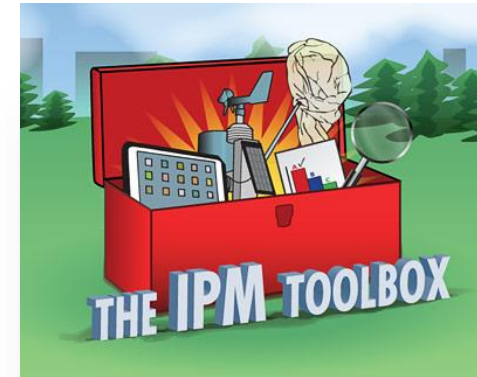


# What's that weed?

Toni DiTommaso, PhD

Professor and Head, School of Integrative Plant Science Soil and Crop Sciences  
Cornell University



Northeastern  
**IPM**  
Center

September 21, 2023



United States  
Department of  
Agriculture

National Institute  
of Food and  
Agriculture

# Webinar Details



Live Transcription



A recording of this webinar will be available within a week at



<http://www.neipmc.org/go/ipmtoolbox>

# We Welcome Your Questions

Please submit a question at any time using the Q&A feature to your right at any time

If you'd like to ask a question anonymously, please indicate that at the beginning of your query.

# Webinar Presenter

Dr. Toni DiTommaso  
Professor and Head  
Soil and Crop Sciences Section  
School of Integrative Plant Science  
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# Some Questions for You





