

Canada Anemone

Anemone canadensis, L.

Genus *Anemone*, Greek ‘wind’, e.g. ‘windflower’; species *canadensis* Latin ‘of Canada’.

Family: Buttercup (Ranunculaceae)

Other Common Name(s): meadow anemone

Description: Native herbaceous perennial. 1-1 1/2’ tall, sprawling. Large white flowers, 1 1/2” wide, borne above on stalk above leaves. Leaves basal with long (6”) stalks, deeply 3-lobed, 2-3” wide. Seedhead somewhat mace-like, globular, often overtopped by foliage at maturity. Seedheads shatter by mid-summer. This plant is very clonal, spreading vegetatively from rhizomes, and is typically found in patches, sometimes large ones.



Adaptation/Habitat:

Wet-mesic to mesic soil conditions, full sun to partial sun.

Threatened/Endangered Status:

Endangered in CT, TN, MD; Historical in KY.

General Comments: This species is challenging to propagate from seed because of difficulties with germination, but once established it tends to spread prolifically and is relatively easy to manage, harvest, and clean.

Establishment for Seed Production (Appendix A)

Direct seeding:

Seeding rate: 4.5 PLS lbs/acre (40 seeds/linear foot)
Row Spacing: 30-36” rows
Seeding Depth: 1/4”
Seeding Methods: drill
Time of Seeding: Dormant
Weed Control: Prepare clean, firm, weed free seedbed prior to seeding

Greenhouse:

Seed pre-treatment: Moist stratify 12 weeks at 40° F, or alternatively in ambient winter conditions (unheated building). Sow seed in greenhouse two months before last frost free date. Typically this species exhibits very high dormancy (low germination) and may require two winter cycles to germinate. Transplant into bare soil in rows or weedbarrier at 8” intervals after all danger of frost is past. Once plants are established they spread prolifically by rhizomes, so weed barrier will need to be removed or slit open to accommodate growth and enhance seed production.

Stand Management

Weeds – Weed control is critical to successful establishment and seed production of this species.

Control with post-emergent grass herbicide, tillage, hand roguing.

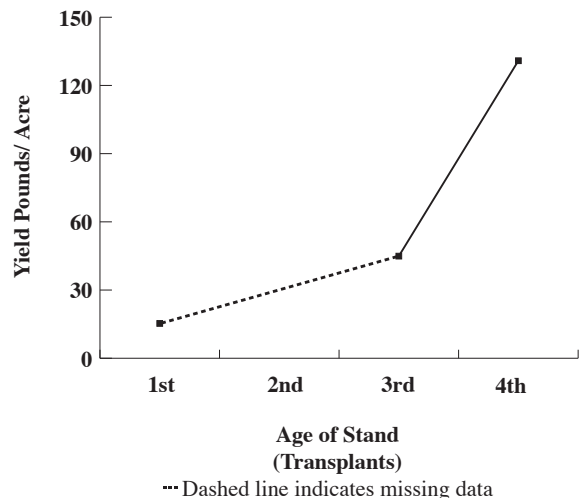
Pests – Blister beetles may forage voraciously on foliage

Diseases – No serious diseases known

Pollination: Insects. Plants will not self-pollinate within the same genetic clone (Douglas and Cruden, 1994). Easy to propagate by division of rhizomes, but more than one genotype needs to be present for effective seed production.

Seed Production (Appendix B)

- **First Harvest:** Some flowering and seed set end of 1st growing season from greenhouse grown transplants. Direct seed stands may take 3 years to become productive
- **Yield/Acre:** 50-150 bulk lbs/ac
- **Stand Life:** Peak harvest 4th year? Stand longevity unknown as of this writing.
- **Flowering Date:** Flowering occurs mid-May to late June.
- **Seed Maturity:** Mid- to late July
- **Seed Retention:** Shattering occurs soon after (and perhaps before) seed maturity.
- **Harvest date range at TPC (2002-2006):** July 17 – July 26
- **Recommended Harvest Method:** Combine near maturity, but before seed head breaks apart. (Refer to *Appendix B* for settings.) Plants will regrow new foliage after harvest.



Seed Cleaning (Appendix C)

Cleaning Process: Pre-clean air-dried material by scalping thru 1/2” and 1/4” mesh to remove large particles. Air-screen to clean.

Butterfly Milkweed

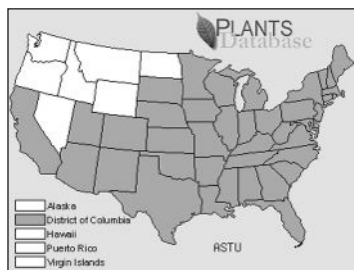
Asclepias tuberosa L.

Genus *Asclepias*, Latin, named for *Aesculapius*, Roman god of medicine and healing in recognition of plants medicinal qualities; species *tuberosa*, Latin *tuberosus* 'knobby, tuberous', in reference to tuberous, knobby tap root.

Family: Milkweed family (Asclepiadaceae)

Other Common Name(s): Butterfly weed, Pleurisy-root.

Description: Native herbaceous perennial. 1.5-2.5' tall. Bright orange flowers 1/4" long borne in clusters (umbels) on stem tips. Alternate leaves, somewhat hairy. Seedpods (follicles) about 4" long, produced more abundantly on 2nd year plants, and tend to abort on older plants. Deep, somewhat woody tap root. Unlike other milkweeds, butterfly milkweed has no milky sap. Forms large clumps in preferred, well-drained soils.



Adaptation/Habitat: Mesic to dry, prefers well-drained soils; high quality prairie remnants. Full sun.

Threatened/Endangered Status: Endangered (NH); Threatened (VT, NY); Possibly extirpated (ME).

General Comments: The bright orange flowers make this a desirable species for horticultural displays as well as prairie reconstructions. Germinates readily in the greenhouse with proper stratification. Requires care in transplanting because of the taproot structure. Does best in very well-drained soils. Requires hand-harvesting as pods ripen.

Establishment for Seed Production (Appendix A)

Direct seeding:

NOT RECOMMENDED FOR THIS SPECIES

Seeding rate: 8.5 PLS lbs/acre (40 seeds/linear foot)

Row Spacing: 30-36" rows

Seeding Depth: 1/4"

Seeding Methods: drill

Time of Seeding: dormant

Weed Control: Prepare clean, firm, weed free seedbed prior to seeding.

Greenhouse:

Seed pre-treatment: Wet stratify 8 weeks at 40° F.

Sow seed in greenhouse two months before last frost free date. Susceptible to damping off in greenhouse (See Greenhouse Propagation chapter). Plant into bare soil in 36" rows or weedbarrier at 12" intervals.

Stand Management

Weeds – Mow/cultivate between rows. Post emergence grass herbicide, tillage, roguing

Pests – Yellow milkweed aphids on upper portions

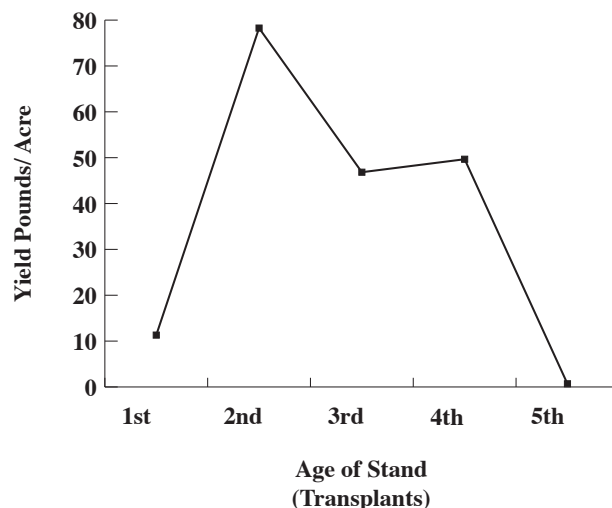
of plant, including pods. Monarch larva eat foliage and pods, but not a serious problem on this milkweed species.

Diseases – Susceptible to Pythium root rot in field soils, contaminated potting soils, containers, etc. (Tsrer et al. 1997).

Pollination: Insects, particularly butterflies, bees

Seed Production (Appendix B)

- First Harvest: Some flowering and minimal seed production first year with greenhouse transplants.
- Yield/Acre: 10-80 bulk lbs/ac
- Stand Life: Peak harvest 2nd year. Stand persists in well-drained soils if disease free, but seed production may decline significantly in subsequent years.
- Flowering Date: Flowering occurs from mid-June to mid-August
- Seed Maturity/Harvest Date: Mid-August to mid-October
- Seed Retention: Seed dispersed soon after ripening
- Harvest date range at TPC (2002-2006): Sept. 2-Oct. 17
- Recommended Harvest Method: Small plots - Hand harvest as pods ripen. Check daily. Ripe pods usually have a blush of yellow (somewhat like a ripe peach) and split readily with a gentle squeeze. Seeds are mature if they appear chocolate brown. If still creamy white, leave pod unpicked for another day or two.



Seed Cleaning (Appendix C)

Cleaning Process: Seeds can be separated from freshly picked pods with a hammer mill, or from dried pods using a debearder. Brush seeds to remove winged margin, then air-screen.

Prairie Coreopsis

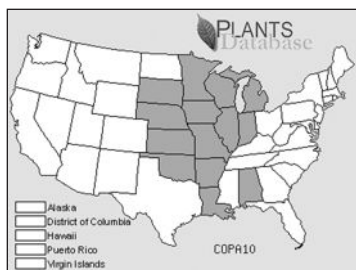
Coreopsis palmata, Nutt.

from *koris*, Greek ‘bedbug’; *opsis*, Greek ‘appearance’; thus bug-like, referring to achenes. *palmata*, Latin ‘palmate’ (hand-shaped leaves).

Family: Daisy family (Asteraceae)

Other Common Name(s): Stiff coreopsis, Stiff tickseed

Description: Native perennial. 2- 2.5’ tall. Composite yellow flowers with notched petals at ends of leafy flower stalks. Only marginal flowers produce ‘seeds’ (fruits). Opposite leaves divided into three elongate lobes. Spreads vegetatively (rhizomatous).



