Top Weeds of New York Field Crops: Tilled Systems

Produced by
Cornell University
Weed Ecology and Management
Laboratory

Giant Foxtail

Palmer Amaranth

Supported by the USDA National Institute of Food and Agriculture,
Smith Lever project 2018-19-268

General Weed Management Considerations

Rotate **herbicide mode of action**. This helps slow the development of herbicide resistance in problem weeds.

Integrate chemical and non-chemical approaches. This can be especially helpful when managing herbicide resistant populations.

Time planting dates to achieve the most competitive crop and optimum yields, generally late April to mid-May for corn and early to late May for soybeans. The highest recommended **crop population** and narrowest recommended **row spacing** will produce the most competitive crop against weeds.

Rotation to crops that are planted in a different season from corn and soybeans and permit different weed control operations, such as mowing and/or tillage during spring and summer, will reduce populations of weeds that would otherwise increase in corn and soybeans.

POST herbicide **application timing** is critical. Generally, application before annual weeds are 4'' tall is much more effective, especially for Palmer, waterhemp, and horseweed.

A strong **PRE emergence program** can be especially mportant when managing species with resistance to common POST herbicides.

Removing weeds before they go to seed can reduce the weed seed bank, especially for prolific seed producers like Palmer amaranth and horseweed.

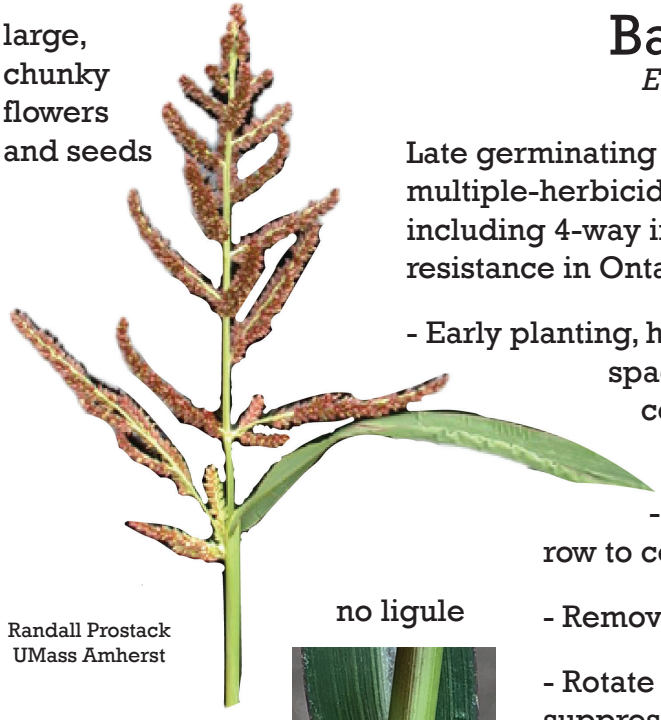
Authors
Caroline Marschner, John Teasdale, Anastasia Bartsch, and Antonio DiTommaso

Front Page Photo Credits: Giant foxtail photo by Doug Doohan of Ohio State University and OARDC, via Bugwood.org.
Palmer amaranth photo by Lynn Sosnoskie of Cornell Uniersity

Barnyardgrass

Echinochloa crus-galli

large, chunky flowers and seeds



Randall Prostack
UMass Amherst

Late germinating summer annual grass. Many multiple-herbicide resistant populations globally, including 4-way in Mississippi (1,2,5, and 29). Group 5 resistance in Ontario, CA.

- Early planting, high crop population, and narrow row spacing will increase the competitiveness of crops against this shade-intolerant weed.

- Cultivate frequently and close to the row to control this fast-growing weed.

- Remove large plants before they go to seed.

- Rotate to winter grain or hay crops that suppress spring establishment and prevent seed production.