# WEEDS OF THE NORTHEAST

SECOND EDITION • REVISED AND EXPANDED  
TO INCLUDE THE MID-ATLANTIC STATES



JOSEPH C. NEAL • RICHARD H. UVA • JOSEPH M. DiTOMASO • ANTONIO DiTOMMASO

# What's that weed?

Dr. Antonio DiTommaso

Cornell University

NEIPMC IPM Toolbox Webinar Series

September 21, 2023

# A practical guide to common weeds

## 540 weed species

Ecologically or economically important



J. Neal

Witchgrass leaf and sheath hairs

## Northeast and beyond

Mid-Atlantic, upper Midwest, southern Canada



J. DiTomaso

Common reed inflorescence and foliage

## Identification

Based on vegetative traits and photographs



J. Neal

Bull thistle rosette



J. Neal

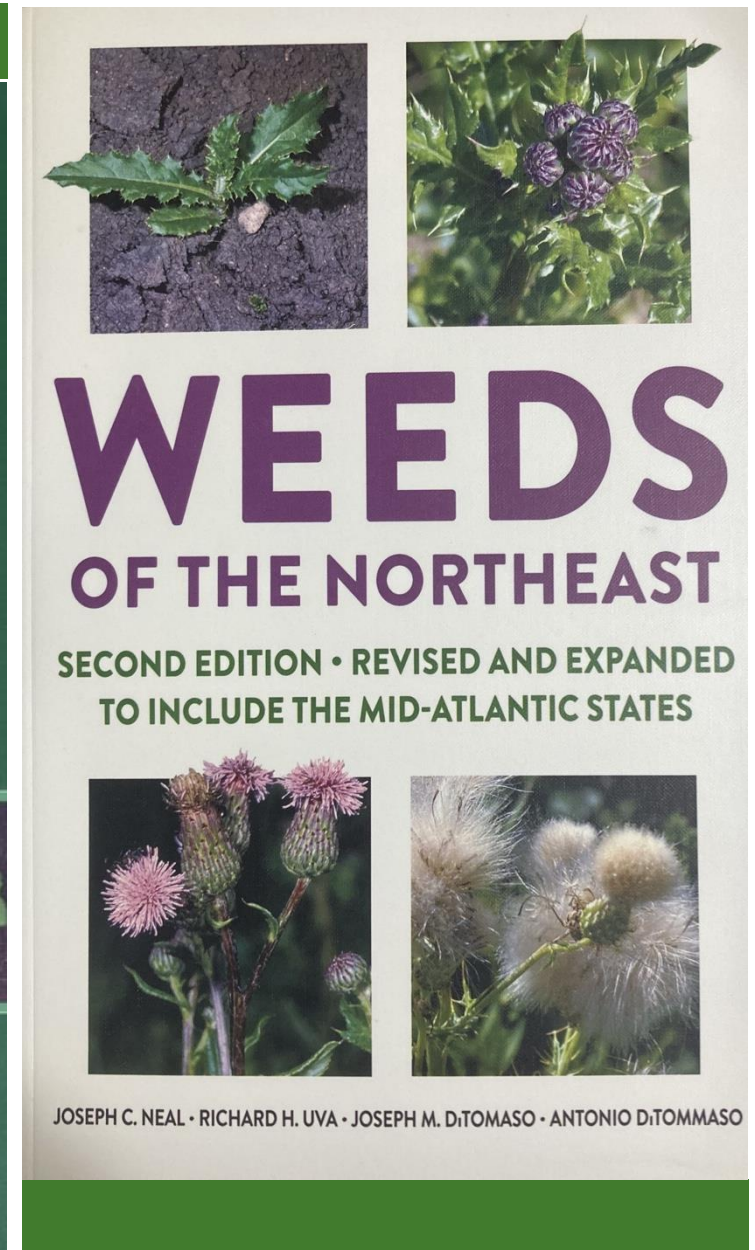
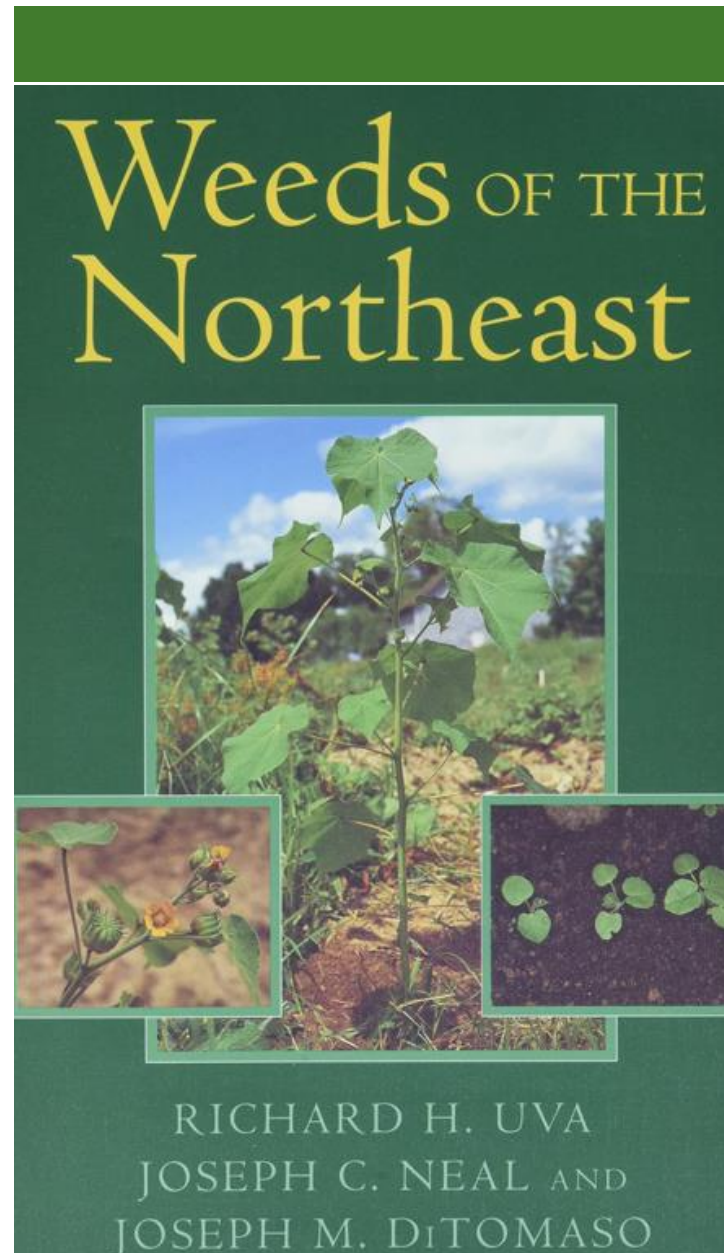
Yellow nutsedge colonial habit

## Biology and ecology

Traits that inform weed management

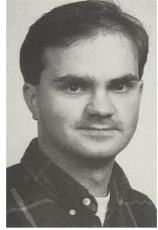
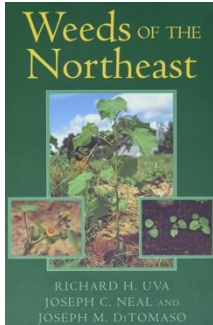
# Why a second edition?