Adaptation/Habitat: Mesic to dry-mesic soils, medium to high quality prairies. Avoid wet and poorly drained soils. Threatened/Endangered Status: Threatened (MI)

General Comments: This species typically occurs in colonies (clonal) in native prairies, spreading from rhizomes. Flattened, inwardly curved, winged seeds makes effective air-screen separation challenging.

Establishment for Seed Production (Appendix A)

Direct seeding:

Seeding rate: 3.0 PLS lbs/acre (40 seeds/linear foot)
 Row Spacing: 30-36” rows
 Seeding Depth: 1/4”
 Seeding Methods: native seed drill
 Time of Seeding: dormant season
 Weed Control: Prepare clean, firm, weed free seedbed prior to seeding.

Greenhouse:

Seed pre-treatment: Wet stratify 8-12 weeks at 40 F. Sow seed in greenhouse two months before last frost free date. Harden-off, transplant into bare soil in rows after all danger of frost. Weed barrier is NOT recommended since this species spreads vegetatively.

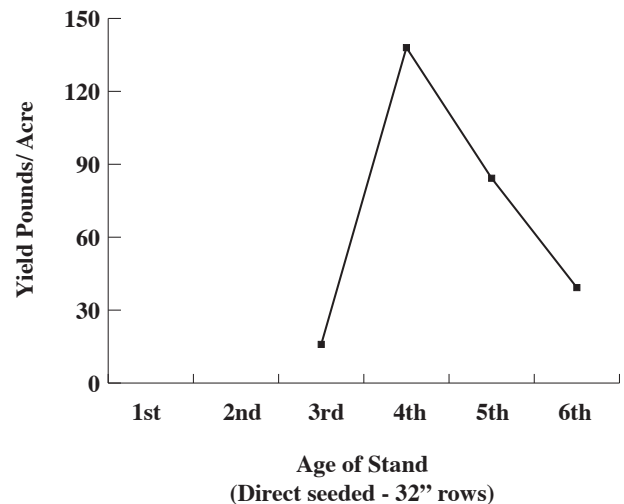
Stand Management

Weeds – Mow/cultivate between rows. Post emergence grass herbicide, tillage, roguing

Pests – No serious pests known

Diseases – Crown root rot if planted in too wet soils

Pollination: Insects



Seed Production (Appendix B)

- First Harvest: Some flowering first growing season from transplants, but minimal seed production. Flowering and seed production second year.
- Yield/Acre: 40-140? bulk lbs/ac Stand Life: Peak harvest 2-3rd year. Stand persists but seed production declines 4th year. Aerating the soil of the plot post-harvest 3rd season with a turf aerator may enhance seed set the following season.
- Flowering Date: Flowering occurs late June through mid July
- Seed Maturity/Harvest Date: October
- Seed Retention: Shattering occurs late October to early November
- Harvest date range at TPC (2002-2006): Oct.. 9 - 20
- Recommended Harvest Method: Combine

Seed Cleaning (Appendix C)

Cleaning Process: Pre-clean by scalping thru 1/2’ and 1/4” mesh to remove large particles and make flowable, then air-screen repeatedly, indent if needed. Because seeds are flat, separation from leaf particle of similar size and weight requires repeated air-screen cleaning to improve purity. (No awns or appendages to remove)

Pale Purple Coneflower

Echinacea pallida, (Nutt.) Nutt.

Genus *Echinacea*, Latin echinos ‘sea urchin, hedgehog’ presumably in reference to the spiny seedhead ; species *pallida* Latin ‘pale, pallid’, in reference to pale colored petals.

Family: Aster (Asteraceae)

Other Common Name(s):

Description: Native perennial. 2-3’ tall. Flowers arranged as a single, composite head at top of flowering stalks. Leaves are mostly basal, long-tapered, coarsely hairy, with three prominent parallel veins. Flowerheads with pale pink-purple drooping ray petals about 1 ½” long. Central cone of disk flowers an inch or more in diameter. Seeds develop from disk flowers, which bloom from the outer ring of ‘cone’ inward.



Adaptation/Habitat:

Mesic to dry-mesic soil conditions, prefers well-drained upland soils, full sun.

Endangered Status:

Threatened (WI), (TN)

General Comments: This species is best propagated in the greenhouse for transplant into weed barrier or bare soil. Weed suppression is essential for good establishment and seed production. Combine harvest is fairly straight forward, since it retains seed well in the heads. All *Echinacea* species are known to hybridize, so proper isolation should be maintained between related species to prevent hybrid seed production (McGregor 1968).

Establishment for Seed Production (Appendix A)

Direct seeding:

- Seeding rate: 3.0-5.0 PLS lbs/acre (40 seeds/linear foot)
- Row Spacing: 30-36” rows
- Seeding Depth: 1/8”
- Seeding Methods: drill
- Time of Seeding: dormant season
- Weed Control: Prepare clean, firm, weed free seedbed prior to seeding.

Greenhouse:

- Seed pre-treatment: Wet stratify 12 weeks at 40° F.
- Sow seed surface to 1/8” deep in greenhouse two months before last frost free date. Literature suggests this species needs light to germinate, but covering seed lightly to 1/8” does not inhibit germination.
- Harden-off, transplant into bare soil in rows or weedbarrier at 8” intervals after all danger of frost.

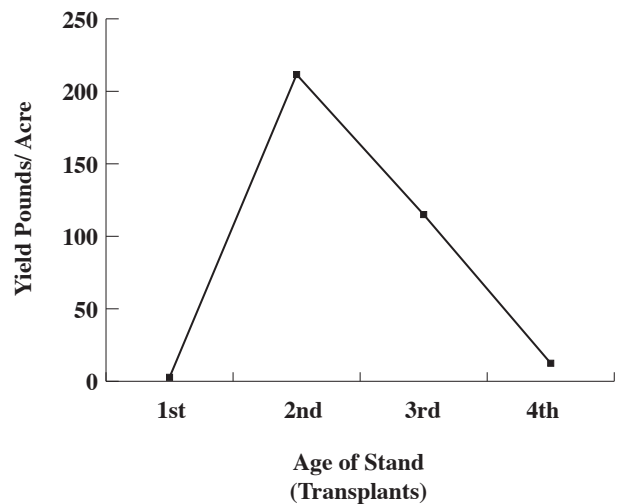
Stand Management

- Weeds – Hand rogue weeds, being careful not to uproot seedlings.

- Pests – No serious pests known
- Diseases – No serious diseases known
- Pollination: Insects, primarily bees, butterflies

Seed Production (Appendix B)

- First Harvest: Second year plants.
- Yield/Acre: 50-250 bulk lbs/ac
- Stand Life: Peak harvests 2nd year. Good harvest 3rd year. Stand persists but seed production declines significantly 4th year and after.
- Flowering Date: Flowering occurs mid-June to mid-July
- Seed Maturity: September
- Seed Retention: Generally holds seed well, some shattering may begin in late September, and extend throughout the winter months.
- Harvest date range at TPC (2002-2006): Sept... 1 – Sept... 23
- Recommended Harvest Method: Combine in the fall before significant shattering occurs. (Refer to Appendix B for settings.)



Seed Cleaning (Appendix C)

Cleaning Process: Combine does a superb job of threshing seedheads. Pre-clean combine run material by scalping thru 1/2” and 1/4” mesh to remove large particles and make flowable, then air-screen. If hand harvested, seedheads need to be threshed using a hammermill or brush machine, using care not to overclean and damage seed coat.

Rattlesnake Master

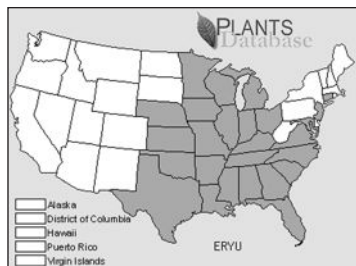
Eryngium yuccifolium, Michx.

(from *Eryngium*, Greek ‘prickly plant’; *yuccifolium*, Greek ‘yucca-like leaves’)

Family: Carrot family (Apiaceae)

Other Common Name(s): Button Snakeroot, Button eryngo

Description: Native perennial. 2-3’ tall. Spherical flower heads arranged on short branches on upper portion of plant. Seedheads with prickly bracts upon drying. Tough, fibrous yucca-like leaves, mostly basal.



Adaptation/Habitat: Dry-mesic to wet-mesic soils. Occurs in medium to high quality remnant prairie (full sun). Well-drained loamy soils preferred for seed production purposes.

Threatened/Endangered

Status: Endangered (MD); Threatened (OH, MI)

General Comments: Greenhouse propagation is recommended for this species. It grows readily, and produces some seed the first year from transplants. Potentially high seed yield. Fairly straight forward to combine harvest and air-screen clean.

Establishment for Seed Production (Appendix A)

Direct seeding:

Seeding rate: 3.25 PLS lbs/acre (40 seeds/linear foot)
 Row Spacing: 30-36” rows
 Seeding Depth: 1/4”
 Seeding Method: seed drill
 Time of Seeding: dormant season
 Site Preparation: Prepare clean, firm, weed free seed bed prior to seeding

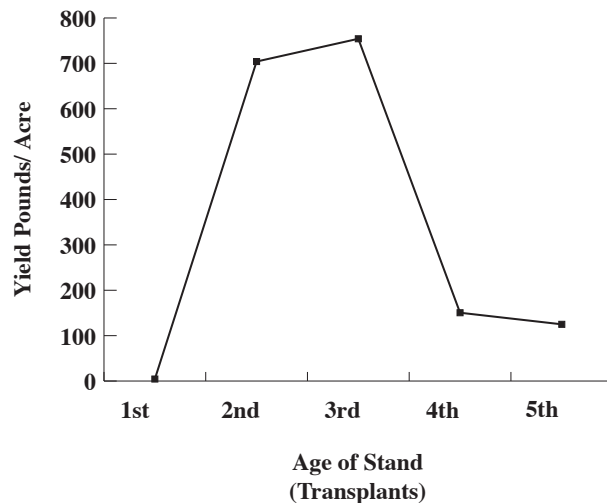
Greenhouse:

Seed pre-treatment: Wet stratify 8-12 weeks at 40° F. Sow seed in greenhouse two months before last frost free date. Harden-off, transplant into bare soil in rows or weedbarrier at 8” intervals after all danger of frost.