Herbicides: most are effective

white midribs, keeled leaves

Antonio DiTommaso
Cornell University

no ligule

Lynn Sosnoskie
Cornell University

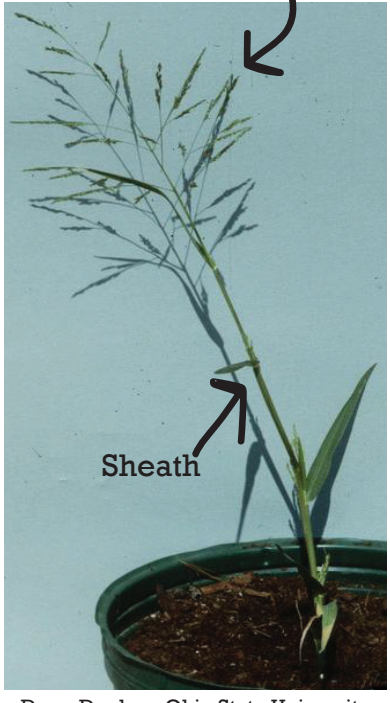
leaves rolled in bud

Steve Dewey of Utah State University, via Bugwood.com

Fall Panicum

Panicum dichotomiflorum

mature seeds turn purplish



Doug Doohan, Ohio State University OARDC, Bugwood.org

Summer annual grass. Only herbicide resistance record is from Spain (atrazine).

Achilles' heel: late germination in warm soil, late seedset after small grain harvest, short lived seed.

- Early planting, high crop population, and narrow row spacing will increase the competitiveness of crops against this shade-intolerant weed.

- Severing seedling root from shoot with minimal soil disturbance may be more effective than uprooting or burying this weed.

- Controlling seed set helps.

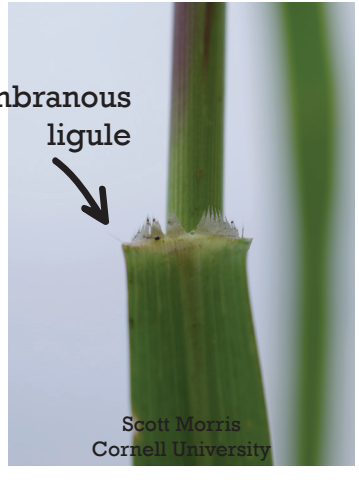
- Rotate with winter grain or hay, which suppress spring establishment and prevent seed production.

Herbicides: Most PREs work in soy, a bit less in corn (85-95% control); POST groups 1, most 2 (but not Permit/Sandea or Yukon), 9, and 2/27 mixes are effective. In sorghum, PREs work great, but POST only group 7 (Linex/Lorox) is over 85% control.

seedling leaves hairy on lower side

Bruce Ackley, The Ohio State University, Bugwood.org

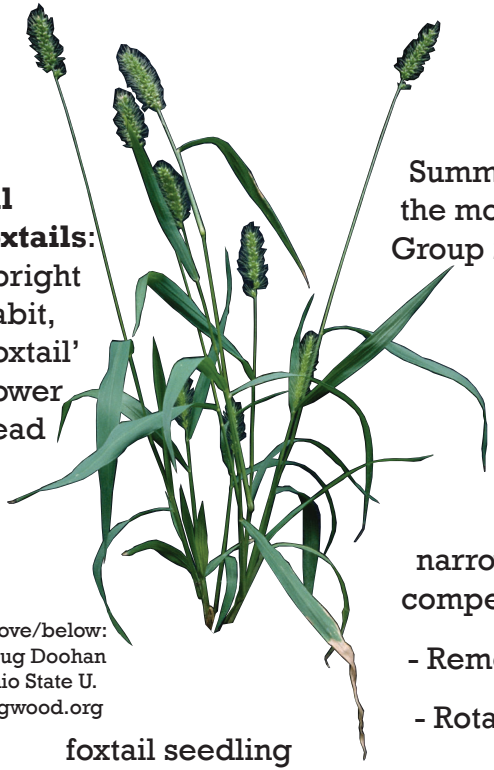
Membranous ligule



Scott Morris Cornell University

Foxtail Grasses

Setaria spp.



all foxtails: upright habit, 'foxtail' flower head

above/below: Doug Doohan Ohio State U. Bugwood.org

Summer annual grasses. Giant foxtail is the most competitive in corn and soy. Group 2 resistance in 6 states including PA, and ON, CA. Group 1 and 5 resistance in Midwestern states.

- A dense layer of surface residue from a winter annual cover crop will suppress or delay emergence.

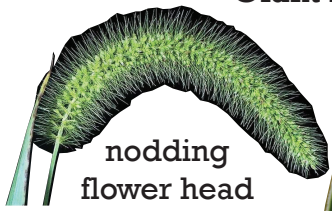
- Early planting, high crop population, and narrow row spacing will increase crop competitiveness against this shade-intolerant. species.

- Remove large plants before they go to seed.

- Rotate to winter grain or hay crops that suppress spring establishment and prevent seed production.