- Weeds that have expanded their range or prevalence in the Northeast
  - Examples: waterhemp, Japanese stiltgrass, garlic mustard
- More species from mid-Atlantic and upper Midwest
- Up-to-date nomenclature





# Authors in 1997... and 2023



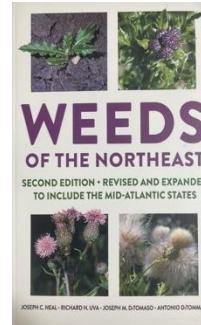
Richard H. Uva



Joseph C. Neal



Joseph M. DiTomaso



Richard H. Uva



Joseph C. Neal



Joseph M. DiTomaso



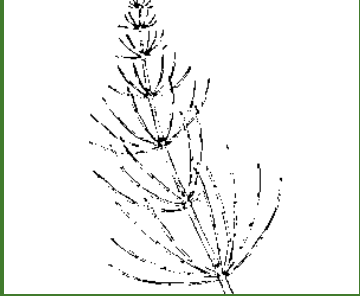
Antonio DiTommaso



## How this book works

- Dichotomous identification key to narrow down the choices
- Illustrated glossary
- Species descriptions
- Drawings and photographs
- Comparison tables

# Four main groups of weeds



---

Spore-  
producing

Grass-like



---

Herbaceous  
broadleaf

Woody



# VEGETATIVE KEY TO THE WEEDS

1. Non-flowering: liverworts, mosses, and horsetails (*Equisetum* spp.) ..... Part A
1. Flower and seed producers
  2. Stems **herbaceous**
    3. Grasses and grass-like species: **monocots** (leaves usually parallel-veined and sheathing the stem) ..... Part B
    3. Broadleaf species: **dicots** (leaves usually with branched veins) ..... Part C
  2. Stems **woody**: shrubs, woody vines, trees, brambles, and tree saplings ..... Part D

## Part A. Non-flowering plants, including spore producers, mosses, algae, and primitive spore-producing plants

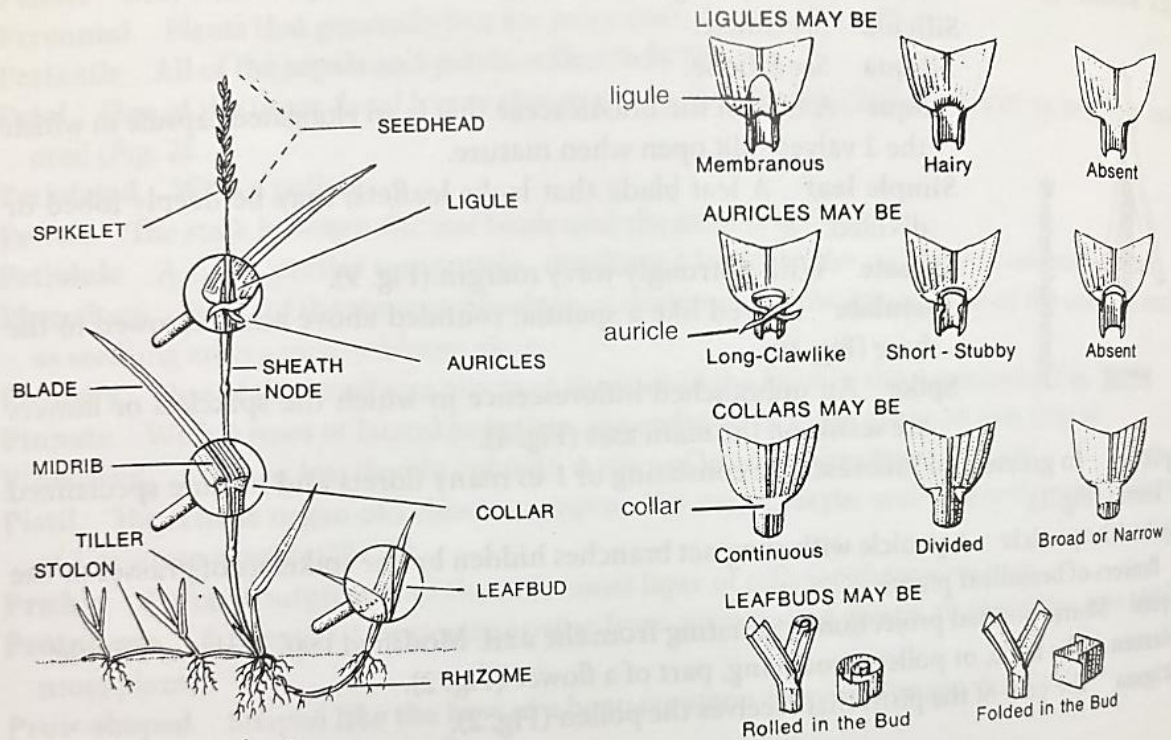
1. Hollow, erect, jointed stems ..... horsetail and scouringrush (p. 22)
1. Mat-forming ..... liverworts (p. 18)
  - ..... mosses and algae (p. 20)
  - ..... birdseye pearlwort (a flowering plant often mistaken for a moss) (p. 274)