Stand Management

Weeds –Mow/cultivate between rows. Post emergence grass herbicide, tillage, hand roguing
 Pests – No serious pests known
 Diseases – Cucumber mosaic virus detected in populations in Ohio (Whitten and Nameth, 2004)
 Pollination: Insects, predominantly bees and wasp, but also flies, butterflies, beetles, moths

- First Harvest: Small harvest first growing season if greenhouse propagated in March and planted into weed-barrier in spring. Second year if direct seeded.
- Yield/Acre: 200-800 bulk lbs/ac
- Stand Life: Peak harvest 2nd-3rd year. Stand declines 4th year
- Flowering Date: Mid July-mid August
- Seed Maturity: Early October
- Seed Retention: Shattering occurs mid to late October
- Harvest date range at TPC (2002-2006): October 5-18
- Recommended Harvest Method: Combine (Refer to Appendix B for settings.)



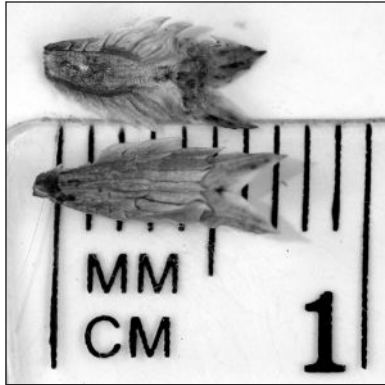
Seed Cleaning (Appendix C)

Cleaning Process: Pre-clean by scalping thru 1/2” and 1/4” mesh to remove large particles and make flowable, then air-screen (No awns or appendages to remove)

Seed Production (Appendix B)

Seed Characteristics (Appendix D)

Seed Count: 7,500 seeds/oz (120,000/lbs)



Description: ‘Seeds’ are one-seeded scaly fruits, 3/16” long

Seed Storage: Stores well in cool, dry conditions

Typical Seed Test (%)
 •Purity: 90+
 •Germination: 32
 •Dormancy: 52
 (50° F, 30% RH)

Photo credit: Dave Williams

Released Germplasm (Appendix E):

Northern, Central, Southern Iowa *Natural Selections*TM Source-Identified germplasm.

References:

USDA, NRCS. 2006. The PLANTS Database (<http://plants.usda.gov>, 28 November 2006). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

Whitten, K.R. and S.G.P. Nameth, First Report of Cucumber mosaic virus in *Eryngium yuccifolium* (Rattlesnake Master) in Ohio. *Plant Dis.* 88:1384, 2004

Planting Guide, *Eryngium yuccifolium*, Michx. USDA-NRCS Elsberry Plant Materials Center. 4/27/00.

An Illustrated Guide to Iowa Prairie Plants, p. 17. Christiansen, P. and M. Muller. University of Iowa Press. Iowa City, IA. 1999.

Flora of Missouri, p. 1122. Steyermark, J.A. Iowa State University Press, Ames, IA. 1996.

Notes:

Oxeye Sunflower

Heliopsis helianthoides, (L.)

Sweet var. *scabra* (Dunal) Fern.

(from *helios*, Greek ‘sun’; *opsis*, Greek ‘appearance’; and *helianthoides*, Latin ‘like Helianthus’ from the likeness to true sunflowers.)

Family: Daisy family (Asteraceae)

Other Common Name(s): Oxeye false sunflower, Sunflower Heliopsis

Description: Native perennial. 2 1/2’ - 4’ tall. Sunflower-like yellow flowers, 2” diameter on heads at ends of long stalks from stem tip and upper leaf axils. Opposite leaves, with sawtooth margins. Clump forming in cultivation.



Adaptation/Habitat: Dry mesic to wet mesic soils, low to high quality remnant prairies, disturbed areas, full sun.

Threatened /Endangered Status: Not Listed

General Comments: This species is fairly easy to establish by direct seeding, if good seedbed preparation and weed suppression are achieved. Extended flowering and seed-ripening period makes determining optimal combine harvesting time more difficult. Seed cleaning accomplished with air-screen cleaning.

Establishment for Seed Production (Appendix A)

Direct seeding:

Seeding rate: 4.0 PLS lbs/acre (40 seeds/linear foot)
 Row Spacing: 30-36” rows (3x above rate for 7” rows or solid stand)
 Seeding Depth: 1/4”
 Seeding Methods: seed drill
 Time of Seeding: dormant season
 Weed Control: Prepare clean, firm, weed free seedbed prior to seeding.

Greenhouse:

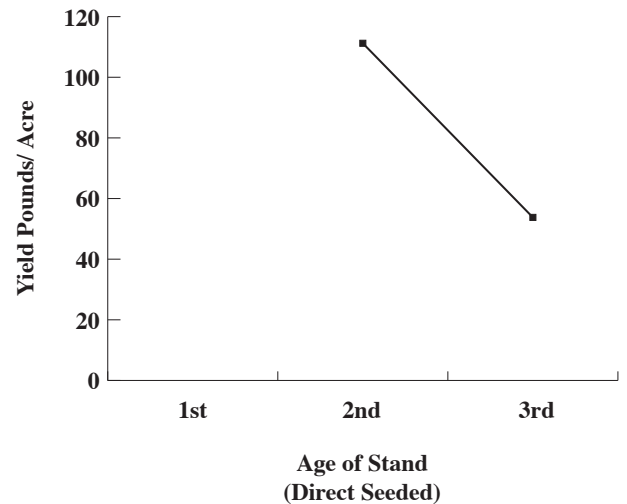
Seed pre-treatment: Wet stratify 8-12 weeks at 40° F.
 Sow seed approx. two months before last frost free date. Harden-off, transplant into bare soil in rows or weedbarrier at 8” intervals after all danger of frost.

Stand Management

Weeds – Mow/cultivate between rows. Post emergence grass herbicide, tillage, roguing
 Pests – No serious pests known
 Diseases – Powdery mildew, some susceptibility to aphids
 Pollination: Insects

Seed Production (Appendix B)

- First Harvest: Some flowering and seed produced first growing season from transplants and in well-managed direct seeded stand.
- Yield/Acre: 100-250 bulk lbs/ac
- Stand Life: Peak harvest 2nd- 4th year. Stand declines 5-7th year
- Flowering Date: Flowering occurs over an extended period from early June through late July.
- Seed Maturity: Mid-September to mid-October
- Seed Retention: Shattering occurs mid to late October
- Harvest date range at TPC (2002-2006): Sept.. 22 – Oct. 10
- Recommended Harvest Method: Combine (Refer to Appendix B for settings.)



Seed Cleaning (Appendix C)

Cleaning Process: Pre-clean by scalping thru 1/2” and 1/4” mesh to remove large particles and make flowable, then air-screen (No awns or appendages to remove)

Seed Characteristics (Appendix D)

Seed Count: 6,300 seeds/oz (100,800/lbs)

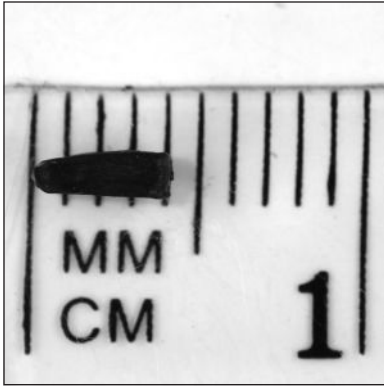


Photo credit: Dave Williams

Description: ‘Seeds’ are a smooth achene about 3/16” long.

Seed Storage: Stores well in refrigerated conditions. (50° F, 30% RH)

Typical Seed Test (%)

- Purity: 95+
- Germination: 71
- Dormancy: 19

Notes:

Released Germplasm (Appendix E)

Northern, Central, Southern Iowa *Natural Selections*TM Source-Identified germplasm.

References:

USDA, NRCS. 2006. *The PLANTS Database* (<http://plants.usda.gov>, 23 December 2006). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

Notice of Release: Oxeye False Sunflower, Iowa Germplasm. USDA-NRCS Elsberry Plant Materials Center. February 2000.

An Illustrated Guide to Iowa Prairie Plants, p. 50. Christiansen, P. and M. Muller. University of Iowa Press. Iowa City, IA. 1999.

Flora of Missouri, p. 1553. Steyermark, J.A. Iowa State University Press, Ames, IA. 1996.

Rough Blazingstar

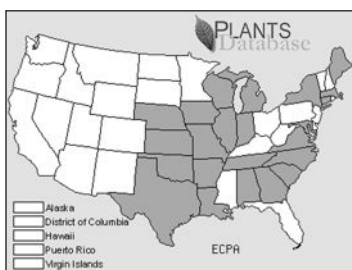
Liatris aspera, Michx.

Genus *Liatris*, derivation unknown; species *aspera* Latin 'rough'.

Family: Aster (Asteraceae)

Other Common Name(s): Button snakeroot, Rough gayfeather

Description: Native perennial. 2-3' tall. Rough blazingstar is similar in appearance to prairie blazingstar (*L. pycnostachya*). Flower heads are larger and more widely spaced on the flowering stalk, giving it the 'button' appearance. Root is a corm, which can be divided.



Adaptation/Habitat:

Occurs on dry-mesic to dry, even sandy or rocky soil conditions, full sun. Upland very well-drained loamy soils preferred for seed production. If soils are too dry or poor seed production will be curtailed.

Threatened/Endangered Status: Not listed

General Comments: This species is best propagated in the greenhouse, and transplanted in spring into weed-free planting bed or weedbarrier. Seedlings develop pea-size corms after two months in the greenhouse. Sometimes 1st year corms are exposed by frost-heaving over the winter, and may be eaten by voles. Species in the genus *Liatris* are known to hybridize, therefore proper isolation should be maintained between related species to avoid hybrid seed production (Levin 1968, Menhusen 1972). *Liatris* species are also being produced commercially for the cut-flower industry.