- Most herbicides still effective.

Giant foxtail



nodding flower head

fringed ligule

Yellow foxtail

wispy hairs near collar

Green foxtail

no leaf blade hairs

Flower spike photos: Doug Doohan, OSU Bugwood.org

Ligule and leaf photos: Scott Morris, Cornell University

foxtail seedling

giant foxtail has fine hairs on upper leaf

Large Crabgrass

Digitaria sanguinalis

Summer annual grass, sprawling growth with stems rooting at nodes. Linked to overgrazing in pastures.

Herbicide resistance: Group 1 (US & ON, CA), Groups 1, 2 and 5 elsewhere, multiple resistance to 1 and 2 in Australia.

- Blind and sweep cultivations should be performed when seedlings are emerging or small, otherwise they rapidly develop an extensive root system that resists soil disruption.

- Rotation to a winter grain will allow tillage in mid-summer and prevention of seed production.

- Rotation to hay crops may increase populations of this weed because they can tolerate the associated mowing, drought, and shade.

Herbicides: Many PRE options; glyphosate most effective POST, but group 27 also fairly effective.

Early leaves hairy, rolled in bud

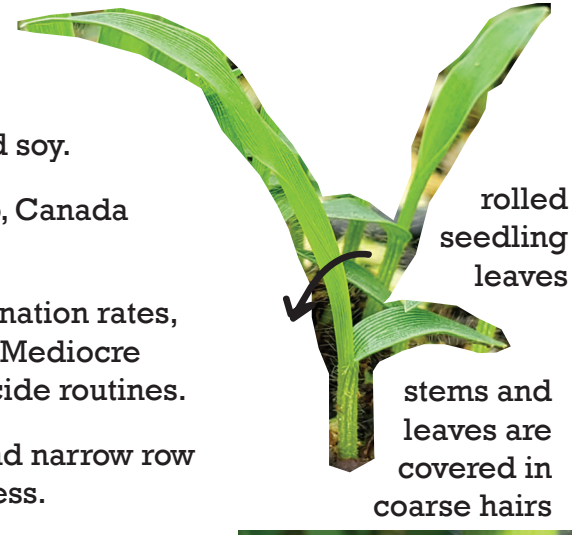
Scott Morris
Cornell University

3-13 long, thin flower spikes

Antonio DiTommaso
Cornell University

Witchgrass

Panicum capillare



Summer annual grass, weedy in corn and soy.

Herbicide resistance: Group 5 in Ontario, Canada (atrazine)

Achilles' heel(s): very high spring germination rates, shallow emergence, slow establishment. Mediocre competitor. Managed by common herbicide routines.

- Early planting, high crop population, and narrow row spacing will increase crop competitiveness.

- Tine weeding and other shallow cultivation methods will control this species that emerges from near the soil surface.

- Avoid excess fertilization.

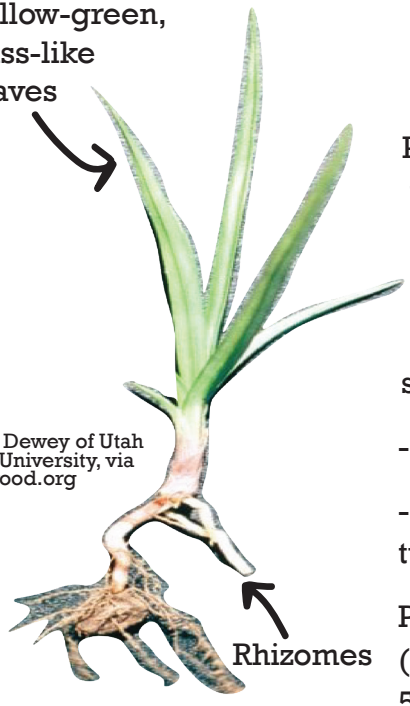
- Rotate with winter grain or hay crops that suppress spring establishment and prevent seed production.

Herbicides: many

Yellow Nutsedge

Cyperus esculentus

Yellow-green, gass-like leaves



Steve Dewey of Utah State University, via Bugwood.org

Rhizomes

Perennial grass-like sedge, establishing from tubers. Tolerant of most herbicides. A short plant with short-lived tubers; most tubers are in top 6" of soil.

- Rotate with crops that have late spring/early summer tillage.

