

Flowers are short-lived & are pollinated by solitary bees & honey bees. Pollen grains are yellow & visible through the transparent sacs carried by honeybees. The fruit capsule is a pyxis, which splits along its diameter, dropping the upper part of the capsule, exposing the black seeds. Seeds germinate better if sown soon after maturity.

M Gillmer & R Symmonds, 1999. Seed collection & germination: *Hypoxis hemerocallidea*. *Plantlife* 21: 36, 37.

www.plantzafrica.com/planthij/hypoxis.htm

Hypoxis hirsuta (Linnaeus) Coville *ME, NH **YELLOW STAR GRASS**, aka **COMMON GOLDSTAR, COMMON GOLDSTARGRASS, COMMON STARGRASS, EASTERN YELLOW STAR-GRASS, GOLD STARGRASS, HAIRY STARGRASS, STARGRASS, YELLOW STARGRASS**, (*hirsutus* -a -um hir-SOO-tus hirsute, hairy, covered with hair, with straight hairs, having long distinct hairs, rough, stiffly hairy; from Latin for rough, shaggy, bristly, prickly, hirsute, or rude, unpolished for the leaves.)

Habitat: Hill prairies, dry mesic, mesic, wet mesic prairies & savannas, calcareous soils, bluff tops: dry open woods on acid soils. Prairies, glades, bluffs, dry woods, & fields. “Species is distributed in open woods; moist calcareous meadows; & woodland paths” (Ilpin). “Habitats include prairies, hill prairies, edges of bluffs, savannas, open woodlands & paths through woodlands, fens, sandstone glades, abandoned fields, & lawns” (Hilty). In the se USA, “In a wide variety of dry to moist forests” (w12). distribution/range Cis-Rocky Mountain USA & Canada. Known from most Illinois counties.

Culture: Seeds are not readily available, but easy from seed by cold moist stratification. Do not over pot. Code B. (cu00) 60 days cold moist stratification. Surface sow, seeds are very small or need light to naturally break dormancy & germinate. (pm09) No pretreatment needed. Sow seeds just below the soil surface at 70°F & water. (ew11) Sow at 20°C (68°F), germinates in less than two wks (tchn). “Seeds should be sown in fall, barely covered with soil” (lbj). Seedlings take 1-3 years to flower. 640,000 (ew11); 1,280,000 (pm02, aes12); 7,568,000 (shirley) seeds per pound. The tiny black seeds are elusive, difficult to collect, & in 2011, impossible to purchase. STARGRASS is occasionally available as seed & sometimes as plants (dormant corms). It may sell out early & may require advance booking, if you find it at all.

Kew Thousand Seed Weight: 0.336g (0.291-0.38)g.

asexual propagation: Division of offsets in the summer or fall. “Easily propagated by division while the plant is dormant in spring or fall. Separate the corms that form around the parent plant.” (lbjwfc)

cultivation: *Hypoxis* has contractile roots & must be planted in loose, living soil. Space plants 0.25-0.05’. Full sun to partial shade, mesic to dry soils. Rich acid loam pH <6.8. Extremely hardy, zones 5 through 10. Plant in dry soils in sun, partial shade or shade; rich acid loams. Soil may also be rocky. Species will eventually form loose colonies.

Description: Native, erect, grass-like perennial forb: 3-8.0” tall, from a hard, hairy corm; rosette of hairy grass-like (villous narrow) olive-green leaves from the base of the plant; inflorescence to 8”, a crude umbel with yellow flowers, 0.75”, star-shaped, tepals 6, stamens 6; seeds black, lustrous coarsely muricate (covered with



numerous wart-like projections). key features: Leaves with spreading hairs (strongly pilose).
Comments: status: Possibly Extirpated in Maine. Threatened in Hew Hampshire. phenology: Blooms 4-6.
 Collect seeds in se Wisconsin in September (Heon et al 1999). The yellow Amaryllis-like flower is slightly
 fragrant, opening in the morning & typically wilting in hot sun. The flowers are sometimes mildly fragrant.
 STARGRASS will self-seed. Easily overlooked when not in bloom. Rated “No Brainer” & “Idiot Proof” by
 some, tolerating moist or dry, sunny or shade, & a range of pH.