Establishment for Seed Production (Appendix A)

Direct seeding:

NOT RECOMMENDED FOR THIS SPECIES

Greenhouse:

Seed pre-treatment: Wet stratify 8-12 weeks at 40° F. Sow seed 1/4" in greenhouse two months before last frost free date. Harden off, transplant into bare soil in rows and mulch or into weedbarrier at 8" intervals after all danger of frost is past.

Stand Management

Weeds – Mow/cultivate between rows, mulch within rows. Post emergence grass herbicide, tillage, hoeing, hand roguing. Very sensitive to soil disturbance during bolting/flowering.

Pests – Voles will eat and/or cache corms, rabbits and deer eat young shoots

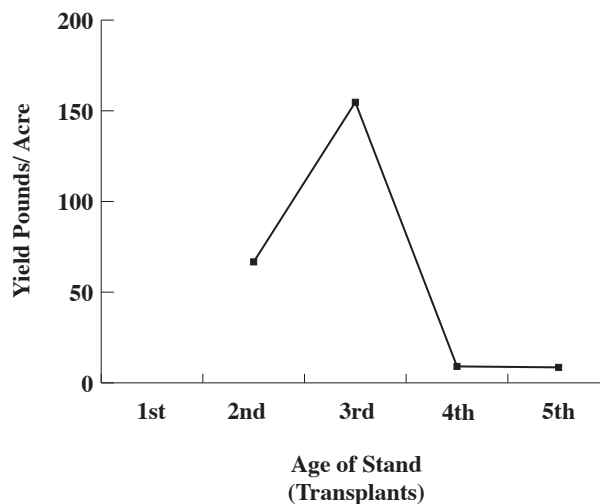
Diseases – powdery mildew, root-knot nematodes,

stem rot, verticillium wilt.

Pollination: Insects, particularly bees and butterflies

Seed Production (Appendix B)

- **First Harvest:** Remain vegetative first year (seedlings), abundant flowering/seed production 2nd year. Fall corm division/transplanting results in abundant flowering the following growing season.
- **Yield/Acre:** 50-150 bulk lbs/ac
- **Stand Life:** Peak harvests 2nd or 3rd year. Stand declines significantly 4th year and after. Plants tend to lodge 2nd year when flowering.
- **Flowering Date:** Flowering occurs early August to early September
- **Seed Maturity:** Late September to mid-October
- **Seed Retention:** Wind dispersed soon after maturity
- **Harvest date range at TPC (2002-2006):** Oct. 1 to Oct. 13
- **Recommended Harvest Method:** Combine at maturity, but before plumes are dry and fluffy. (Refer to Appendix B for settings.)

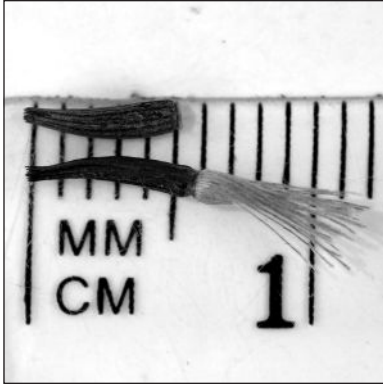


Seed Harvest/Cleaning (Appendix C)

Cleaning Process: Pre-clean by scalping thru 1/2" mesh to remove large particles and make flowable, brush gently to remove 'plumes' (pappus) using care not to damage seed coat, then air screen.

Seed Characteristics (Appendix D)

Seed count: 16,000 seeds/oz (256,000/lb)



Description: ‘Seeds’ are achenes, about 1/8” long or less, with tuft of hairs (plume).

Seed Storage: Stores well in controlled conditions of temperature and RH if seed is not damaged during cleaning. (50° F, 30% RH)

Notes:

Photo credit: Dave Williams

Typical Seed Test (%)

- Purity: 90-99
- Germination: 36
- Dormancy: 61

Released Germplasm (Appendix E):

Source Identified Material: Northern, Central, Southern Iowa *Natural Selections*TM

Cultivated Varieties: No known cultivars

References:

USDA, NRCS. 2006. The PLANTS Database (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA. Accessed 18 January 2007.

Plant Solutions, Missouri Germplasm Rough Gayfeather. USDA-NRCS Elsberry Plant Materials Center. October 2002.

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Liatris, Commercially Specialty Cut Flower Production. Kansas State University Agricultural Experiment Station and Cooperative Extension Service. MF-1087, Available at (<http://www.oznet.ksu.edu>) Oct. 1993

Ecology of the Prairie Species of the Genus Liatris. Menhusen, B.R. Third Midwest Prairie Conference Proceedings. Kansas State University, Manhattan, KS Sept.. 22-23, 1972. Pp. 60-62.

The Structure of a Polyspecies Hybrid Swarm in Liatris. Levin, D.A. Evolution. 22:352-372. June 1968.

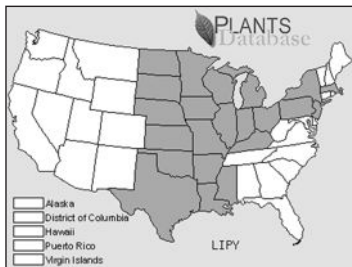
Prairie Blazingstar

Liatris pycnostachya, Michx.

Genus *Liatris*, derivation unknown; species *pycnostachya*
Greek *pycnos* ‘close/compact’, Gr. *stachys* “spike/ear of corn”
reference to the compact flowering spike.

Family: Daisy family (Asteraceae)

Other Common Name(s): Prairie gayfeather, Cattail
gayfeather, Kansas gayfeather



Description: Native perennial. 3-4’ tall. Purplish-pink disc flowers, flower heads sessile arranged in a spike on upper portion of plant. Leaves alternate, grass-like (linear). Seeds are plumed and form in fertile disc flowers. Root is a corm, which can be divided.

Adaptation/Habitat: Wet-mesic to mesic soils, full sun. May be abundant in medium to high quality prairies. Moist but well-drained soils preferred for seed production.

Threatened/Endangered Status: Threatened (IN)

General Comments: Prairie blazingstar is best propagated in the greenhouse, where seedlings form small pea-sized corms after about 2 months. Seedling leaves are grass-like. Prolific seed production second growing season, then stand declines. Corms can be dug and divided for fall transplant, if disease free, for abundant flowering and seed set the following growing season. Species in the genus *Liatris* are known to hybridize, therefore proper isolation should be maintained between related species to avoid hybrid seed production (Levin 1968, Menhusen 1972). *Liatris* species are also being produced commercially for the cut-flower industry.

Establishment for Seed Production (Appendix A)

Direct seeding:

NOT RECOMMENDED FOR THIS SPECIES

Greenhouse:

Seed pre-treatment: Wet stratify 8-12 weeks at 40° F. Sow seed in greenhouse two months before last frost free date. Harden-off, transplant into bare soil in rows or weedbarrier at 8” intervals after all danger of frost.

Stand Management

Weeds – Mow/cultivate between rows, mulch within rows. Post emergence grass herbicide, tillage, hoeing, hand rouging. Very sensitive to soil disturbance during bolting/flowering.

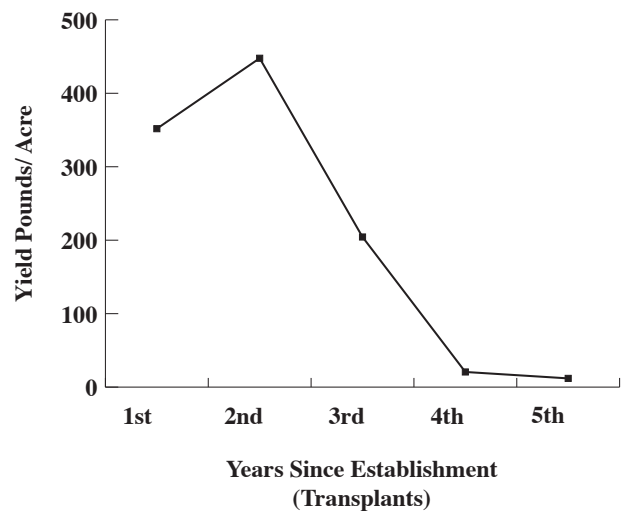
Pests – Voles will eat and/or cache corms. Rabbits and deer eat young shoots.

Diseases – powdery mildew, root-knot nematodes, stem rot, verticillium wilt.

Pollination: Insects, particularly bees and butterflies

Seed Production (Appendix B)

- **First Harvest:** Remain vegetative first year (seedlings), abundant flowering/seed production 2nd year. Fall corm division/transplanting results in abundant flowering the following growing season.
- **Yield/Acre:** 150-450 bulk lbs/ac
- **Stand Life:** Peak harvests 2nd year. Good harvest 3rd year if proper soils. Stand declines significantly 4th year and after. Plants tend to lodge 2nd year when flowering
- **Flowering Date:** Flowering occurs late July to late August
- **Seed Maturity:** Early September to mid-October
- **Seed Retention:** Seed is wind dispersed shortly after ripening and ‘parachutes’ dry
- **Harvest date range at TPC (2002-2006):** Sept.. 9 - Oct. 9
- **Recommended Harvest Method:** Combine at maturity, but before plumes are dry and fluffy (Refer to *Appendix B* for settings.)

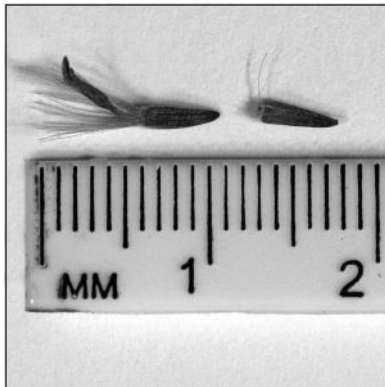


Seed Cleaning (Appendix C)

Cleaning Process: Pre-clean by scalping thru 1/2” mesh to remove large particles and make flowable, brush gently to remove ‘parachutes’ (pappus) using care not to damage seed coat, then air screen.