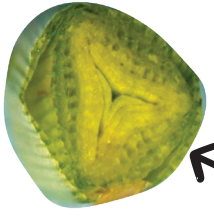
- Dense plantings will overtop nutsedge.

- Rotational control for 2-3 years will eliminate most tubers.

PRE Herbicides: Groups 1/3 (i.e. Harness Xtra), 5 (atrazine, Princep), 5/15 (Bicep, CinchATZ), 5/15/27 (Acuron/Acuron Flexi, Lumax, Lexstar), 15 (Dual)

POST Herbicides: Group 2 (Permit, Sandea, Yukon, Permit Plus)

Bruce Ackley of Ohio State University, via Bugwood.org



Stems triangular in cross section

Spiked flowers

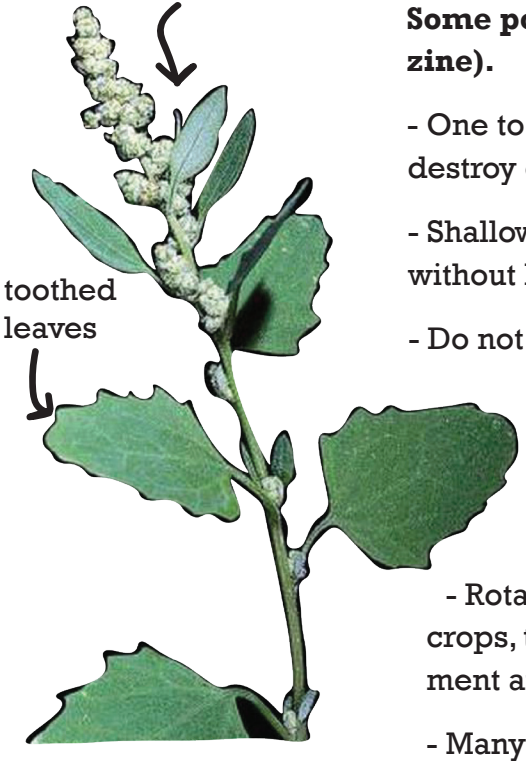
Above & below: Steve Dewey of Utah State University, via Bugwood.org

Tubers start new plants

Common Lambsquarters

Chenopodium album

gray coating on young leaves



toothed leaves

Joseph M. DiTomaso of UC-Davis, via Bugwood.org

Common summer annual herb; prolific seed producer. Some populations resistant to group 5 herbicides (atrazine).

- One to two weeks of cultivated fallow before planting will destroy early emerging seedlings.

- Shallow cultivations early and often will remove seedlings without bringing up deeper buried seeds.

- Do not overfertilize with N, and sidedress rather than broadcast most N for corn.

- Remove large plants before they go to seed.

- Rotate with winter grain or hay crops, that suppress spring establishment and prevent seed production.

- Many effective herbicides.

long, narrow cotyledon purple below

Cornell University's Weed Ecology and Management Lab

tiny, whitish flower clusters

From "Weed Identification, Biology and Management" by Alan Watson and Antonio DiTommaso

long, thin
flowering stalks

Joseph M. DiTomaso, University of California - Davis, Bugwood.org

Steve Dewey, Utah State University
bugwood.org

Common Ragweed

Ambrosia artemisiifolia

Summer annual; emerges in early spring. In NY, Group 5 (atrazine) resistant and under study for glyphosate resistance.

- POST applications after plants reach 4" are largely ineffective. Effective PRE programs are useful.

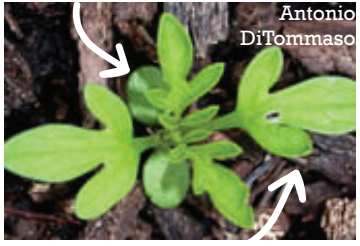
- A cultivated fallow in early spring before planting will suppress emergence.

- Aggressive post-plant cultivation of this fast-growing weed should be performed when it is still small.

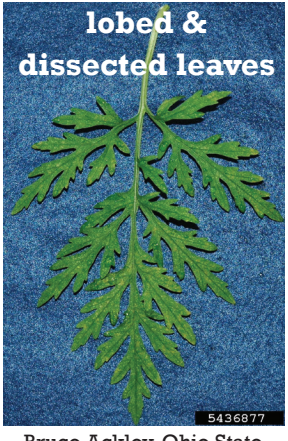
- Prevent large established ragweed plants from seeding.