## Part B. Grasses and grass-like species: monocots (leaves usually parallel-veined and sheathing the stem at the base)

1. Leaves relatively broad, often ovate or lanceolate (habit and leaves reminiscent of a dicot) ..... dayflowers (p. 24)
  - ..... doveweed (p. 26)
  - ..... basketgrass (p. 70)
1. Leaves narrow, often basal (leaves and habit reminiscent of a grass):
  2. Stems 3-angled, sharply triangular in cross section ..... sedges (pp. 28, 30)
    - ..... kyllingas (p. 32)
  2. Stems roundish or sometimes flattened:
    3. From a bulb. .... onion and garlic (p. 36)
      - ..... star-of-Bethlehem (p. 38)
    3. From fibrous roots, rhizomes, or stolons:
      4. Leaves hollow and round, stem-like ..... rushes (p. 34)
      4. Leaves flat not hollow or round (grasses):
        5. Leaves folded in the bud (see illustrated glossary):
          6. Short auricles present. .... perennial ryegrass (p. 68)
          6. Auricles absent:
            7. Ligule a fringe of hairs. .... sandburs (p. 48)
              - ..... bermudagrass (p. 50)
              - ..... bahiagrass (rolled but may appear folded) (p. 86)
            7. Ligule membranous:
              8. Blade with a prow (boat) shaped tip ..... bluegrasses (p. 94)
                - ..... rough stalk bluegrass (p. 96)
                - ..... bluestems and broomsedge (p. 40)
              8. Blade tip otherwise. .... orchardgrass (p. 52)
                - ..... goosegrass (p. 58)
                - ..... annual ryegrass (p. 68)