Seed Characteristics (Appendix D)

Seed count: 11,000 seeds/oz (176,000/lb)



Description: ‘Seeds’ are achenes, about 1/8” long, with tuft of hairs (plume).

Seed Storage: Stores well in controlled conditions of temperature and RH if seed is not damaged during cleaning.
(50° F, 30% RH)

Photo credit: Brent Butler

Typical Seed Test (%)

- Purity: 90-99
- Germination: 3.5
- Dormancy: 90+

Notes:

Released Germplasm (Appendix E)

Source Identified Material: Northern, Central, Southern Iowa *Natural Selections™*; Northern, Western Missouri Source Identified.

Cultivated Varieties: ‘Eureka’ (developed for cut flower industry)

References:

USDA, NRCS. 2006. The PLANTS Database (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA. Accessed 4 January 2007.

Planting Guide, Prairie blazingstar, *Liatris pycnostachya* Michx. USDA-NRCS Elsberry Plant Materials Center. April 2000.

An Illustrated Guide to Iowa Prairie Plants, p. 56. Christiansen, P. and M. Muller. University of Iowa Press. Iowa City, IA. 1999.

Liatris, Commercially Specialty Cut Flower Production. Kansas State University Agricultural Experiment Station and Cooperative Extension Service. MF-1087, Available at (<http://www.oznet.ksu.edu>) Oct. 1993

Ecology of the Prairie Species of the Genus *Liatris*. Menhusen, B.R. Third Midwest Prairie Conference Proceedings. Kansas State University, Manhattan, KS Sept.. 22-23, 1972. Pp. 60-62.

The Structure of a Polyspecies Hybrid Swarm in *Liatris*. Levin, D.A. Evolution. 22:352-372. June 1968.

Rigid Goldenrod

Oligoneuron solidago (L.)

Small var. *rigidum*

(Formerly as *Solidago rigida*, (L.))

Genus *Solidago*, Latin *solidare* 'to strengthen, unite' an allusion to reputed healing properties; species *rigida* Latin 'stiff, rigid, inflexible'.

Family: Aster (Asteraceae)

Other Common Name(s): Stiff goldenrod

Description: Native herbaceous perennial 3'- 4' tall. Stem usually unbranched, finely hairy. Yellow flowers borne in a branched flat-domed cluster at top of stem. Leaves alternate, lower leaves long-stalked, upper nearly clasping stem, with soft hairs. Seeds have fluffy plumes when ripe, seedhead at top of mature plant.



Adaptation/Habitat:

Wet-mesic to dry-mesic soil conditions, full sun. Well-drained loamy soils preferred for seed production

Threatened/Endangered Status: Endangered in CT, MD, NJ, PA; Threatened

(NY); Historical (RI)

General Comments: Rigid goldenrod establishes readily from direct seed or transplants, and will spread from short rhizomes to form clumps. Seed can be combined but is critical to harvest before plumes are dry and fluffy.

Establishment for Seed Production (Appendix A)

Direct seeding:

- Seeding rate: 1.0 PLS lbs/acre (40 seeds/linear foot)
- Row Spacing: 30-36" rows
- Seeding Depth: 1/4"
- Seeding Methods: drill
- Time of Seeding: Dormant
- Weed Control: Prepare clean, firm, weed free seedbed prior to seeding

Greenhouse:

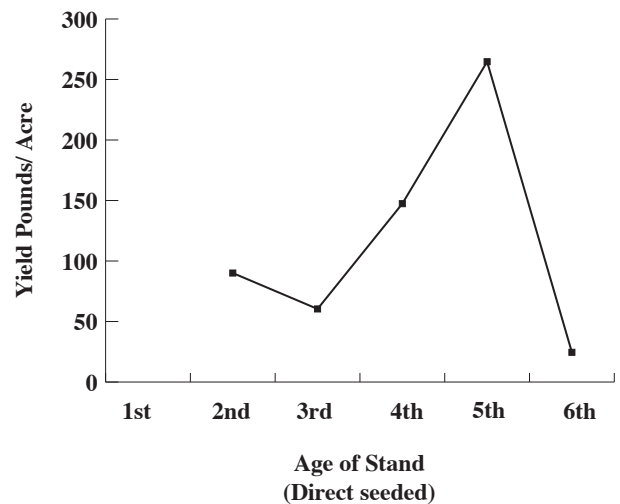
- Seed pre-treatment: Wet stratify 8-12 weeks at 40° F. Sow seed in greenhouse two months before last frost free date. Transplant into bare soil in rows convenient for tillage, equipment, or weedbarrier at 8" intervals after all danger of frost is past.

Stand Management

- Weeds – Post emergence grass herbicide, tillage, hand roguing
- Pests – No serious pest known; powdery mildew on foliage
- Diseases – No serious disease known, foliage may be affected by rust
- Pollination: Insects, especially bees, wasps, butterflies, beetles

Seed Production (Appendix B)

- First Harvest: Flowering and seed set end of 2nd growing season from either greenhouse grown transplants or direct seeded, well-managed stand
- Yield/Acre: 100-250 bulk lbs/ac
- Stand Life: Peak harvests 2nd growing season. Seed production declines 3rd year and after.
- Flowering Date: Flowering occurs mid-August to mid-September
- Seed Maturity: October
- Seed Retention: Seed wind dispersed soon after maturity and drying of plumes.
- Harvest date range at TPC (2002-2006): Oct. 9 – Oct. 25
- Recommended Harvest Method: Combine after seed maturity but before more than 10% of the seedheads have turned white and fluffy. Otherwise, combining will simply contribute to dispersal of the seed crop. Harvested material will have to be forced-air dried and turned carefully to prevent mold and decay. (Refer to Appendix B for settings.)

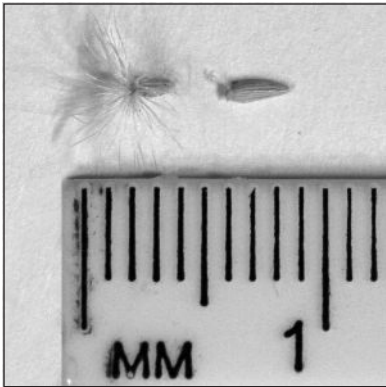


Seed Cleaning (Appendix C)

Cleaning Process: Pre-clean air-dried material by scalping thru 1/2" and 1/4" mesh to remove large particles. Remove plumes with debearder or brush machine, then air-screen.

Seed Characteristics (Appendix D)

Seed count: 41,000 seeds/oz (656,000/lb)



Description: ‘Seeds’ (achenes) glabrous, bone white, about 1/16” long with long white plumes. Stores well in refrigerated conditions. (50° F, 30% RH)

Typical Seed Test (%)

- Purity: 90-99
- Germination: 60
- Dormancy: 22

Notes:

Photo credit: Brent Butler

Released Germplasm (Appendix E):

Source Identified Material: Northern, Central, Southern Iowa *Natural Selections™*

Cultivated Varieties: No known cultivars

References:

USDA, NRCS. 2006. The PLANTS Database (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA. Accessed 16 January 2007.

Missouri Botanic Gardens. 2006. PlantFinder Database, Kemper Center for Home Gardening (<http://www.mobot.org/GARDENINGHELP/PLANTFINDER/>). Accessed 16 January 2007.

Plant Fact Sheet, Stiff goldenrod, *Oligoneuron rigidum* (L.) Small var. *rigidum*. USDA-NRCS Elsberry Plant Materials Center. October 2001.

An Illustrated Guide to Iowa Prairie Plants, p 74. Christiansen, P. and M. Muller. University of Iowa Press. Iowa City, IA. 1999.

Narrowleaf Mountain Mint

Pycnanthemum tenuifolium

Schrader

Genus *Pycnanthemum*, Greek *pycn* ‘compact’, and *anthum* ‘flowers’, e.g. ‘dense flower-clusters’; species *tenuifolium* Latin *tenuis* ‘thin, slender’ and *folius*, ‘leaves’.

Family: Mint (Lamiaceae)

Other Common Name(s): Slender mountain mint

Description: Native perennial. 1-3’ tall. Small white flowers (1/4”) clustered at stem tips. Stems are four sided and are smooth. Leaves are opposite, very narrow (1/8” or less). Seeds (nutlets) develop within the calyx. Strong mint odor when crush. Seedheads light brown color when mature, in contrast to grey color of *P. virginianum* seedheads. Also spreads vegetatively by rhizomes.



Adaptation/Habitat:

Mesic to dry-mesic soils in upland prairies, full sun.

Threatened/Endangered Status:

Not a listed species

Establishment for Seed Production (Appendix A)

Direct seeding:

NOT RECOMMENDED FOR THIS SPECIES

Greenhouse:

Seed pre-treatment: Dry cold stratify 12 weeks at 40° F. Surface sow seed in greenhouse two months before last frost free date. Water carefully (fine mist) to prevent seed from splattering out of containers. Transplant into weedbarrier at 8” intervals. Plants spread clonally, so weed barrier can be remove by third season, but seed production typically declines by 4th season.

Stand Management

Weeds – Hand rogue weeds, being careful not to uproot seedlings.