- Rotate to a competitive late-spring planted crop that allows for a pre-plant cultivated fallow or rotate to a crop where ragweed flowering stalks can be mowed in mid-summer.

thick cotyledon with
speckled edges



deeply lobed
first leaves



Bruce Ackley, Ohio State
University, Bugwood.org

Horseweed

Erigeron canadensis

Winter or summer annual. Resistant to multiple herbicides in parts of New York, including groups 2 (ALS inhibitors), 9 (glyphosate), and 22 (paraquat).

- Winter annual cover crops with a dense leaf canopy will suppress establishment and growth.

- Spring tillage and tine weeding both eliminate established seedlings.

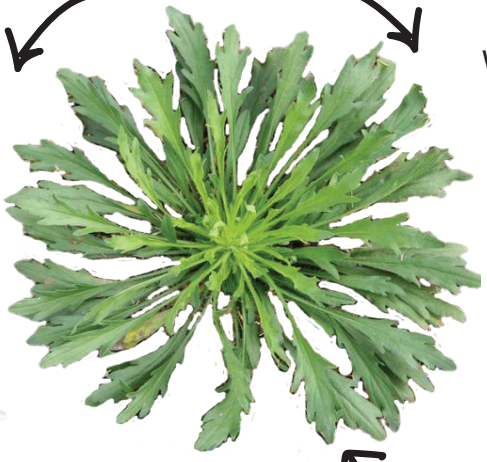
- Mowing will reduce seed production and dispersal.

- Seeds are short-lived; preventing seed production controls the population within a few years. Clean fields after early harvests to prevent seed set.

- Wind-dispered seeds; eliminate plants from surrounding field edges and non-crop areas to prevent new additions to the field.

- Group 4 (2,4-D, dicamba) herbicides effective in NY.

early rosette



Robert Vidéki, Doronicum Kft., Bugwood.org

hairy leaves

hairy, egg shaped first leaves

Scott Morris, Cornell University

tiny cotyledons

mature plants

Lynn Sosnoskie Cornell University

hairy stems

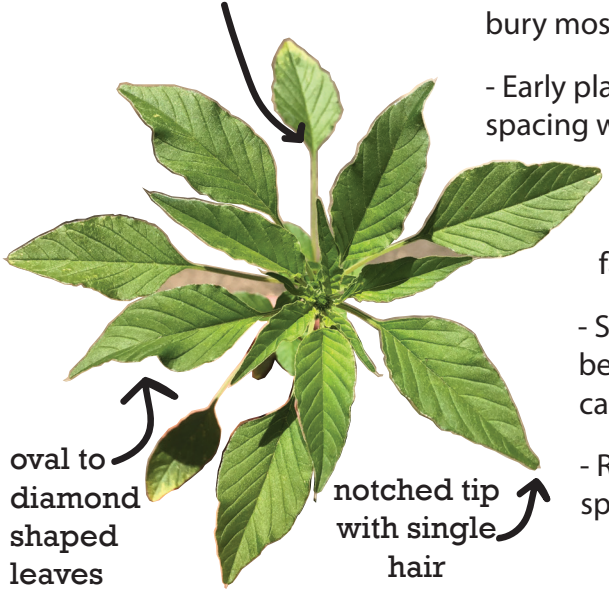
white flowers

Antonio DiTomasso, Cornell University

Palmer Amaranth

Amaranthus palmeri

lower petioles longer than leaf



oval to diamond shaped leaves

notched tip with single hair

Annual herb with a long emergence window, rapid growth, abundant seed production, and resistance to ALS, PPO, and glyphosate herbicides in New York.

- POST herbicide applications ineffective after plants are 4" tall. A stong PRE herbicide program wil help with this species.

- Inversion tillage after a year of high seed production will bury most seeds too deep for emergence.

- Early planting, high plant population, and narrow row spacing will increase the competitiveness of crops against this late-spring emerging weed.

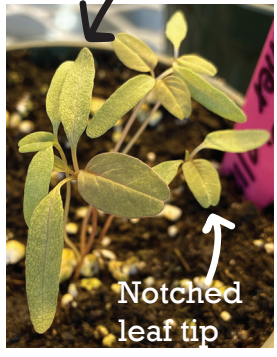
- Blind and sweep cultivate early to destroy fast-growing seedlings.

- Seeds remain on the plant, so removal of large plants before harvest or of residue and chaff during harvest can substantially reduce seed input to the field.