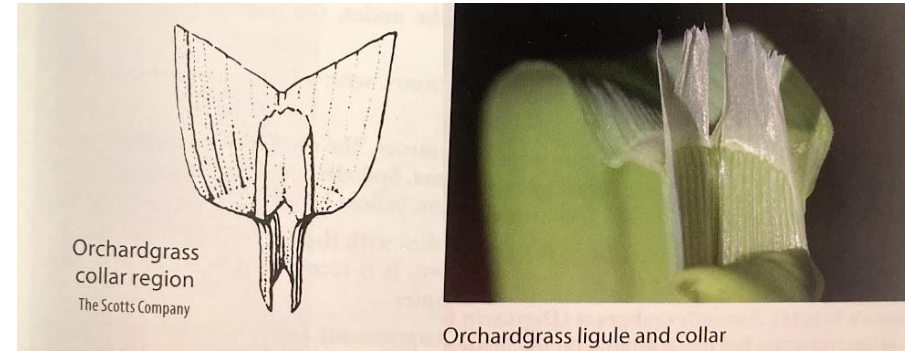
# Identification key

Based on vegetative traits, not flowers  
Some species shown in multiple places



1. Parts of a grass plant  
(The Scotts Company)

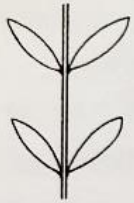
# Glossary: grass ID



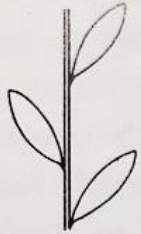
# Glossary: leaf traits

## 7. Leaf arrangement

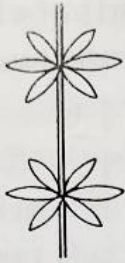
(Syngenta Crop Protection AG; M. Neal)



opposite



alternate



whorled



basal rosette



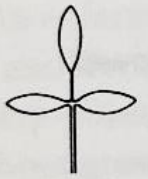
Uva

## 8. Compound leaves

(Syngenta Crop Protection AG)