Pests – No serious pest known

Diseases – No serious diseases known

Pollination: Insects, particularly bees, wasps, butterflies, flies, beetles

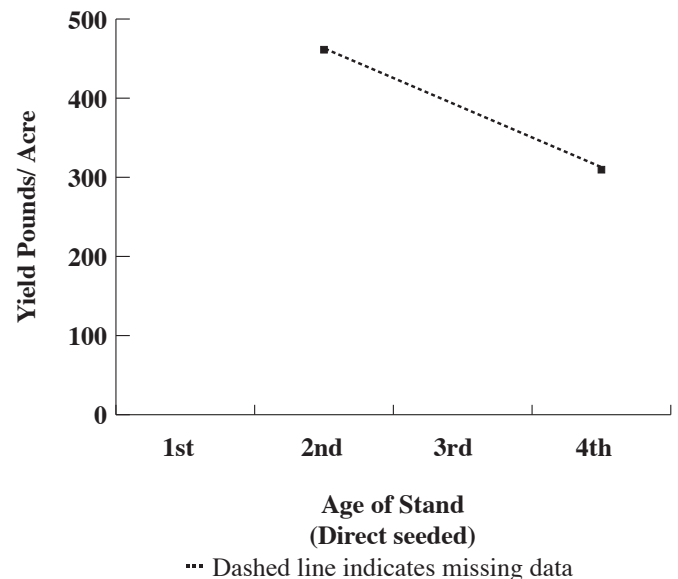
Seed Production (Appendix B)

- First Harvest: Some flowering and seed production first year from greenhouse grown transplants
- Yield/Acre: 10-80 bulk lbs/ac
- Stand Life: Peak harvests 2nd - 3rd year. Stand persists but seed production may decline significantly 4th year and after
- Flowering Date: Flowering occurs mid-July into August
- Seed Maturity: Mid September to early October
- Seed Retention: Holds seed well, shattering occurs mid to late October
- Harvest date range at TPC (2002-2006): Oct. 12-18
- Recommended Harvest Method: Combine, no air (Refer to Appendix B for settings.)

Seed Cleaning (Appendix C)

Cleaning Process: Pre-clean by scalping thru 1/2” and 1/4” mesh to remove large particles and make flowable, then air-screen.

(No awns or appendages to remove)



Seed Characteristics (Appendix D)

Seed count: 378,000 seeds/oz (6,048,000/lb)

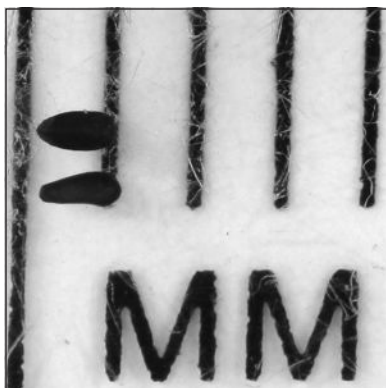


Photo credit: Dave Williams

Description: ‘Seeds’ are nutlets, about 1mm long, developing in tube-like calyx of inflorescence. Stores well in refrigerated conditions. (50° F, 30% RH)

Typical Seed Test (%)

- Purity: 90-99
- Germination: 75
- Dormancy: 11

Notes:

Released Germplasm (Appendix E):

Source Identified Material: Southern Iowa *Natural Selections™*

References:

USDA, NRCS. 2006. The PLANTS Database (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA. Accessed 8 January 2007.

Plant Fact Sheet, Narrowleaf mountainmint, *Pycnanthemum tenuifolium* Schrad. USDA-NRCS East Texas Plant Materials Center. Nacogdoches, TX. September 2004

An Illustrated Guide to Iowa Prairie Plants, p. 125, Christiansen, P. and M. Muller. University of Iowa Press. Iowa City, IA. 1999.

Virginia Mountain Mint

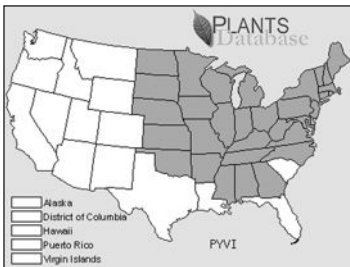
Pycnanthemum virginianum, (L.)

Genus *Pycnanthemum*, Greek *pyn* 'compact', and *anthum* 'flowers', e.g. 'dense flower-clusters'; species *virginianum* Latin 'of Virginia'.

Family: Mint (Lamiaceae)

Other Common Name(s): Mountain mint

Description: Native perennial, 1-3' tall. Small white flowers (1/4") clustered at stem tips. Stems are four sided, and smooth except for *hairs on the stem angles*. Leaves are opposite, at least 3/16" wide or more. Seeds (nutlets) develop within the calyx. Strong mint odor when crush. Mature seedheads grey color. Spreads vegetatively by rhizomes.



Adaptation/Habitat:

Wet-mesic to mesic soils, low prairies, full sun. Moist, well-drained loamy soils preferred for seed production.

Threatened/Endangered Status: Endangered (NH)

General Comments: This species is typically encountered in patches or colonies in native prairie, spreading by rhizomes. Weed control is essential for good establishment and seed production. Can be combine harvested if plots are weed free.

Establishment for Seed Production (Appendix A)

Direct seeding:

NOT RECOMMENDED FOR THIS SPECIES

Greenhouse:

Seed pre-treatment: Dry cold stratify 12 weeks at 40° F. Surface sow seed in greenhouse two months before last frost free date. Water carefully (fine mist) to prevent seed from splattering out of containers. Transplant into weedbarrier at 8" intervals. Plants spread clonally, so weed barrier can be remove by third season.

Stand Management

Weeds – Hand rogue weeds, being careful not to uproot seedlings.

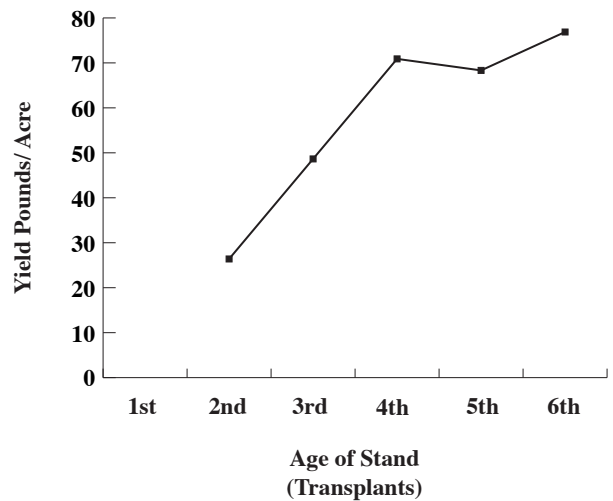
Pests – No serious pest known

Diseases – No serious diseases known

Pollination: Insects, particularly bees, wasps, butterflies, flies, beetles

Seed Production (Appendix B)

- First Harvest: Some flowering and seed production first year from greenhouse grown transplants
- Yield/Acre: 25-70 bulk lbs/ac in
- Stand Life: In proper soils with good management, stand and seed production persists at least into 4th year
- Flowering Date: Flowering occurs mid-July into August
- Seed Maturity: Mid September to early October
- Seed Retention: Holds seed well, shattering occurs mid to late October
- Harvest date range at TPC (2002-2006): Oct. 6- Oct.. 20
- Recommended Harvest Method: Combine at maturity (Refer to *Appendix B* for settings.)



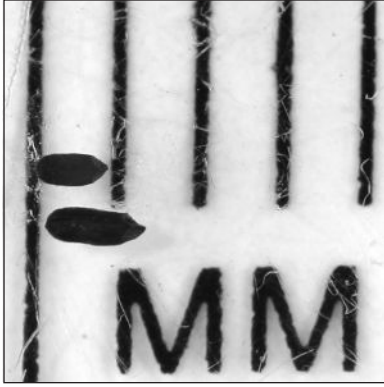
Seed Cleaning (Appendix C)

Cleaning Process: Pre-clean by scalping thru 1/2" and 1/4" mesh to remove large particles and make flowable, then air-screen.

(No awns or appendages to remove)

Seed Characteristics (Appendix D)

Seed count: 220,000 seeds/oz (3,520,000/lb)



Description: ‘Seeds’ are nutlets, developing in tube-like calyx of inflorescence. Stores well in refrigerated conditions.
(50° F, 30% RH)

Typical Seed Test (%)

- Purity: 90-99
- Germination: 77
- Dormancy: 8

Photo credit: Dave Williams

Released Germplasm (Appendix E):

Source Identified Material: Northern, Central, Southern Iowa *Natural Selections*TM;

Cultivated Varieties: None known

References:

USDA, NRCS. 2006. The PLANTS Database (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA. Accessed 9 January 2007.

An Illustrated Guide to Iowa Prairie Plants, p. 124. Christiansen, P. and M. Muller. University of Iowa Press. Iowa City, IA. 1999.

Notes:

Greyhead Coneflower

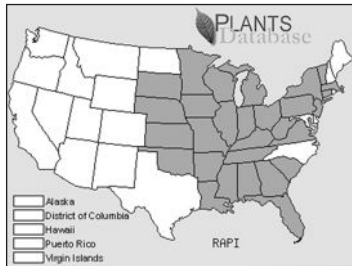
Ratibida pinnata (Vent.) Barnhart

Genus *Ratibida*, definition unknown; *pinnata* Latin pinnatus 'feather', reference to the pinnately lobed leaves.

Family: Daisy family (Asteraceae)

Other Common Name(s): Drooping Yellow Coneflower, Prairie Coneflower

Description: Native perennial. 3 - 5' tall. Composite flowers with drooping 1" long yellow petals, surrounding egg-shaped dome of disc flowers. Disc gray, becoming brown as disc flowers open. Leaves alternate, pinnately lobed. Seedheads borne at the end of long flower stalks on upper portion of plant. Seedheads release an anise or citrus scent when crushed.



Adaptation/Habitat: Wet-mesic to dry-mesic loamy soils, usually common on medium to high quality prairies.

Threatened/Endangered Status: Extirpated (PA)

General Comments: Greyhead coneflower is typically common on mid-western prairies, and establishes readily in reconstructed prairies. Seed harvesting and cleaning are relatively straight forward if good weed control is maintained.

Establishment for Seed Production (Appendix A)

Direct seeding:

- Seeding rate: 3.6-5.0 PLS lbs/acre (40 seeds/linear foot)
- Row Spacing: 30-36" rows
- Seeding Depth: 1/4"
- Seeding Methods: drill
- Time of Seeding: dormant season
- Weed Control: Prepare clean, firm, weed free seedbed prior to seeding.