- Rotate to winter grain or hay crops that suppress spring establishment and prevent seed production.

Photos by Lynn Sosnoskie of Cornell University

long cotyledons with visible midvein



up to 12' tall; smooth, hairless stem

Redroot Pigweed

Amaranthus retroflexus

cluster of green flowers

Matt Lavin via flickr.com

Common summer annual herb; emerging in late spring, prolific seed producer.

- Early planting, high crop population, and narrow row spacing will increase the competitiveness of crops against this late-spring emerging weed.

- Shallow blind cultivations will destroy seedlings as they emerge.

- Sweep cultivations that throw soil to the crop row will bury small seedlings.

- Do not overfertilize, sidedress rather than broadcast most nitrogen for corn.

- Remove large plants before they go to seed.

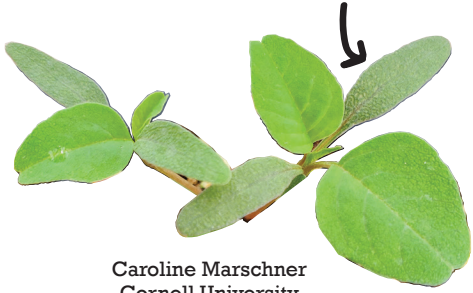
- Rotate with winter grain or hay crops that suppress spring establishment and prevent seed production.

- Responds to ordinary chemical weed management systems.

Mature leaves

Antonio DiTommaso
Cornell University

cotyledon red below visible midvein



Caroline Marschner
Cornell University

hairy stems and leaves

Antonio DiTommaso
Cornell University

Tall waterhemp

Amaranthus tuberculatus

Annual herb with a long emergence window, rapid growth and abundant seed production. Can be resistant to group 2 and possibly group 9 (glyphosate) herbicides.

- Timing is critical for POST applications; herbicide applications are ineffective on plants > 4" height.

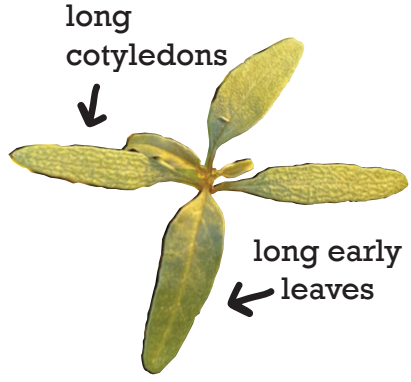
- Surface residue from a winter annual cover crop will suppress emergence.

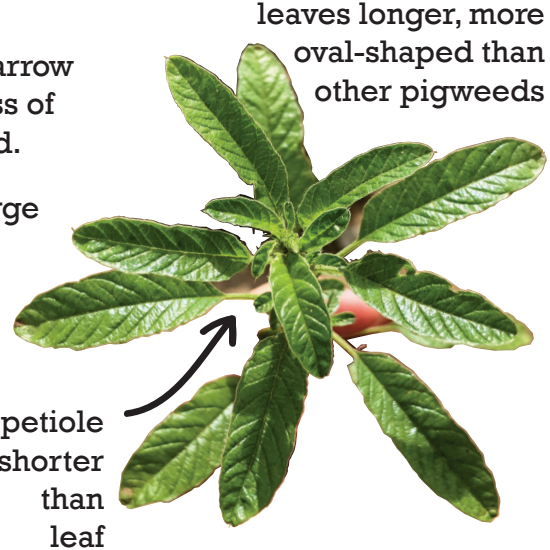
- Early planting, high crop population, and narrow row spacing will increase the competitiveness of crops against this late-spring emerging weed.

- Seeds remain on the plant, so removal of large plants before harvest or of residue and chaff during harvest can substantially reduce seed input to the field.

- Rotation to winter grain or hay crops suppresses spring establishment, prevents seed production, and reduces the soil seedbank.