This plant produces a few seeds per plant per year. It is not a sp for commercial restoration. Including
 it in a set of seed specs shows you’re a real “No Brainer”.

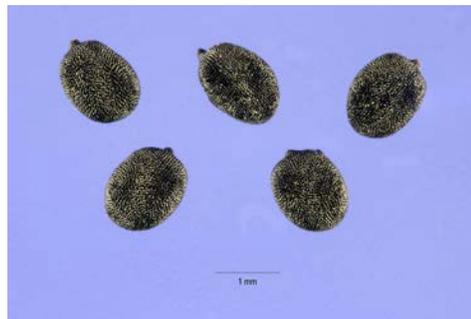
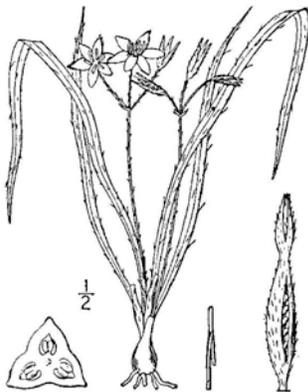
“Very rarely, specimens of *Hypoxis hirsuta* have cylindrical ovaries &/or bracts nearly equaling the
 pedicels. These specimens are recognized by the umbelliform inflorescence typical of *H hirsuta*. The condition
 appears to be pathological & is associated with a lack of seed development.” (Herndon in fna)

“Common on low prairies & also in open woods & in sandy soil.” (ewf55)

Associates: Attracts bees & butterflies. Pollinated by long-tongued bees, short-tongued bees, *Diptera*, &
Coleoptera. Pollinated primarily by small bees, including *Ceratina spp* Little Carpenter Bees, *Osmia spp*
 Mason bees, & *Halictus spp*, *Lasioglossum spp*, & other Halictid bees. Small rodents may eat the corms.

ethnobotany: The Cherokee used an infusion for heart medicine.

VHFS: [*Ornithogalum hirsutum* Linnaeus, Sp Pl 1: 306. 1753, *Hypoxis carolinensis* Michx, *H erecta* L, *H*
graminea Pursh, *H grandis* Pollard, *H hirsuta* f *hirsuta*, *H h* var *hirsuta*, *H h* var *leptocarpa* (Engelm & Gray)
 Brackett, *H h* f *villosissima*, *H micrantha* Pollard, *H pallida* Salis, *H villosa* Raf]



Hypoxis hirsuta

Photo Robert H Mohlenbrock USDA-NRCS PLANTS Database - Not copyrighted image. Line drawing Britton & Brown (1913) courtesy of
 Kentucky Native Plant Society. Seed photo Steve Hurst USDA-NRCS PLANTS Database. - Not copyrighted image. Second line drawing
 Mark Mohlenbrock, USDA-NRCS PLANTS Database / USDA NRCS *Wetland flora: Field office illustrated guide to plant spp*. Not
 copyrighted image.

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Credo Elvem etiam vivere.

Endnotes & abbreviations. The following math functions violate Abbey’s 1st Law, which see.

++ The listed numbers are seed count mean, seed count median, seed count mode, seed count standard deviation, seed count max, seed count min, seed count range.