Greenhouse:

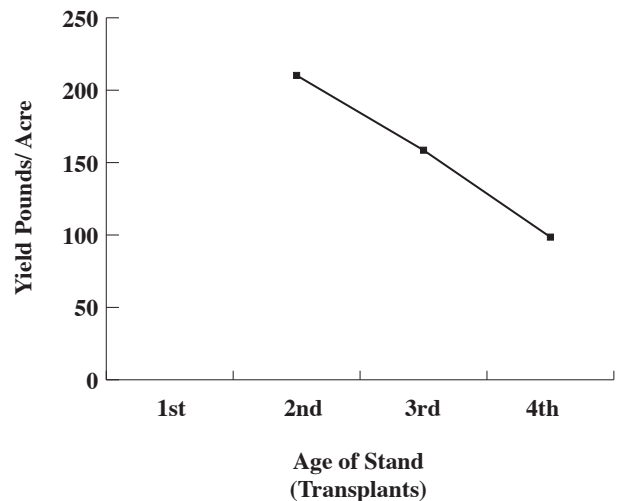
- Seed pre-treatment: Wet stratify 8-12 weeks at 40° F. Sow seed in greenhouse two months before last frost free date. Harden-off, transplant into bare soil in rows or weedbarrier at 8" intervals after all danger of frost.

Stand Management

- Weeds – Mow/cultivate between rows. Post emergence grass herbicide, tillage, roguing
- Pests – No serious pest known
- Diseases – No serious diseases known
- Pollination: Insects, particularly bees

Seed Production (Appendix B)

- First Harvest: Remain vegetative the first year, abundant flowering and seed production second year.
- Yield/Acre: 100-250 bulk lbs/ac
- Stand Life: Peak harvests 2nd year. Good harvest 3rd year. Stand persists but seed production may decline significantly 4th year and after.
- Flowering Date: Flowering occurs early July to mid-August
- Seed Maturity: Late September
- Seed Retention: Shattering occurs mid to late October
- Harvest date range at TPC (2002-2006): Sept... 20 – Oct.. 12
- Recommended Harvest Method: Combine (Refer to Appendix B for settings.)



Seed Cleaning (Appendix C)

Cleaning Process: Pre-clean by scalping thru 1/2" and 1/4" mesh to remove large particles and make flowable, then air-screen. Foxtail can be removed from most of the seed with scalping screens, followed by a final cleaning with a belt-sorter or velvet roller of scalped material.
(No awns or appendages to remove)

Seed Characteristics (Appendix D)

Seed count: 30,000 seeds/oz (480,000/lb)

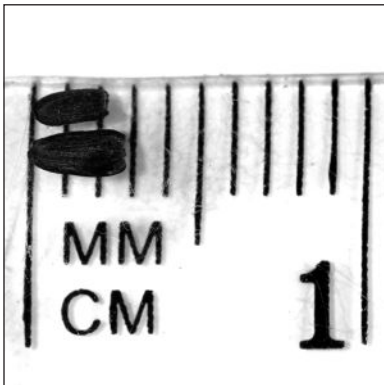


Photo credit: Dave Williams

Description: seeds (achenes) develop from fertile disc flowers. About 1/16” long. Stores well in refrigerated conditions (50° F, 30% RH)

Typical Seed Test (%)

- Purity: 90-99
- Germination: 80-90
- Dormancy: 0-10

Notes:

Released Germplasm (Appendix E):

Source Identified Material: Northern, Central, Southern Iowa *Natural Selections™*; Northern Missouri Source Identified.

Cultivated Varieties: ‘Sunglow’ (Kansas)

References:

USDA, NRCS. 2006. The PLANTS Database (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA. Accessed 3 January 2007.

<http://www.usask.ca/agriculture/plantsci/classes/range/ratibida.html> (Accessed 1/3/07). University of Saskatchewan, Dept. of Plant Sciences

Plant Fact Sheet, Grey-headed Coneflower, *Ratibida pinnata* (Vent.) Barnh. USDA-NRCS Elsberry Plant Materials Center. May 2003.

An Illustrated Guide to Iowa Prairie Plants, p. 64. Christiansen, P. and M. Muller. University of Iowa Press. Iowa City, IA. 1999.

An Illustrated Flora of the Northern United States and Canada, Vol. III p. 474. Britton, N. and A. Brown. General Publishing Company, Ltd., Toronto, Ontario, Canada. 1970.

Compass Plant

Silphium laciniatum, L.

Genus *Silphium*, Latin named after an extinct medicinal plant of ancient Cyrene; species *laciniatum* Latin ‘deeply cut’, in reference to the deeply lobed irregular leaf shape of this plant. Common name refers to habit of basal leaves to be oriented perpendicular to the ground along a north-south axis.

Family: Aster (Asteraceae)

Other Common Name(s): Pilot-weed



Description: Native perennial. 4-6’ tall (6’-9’ tall in production). Stem rounded in cross-section, coarse hairs, somewhat woody late season. Composite yellow flower, 3-4” in diameter. Leaves alternate, deeply lobed, 12-24” long, coarsely hairy.

Seeds formed only in outer fertile flowers of central disk. Flowering and seed ripening occurs first in flowers on ends of main stalks and branches, later on lateral flowers.

Adaptation/Habitat: Wet-mesic to dry-mesic soil conditions, typically on high quality prairie remnants, full sun. Preference is for moist, well-drained soils for seed production.

Threatened/Endangered Status: Threatened (MI, TN); Endangered (OH)

General Comments: Compass plants are a long-lived, tap-rooted species. An individual seedling may take 2-4 years to flower in production, and flower every year thereafter for a few years. In a prairie, an individual may take 5-10 years to flower from seed, and typically flowers every other year or so. *Silphium* species (congeners) will hybridize with one another in nature, so *Silphium*s should be properly isolated from related species for seed production purposes (i.e. cupplant, *Silphium perfoliatum*; rosinweed, *Silphium integrifolium*; prairie dock, *Silphium terebinthinaceum*; etc.) (Fisher 1966, Clevinger and Panero 2000)

Establishment for Seed Production (Appendix A)

Direct seeding:

NOT RECOMMENDED FOR THIS SPECIES

Greenhouse:

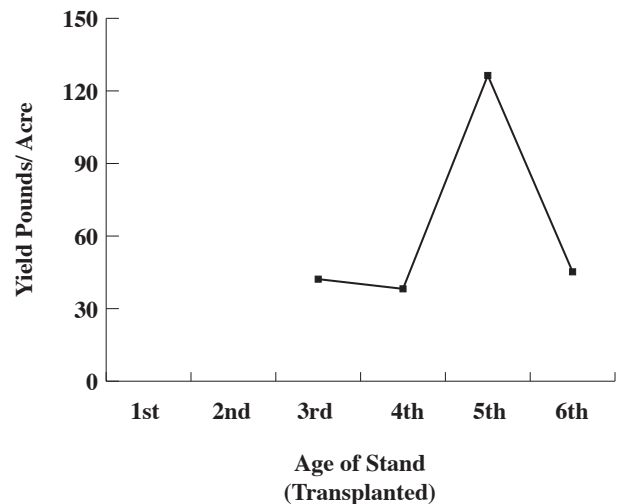
Seed pre-treatment: Wet stratify 8-12 weeks at 40° F. Sow seed in greenhouse two months before last frost free date. Transplant into bare soil in rows or weedbarrier at 12” intervals after all danger of frost is past.

Stand Management

- Weeds – Post emergence grass herbicide, tillage, hand roguing
- Pests – No serious insect pest known
- Diseases – No serious diseases known
- Pollination: Insects, primarily bees

Seed Production (Appendix B)

- First Harvest: Some flowering and seed set end of 2nd year, most will flower during 3rd growing season from greenhouse grown transplants
- Yield/Acre: 40-130 bulk lbs/ac
- Stand Life: Peak harvests 3rd year. Plants are very long-lived, but seed production begins to decline significantly 5th year and after.
- Flowering Date: Flowering occurs early July to mid-August
- Seed Maturity: Mid-August to mid-September
- Seed Retention: Shattering occurs as seeds mature and dry, end of August into September
- Harvest date range at TPC (2002-2006): Aug. 30 – Sept.. 27
- Recommended Harvest Method: Hand collect as seed ripens for most efficient harvest of small plots, combine for larger stands when seed is mostly mature and before significant shattering (Refer to *Appendix B* for settings.)



Seed Cleaning (Appendix C)

Cleaning Process: Pre-clean air-dried material by scalping thru 1/2” and sifting through 1/4” mesh, if desired (most seed will be retained on top of 1/4” mesh). Repeated air-screening to clean.

Seed Characteristics (Appendix D)

Seed count: 660 seeds/oz (10,560/lb)

Notes:



Photo credit: Dave Williams

Description: ‘Seeds’ are flat fruits (achenes), 3/8 – 1/2” long, with broad wing around margins, making it difficult to get a good separation between filled and unfilled seed. No plume.

Seed Storage: Stores well in refrigerated conditions (50° F, 30% RH)

Typical Seed Test (%)

- Purity: 85+
- Germination: 23
- Dormancy: 72

Released Germplasm (Appendix E)

Source Identified Material: Northern, Central, Southern Iowa *Natural Selections*TM

Cultivated Varieties: No known cultivars

References:

USDA, NRCS. 2006. The PLANTS Database (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA. Accessed 16 January 2007.

The Phylogenetic Analysis of *Silphium* and subtribe *Engelmanniinae* (Asteraceae: Heliantheae) Based on ITS and ETS Sequence Data. Clevinger, J.A. and J.L.Panero. 2000. American Journal of Botany 97(4): 565-572.

An Illustrated Guide to Iowa Prairie Plants, p. 69 Christiansen, P. and M. Muller. University of Iowa Press. Iowa City, IA. 1999.

The Genus *Silphium* in Ohio. Fisher, T.R. 1966. The Ohio Journal of Science 66(3): pp 259-263.

New England Aster

Symphotrichum novae-angliae, (L.) Nelson

(Formerly classified as *Aster novae-angliae*(L.) Recently reclassified as *Symphotrichum-angliae* based on G.L. Nesom, based on molecular analysis)

Genus *Aster*, Latin 'star'; species *novae-angliae* Latin 'of New England'.