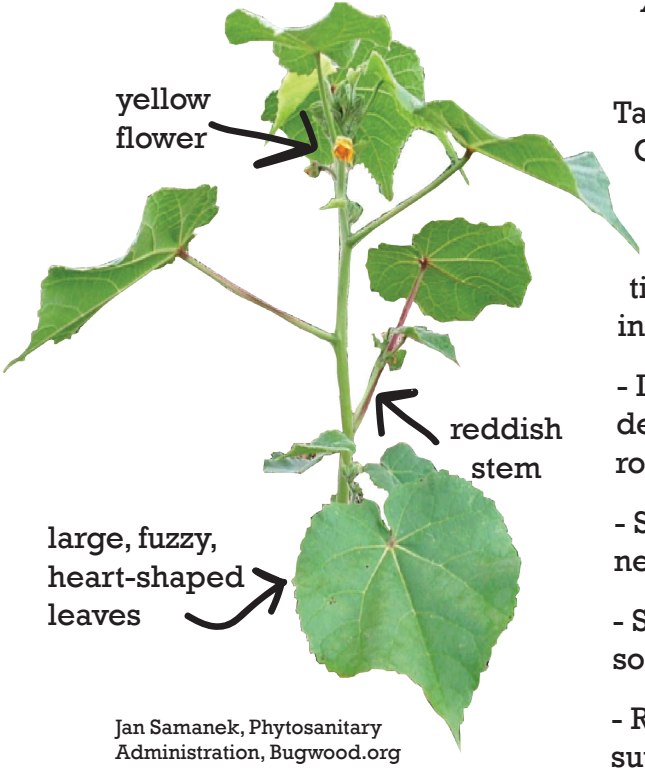
hairless green, red, or striped stems





Velvetleaf

Abutilon theophrasti



Jan Samanek, Phytosanitary Administration, Bugwood.org

Tall, summer annual herb. Resistant to Group 5 herbicides elsewhere in the US.

- Early planting, high crop population, and narrow row spacing will increase crop competitiveness.

- Large seeds allow emergence from deeper in soil, so blind cultivation with a rotary hoe or tine weeder is ineffective.

- Shallow cultivation that slices plants near the soil surface is most effective.

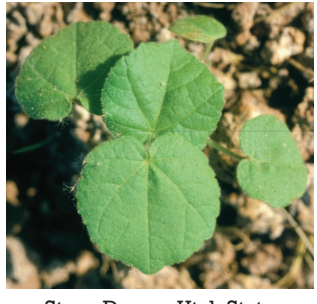
- Seed production occurs in late summer, so escaped plants should be removed.

- Rotate for multiple years with crops that suppress establishment during spring and/or seed production in late summer.

hairy, round and heart-shaped cotyledons

Scott Morris
Cornell University

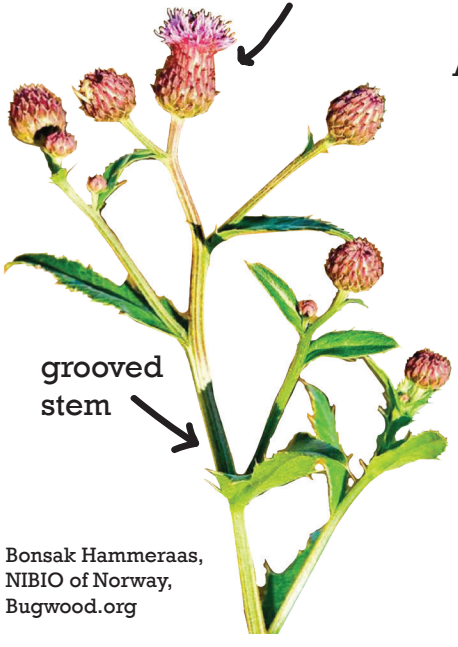
seedling leaves fuzzy, rounded-heart shape with toothed edges



Steve Dewey, Utah State University, Bugwood.org

Canada Thistle

Cirsium arvense



Bonsak Hammeraas, NIBIO of Norway, Bugwood.org

Aggressive perennial spreading from deep storage roots below the plow layer.

- Control requires exhaustion of storage root reserves, which usually takes 2-3 years.

- A multi-year rotation of crops and fallow that permits repeated tillage, mowing, and smothering with competitive crops is required.

- Prevent dispersal from field edges and non-cropland as well as from straw or hay.

- A competitive grain crop will shade this species and minimize growth and damage.

- This species is most sensitive to cultivation in June when storage reserves are lowest (plants 1 ft tall).

- herbicide applications between bud and flowering are most effective.