** The listed numbers are Germ mean, germ median, germ mode, germ standard deviation, germ range (range); Dorm mean, dorm median, dorm mode, dorm standard deviation, dorm range (range); Test mean, test median, test mode, test range. (#germ test : tz etc)

Reference abbreviations May 04 2014

CEPPC California Exotic Pest Plant Council
CIPC California Invasive Plant Council
SEPPC Southeast Exotic Pest Plant Council
SWSS Southern Weed Science Society
RBG Kew RBG Kew, Wakehurst Place
aes10 (AES 2010)
afvp (Atlas of Florida Vascular Plants)
anef (Angelo & Boufford: Atlas of New England flora)
apl (Applewood)
asfg (Audubon Society Field Guide)
wade (Alan Wade, nd, various years, 95, &c)
bsh (Baker Seed Herbarium, California)
bb02 (Baskin & Baskin 2002, 2001, &c.)
nlb05 Britton 1905
cb03 (CC Baskin 2003, 2001, &c.)
crfg California Rare Fruit Growers
csvd (Currah, Smreciu, & Van Dyk 1983)
tchn tomclothier.hort.net (-4°C 24°F stratification being corrected)
cu00 (or cu02, &c, Cullina 2000, 2002, 2008)
nd91 (Norm Deno, 1991, 1993)
den28 (Densmore 1928)
do63 (Dobbs 1963)
mfd93 (Mary Fisher Dunham 1993)
dh87 (Dirr & Heusser 1987)
drwfp (Directory of Resources on Wildflower Propagation)
ecs (Ernst Conservation Seeds catalog)
ew12 (Everwilde 2012) also ew11
ewf55 (Egbert W Fell 1955)
ewf59 (Egbert W Fell 1959)
fh (Robert W Freckmann Herbarium)
fna (Flora of North America project)
foc (Flora of China online)
fop (Flora of Pakistan online)
gni (Genesis Nursery, Inc)
gc63 (Gleason & Cronquist 1963, 1991)
gran (Granite Seeds)
he99 (Heon et al 1999)
hk83 (Hartman & Kester 1983)
hpi (Hill Prairies of Illinois
(Hilty website)
Ilpin (Illinois Plant Information network)
jf55 (Jones & Fuller 1955)
jlh (JL Hudson, Seedsman, (if the phone doesn't ring its me))
kpw (Kansas Prairie Wildflowers)
krr (Kenneth R Robertson)
lbj (Lady Bird Johnson Wildflower Center Native Plant Information Network)
m14 (Mohlenbrock 2014) also m86, m99, m02, m05, m06, &c
mbg (Missouri Botanic Garden)
msue (Michigan State University Extension)

nae Native American Ethnobotany (Moerman, University of Michigan Dearborn)
now36 (Nowosad et al 1936)
nyfa (New York Flora Atlas)
orghp (Ontario Rock Garden Hardy Plant Society)
ppc (Philips Petroleum Company)
pots (Plants of the Southwest 2000)
pm09 (Prairie Moon 2009) also pm02, pm11, &c
pnnd (Prairie Nursery no date)
pph (Prairie Propagation Handbook)
ppi (Prairie Plants of Illinois)
psdg (Plants of South Dakota Grasslands)
pug13 (plants.usda.gov accessed 2013, 2014)
oed Oxford English Dictionary online
rain (Ranier Seeds)
rrn97 (Reeseville Ridge Nursery 1997)
rvw11 (Reznicek et al 2011)
rs ma (Ray Schulenburg Morton Arboretum)
rhs Royal Horticultural Society
sh94 (Shirley Shirley 1994) & don't call me Shirley
sk08 (Stuppy & Kessler 2008)
sm23 (Smith 1923) also sm32, sm33, sm28, &c.
sw79 (Swink & Wilhelm 1979)
sw94 (Swink & Wilhelm 1994)
tlp (Time Life Perennials)
tlw (Time Life Wildflowers)
tpg The Prairie Garden
uconn (UConn Plant Database)
us97 (USDA 1997)
w12b (Weakley Nov 2012) also w07-12
wfatp (Vance & Vance 1979)
wfn (Wildflowers of Nebraska)
wfnp Wildflowers Northern Prairies)
ws92 (Wilhelm & Swink 1992)
w73 (Alphonso Wood 1873)
ry64 (Richard Yarnell 1964)
yy92 (Young & Young 1992)
Reliquum etiam non scriptum est.