Family: Aster (Asteraceae)

Other Common Name(s): Purple meadow aster

Description: Native herbaceous perennial. 3-4' tall. Stem hairy. Composite flowerheads 1" to 1 1/2" across, usually purple rays, but may occasionally be white or pink; with yellow disk flowers. Leaves opposite, base of each leaf clasps stem, hairy below. Seed is small and plumed, dispersing very soon after ripening.



Adaptation/Habitat: Wet-mesic soil conditions, prairie swales, wet meadows, full sun. Avoid poorly drained clay soils for seed production purposes.

Threatened/Endangered Status: Not listed

General Comments: This species is easy to propagate in the greenhouse. Though this species establishes readily in prairie reconstructions, weedy competition will severely curtail establishment and seed yield for seed production purposes. Plumes consist of fine hairs arising from nearly the entire surface of the seed, requiring thorough brushing/debearding to remove for good airscreen separation.

Establishment for Seed Production (Appendix A)

Direct seeding:

NOT RECOMMENDED FOR THIS SPECIES

Greenhouse:

Seed pre-treatment: Wet stratify 8 weeks at 40° F. Sow seed in greenhouse two months before last frost free date. Harden-off, transplant into bare soil in rows or weedbarrier at 8" intervals after all danger of frost.

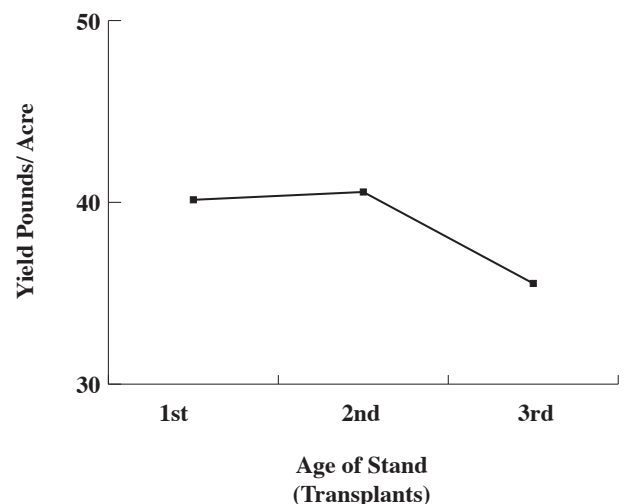
Stand Management

Weeds – Post emergence grass herbicide, tillage, hand roguing. Weed pressure severely curtails establishment and seed production of this species. Pests – Rabbits and groundhogs seem to favor eating foliage of this and other aster species, keeping plants pruned to 8" all growing season, particularly establishment year.

Diseases – Powdery mildew
Pollination: Insects, primarily bees and butterflies.

Seed Production (Appendix B)

- First Harvest: Flowering and seed set end of first growing season from greenhouse grown transplants
- Yield/Acre: 20-40 bulk lb/ac
- Stand Life: Peak harvests 1st and 2nd year. Seed production declines significantly 3rd year and after. For ornamental purposes, plants of this species are commonly pinched back through mid-summer to increase bushiness and flowering. Whether this would also increase seed production has not been demonstrated.
- Flowering Date: Flowering occurs late August to September
- Seed Maturity: Mid-September to October
- Seed Retention: Seeds wind dispersed very soon after maturity
- Harvest date range at TPC (2002-2006): Oct. 7- Oct.. 25
- Recommended Harvest Method: Combine after seed maturity but before more than 10% of the seedheads have turned brown and fluffy. Otherwise, combining will simply contribute to dispersal of the seed crop. Harvested material will have to be forced-air dried and turned carefully to prevent mold and decay. (Refer to *Appendix B* for settings.)



Seed Cleaning (Appendix C)

Cleaning Process: Pre-clean air-dried material by scalping thru 1/2" and 1/4" mesh to remove large particles. Remove plumes with debearder or brush machine, then air-screen.

Seed Characteristics (Appendix D)

Seed count: 66,000 seeds/oz (1,056,000/lb)

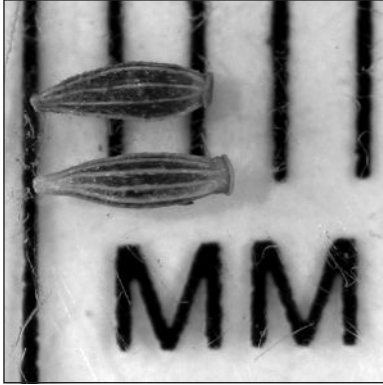


Photo credit: Dave Williams

Description: ‘Seeds’ are achenes 1/16” long, very hairy, with plume hairs attached to all parts of the achene.

Seed Storage: Stores well in refrigerated conditions (50° F, 30% RH)

Typical Seed Test (%)

- Purity: 80+
- Germination: 40-50
- Dormancy: 20-30

Notes:

Released Germplasm (Appendix E):

Source Identified Material: Northern, Central, Southern Iowa *Natural Selections™*;

Cultivated Varieties: None

References:

USDA, NRCS. 2006. The PLANTS Database (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA. Accessed 11 January 2007.

Plant Fact Sheet, New England aster, *Symphotrichum novae-angliae* (L.). USDA-NRCS Elsberry Plant Materials Center. October 2002.

An Illustrated Guide to Iowa Prairie Plants, p. 37. Christiansen, P. and M. Muller. University of Iowa Press. Iowa City, IA. 1999.

Ohio Spiderwort

Tradescantia ohioensis Raf.

Genus *Tradescantia*, reference to John Tradescant the elder, a 17th century English plant collector and nurseryman; species *ohioensis* i.e. 'of Ohio'.

Family: Dayflower of Spiderwort family (Commelinaceae)

Other Common Name(s): Common spiderwort, Bluejacket, Cow-slobbers, Snotweed

Description: Native perennial. 1 ½ - 2 ½ ' tall. Smooth, unbranched stem. Umbel of few to many flowers arising from stem tip and upper leaf axils. Flower buds bent downwards, bending upwards only as each bud flowers, on smooth flowering stalks. Each flower only opens for a day, primarily in the morning hours. Three petals, blue to purple about ½" long. Three sepals, smooth. Blue, hairy stamens with orange-yellow anthers. Leaves alternate, linear, joining main stem as a sheath, up to 2' long and ½" wide. Dark grey to black seeds develop inside three-parted capsules that split open and drop seed at maturity.



Adaptation/Habitat:

Mesic soils, prefers sandy soil conditions in remnant prairies and open woodlands, often in areas with some disturbance. Full sun and well-drained loam soils preferred soils for seed production.

Threatened/Endangered Status: Endangered (PA).

General Comments: This species is easily propagated in the greenhouse and readily transplanted into production beds. Plants will spread with good management. Timing of seed harvest is challenging, since flowering and seed maturity occur gradually over, and bracts will still appear green after mature seed has dropped. Also, plants have a slimy, sticky sap (hence the unglamorous but obvious common name 'snotweed'), which makes direct combining inadvisable.

Establishment for Seed Production (Appendix A)

Direct seeding:

Seeding rate: 4.5 PLS lbs/acre (40 seeds/linear foot)
 Row Spacing: 30-36" rows
 Seeding Depth: ¼"
 Seeding Methods: Drill
 Time of Seeding: Dormant
 Weed Control: Prepare clean, firm, weed free seedbed prior to seeding

Greenhouse:

Seed pre-treatment: High percentage of dormancy, seed must be wet stratify 12 weeks at 40 F. Sow seed ¼" depth in greenhouse two months before last frost-free date. Transplant into bare soil or weedbarrier at 30-36" row spacing after all danger of frost is past.

Stand Management

Weeds – Post emergence grass herbicide, tillage, hand roguing.

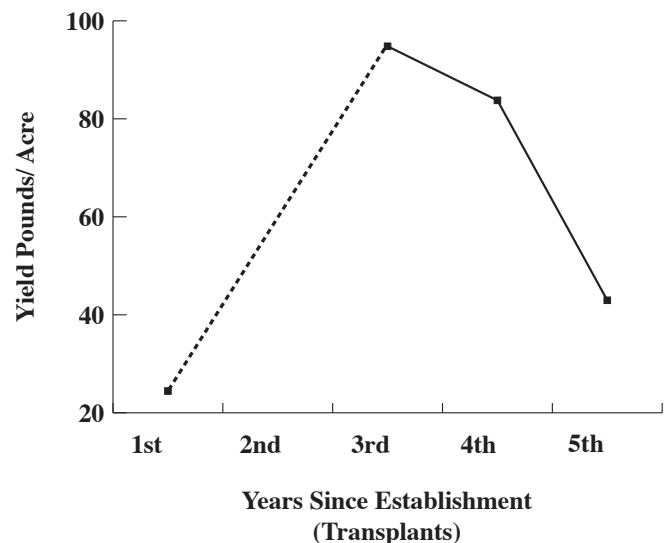
Pests – No serious pest known. Rabbit and deer will browse foliage.

Diseases – No serious diseases known

Pollination: Insects, primarily bumblebees.

Seed Production (Appendix B)

- **First Harvest:** Some flowering and seed set end of first growing season from greenhouse grown transplants. We harvested 24 bulk pounds per acre first growing season.
- **Yield/Acre:** 40-100 bulk lbs/ac
- **Stand Life:** Peak harvests second and third full growing season after establishment. Seed production declined somewhat 4th year and was about half peak harvest 5th year. Chisel plowing can reinvigorate stands. Spiderwort is reportedly tolerant of low rates (1%) glyphosate.
- **Flowering Date:** Flowering occurs late May to late June.
- **Seed Maturity/Harvest Date:** Maturity begins in June, but optimal harvest early to mid-July.
- **Seed Retention:** Shattering occurs as soon as seed ripens.
- **Harvest date range at TPC (2002-2006):** July 7 to July 23
- **Recommended Harvest Method:** Hand clip seed heads and dry on tarps for several days and thresh. Large fields may be machine swathed, but seed will shatter out of heads as material dries down.



--- Dashed line indicates missing data