Ohio State Weed Lab, Ohio State University, Bugwood.org

spiny, wavy leaf edge

Leslie J. Mehrhoff, University of Connecticut, Bugwood.org

leaf clasps stem

Rob Routledge, Sault College, Bugwood.org

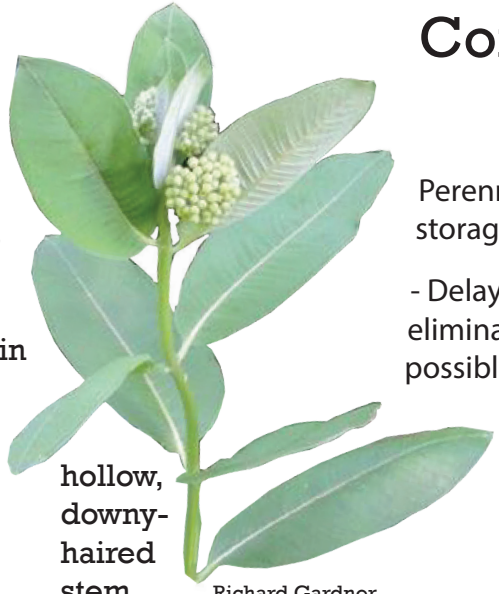
extensive rhizomes

Merrill Ross, Control Practices for Canada thistle

Common Milkweed

Asclepias syriaca

waxy, stiff leaves with white midvein



hollow, downy-haired stem

Richard Gardner, Bugwood.org

Perennial herb spreading by deep storage roots.

- Delay planting so seedbed preparation can eliminate as many early emerging shoots as possible.

- One plowing will not control this weed, which can emerge from below the plow layer.

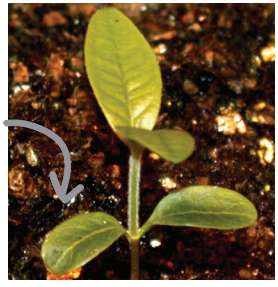
- Repeated shallow cultivations will cut shoots before they can replenish the roots.

- Rotate to alfalfa where frequent mowing will deplete storage reserves.

- Rotate to fallow or crops where repeated tillage can control this species.

- Herbicide application at late bud/early flowering stage is most effective.

oval seedling cotyledons

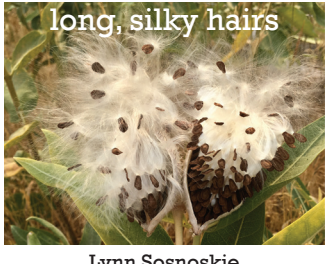


spring growth from rhizome

pink to purple flowers

Above: Antonio DiTommaso Cornell University

large pods, seeds with long, silky hairs



Lynn Sosnoskie Cornell University

milky white sap

Antonio DiTommaso Cornell University

Field Bindweed

Convolvulus arvensis

pink to white flowers
tiny bracts below flower base

Lynn Sosnoskie
Cornell University

Twining perennial with an extensive root system that competes with crops for soil moisture.

- Repeated tillage/cultivation in spring before and after planting is required to deplete root reserves.

- This plant has lowest root reserves and are most sensitive to tillage when shoots are 1-2 feet long.

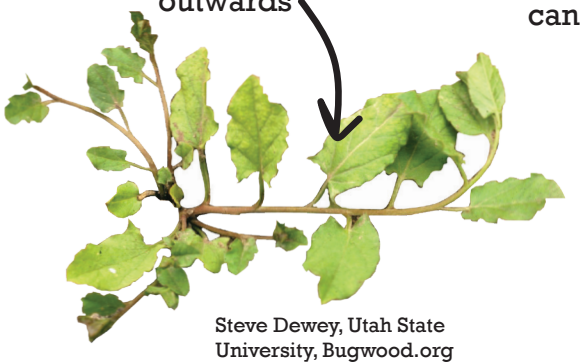
- Rotate to winter grain crops or alfalfa where late summer tillage or mowing will deplete reserves.

- Rotate to fallow or crops where repeated tillage can control this species.

many sprouts are from rhizomes, not seeds

Antonio DiTommaso
Cornell University

alternate leaves; rounded point, leaf base tips point outwards

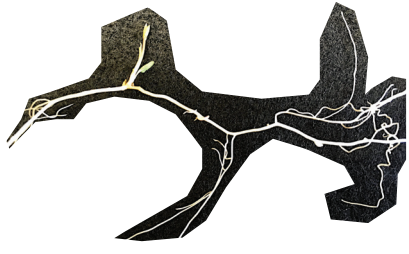


Steve Dewey, Utah State University, Bugwood.org

seedlings have squareish, indented cotyledons

Caroline Marschner
Cornell University

Extensive rhizomes



Lynn Sosnoskie
Cornell University