palmately trifoliolate



pinnately trifoliolate



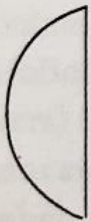
pinnate



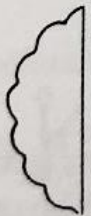
bipinnate



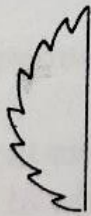
Neal



entire



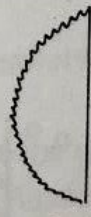
crenate



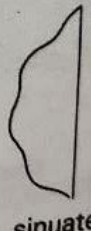
serrate



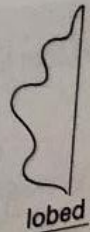
dentate



denticulate



sinuate



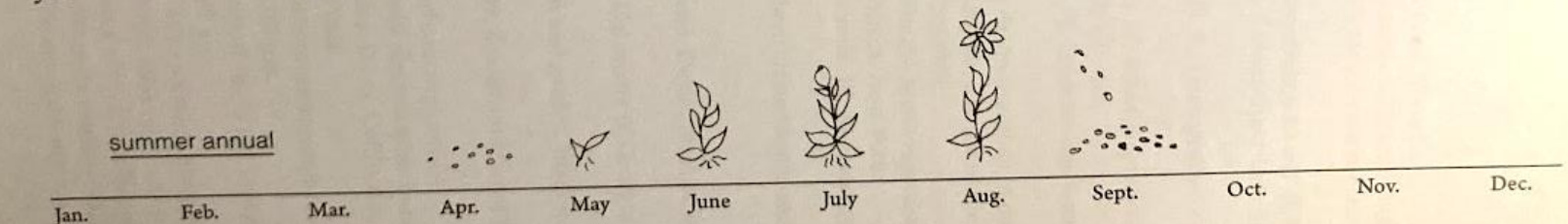
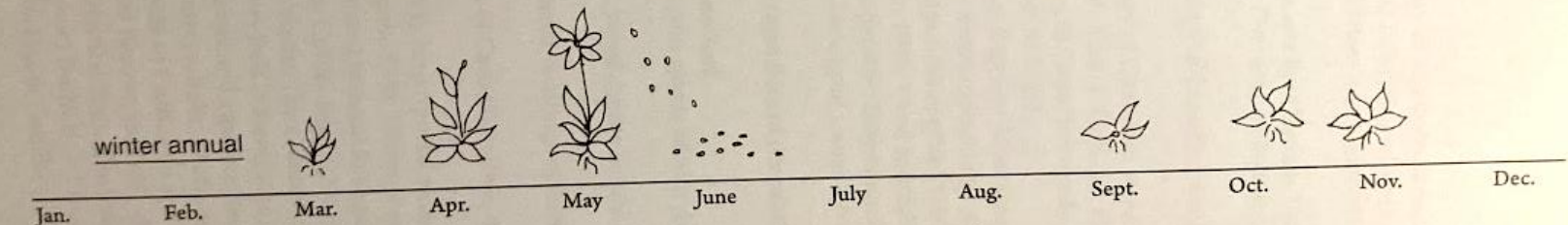
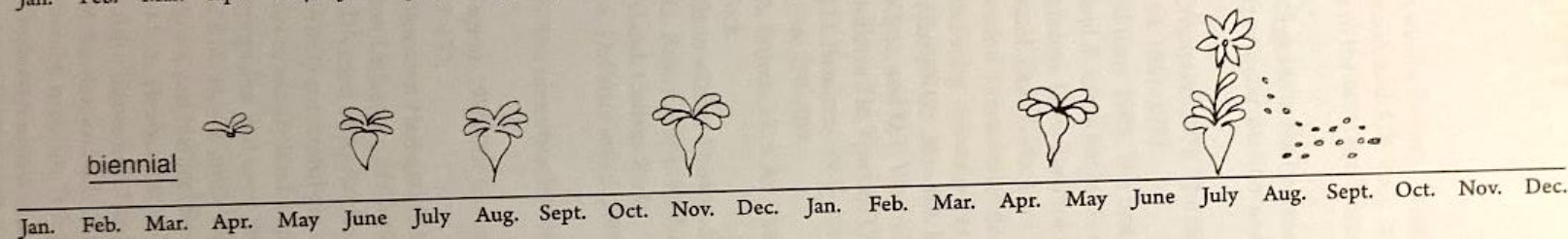
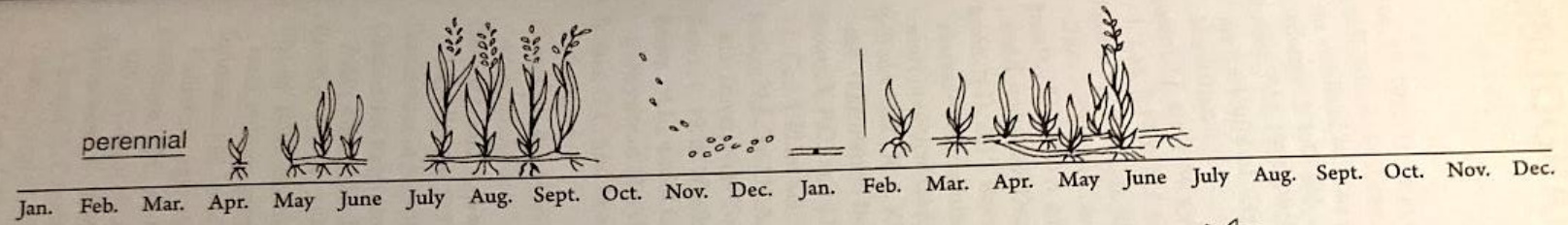
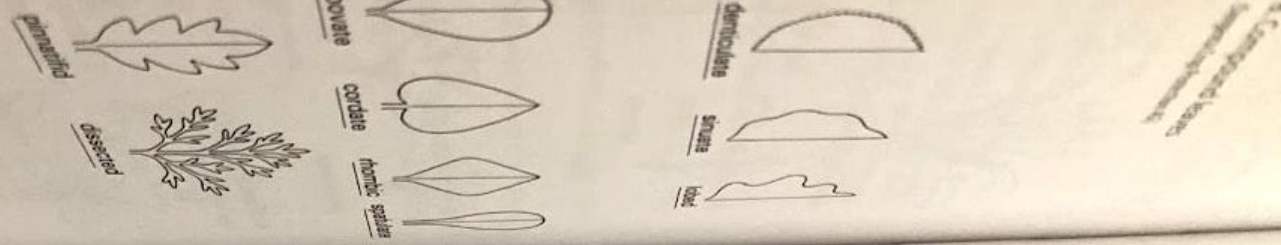
lobed



Neal

## 9. Leaf margins

(Syngenta Crop Protection AG)



# Glossary: life cycle

Authors: Joseph C. Neal,  
Richard H. Uva, Joseph M.  
DiTomaso, A. DiTommaso

Contributors: Andrew F.  
Senesac, Scott H. Morris, and  
many others



# WEEDS OF THE NORTHEAST

SECOND EDITION • REVISED AND EXPANDED  
TO INCLUDE THE MID-ATLANTIC STATES



Weeds of the Northeast is  
available on Amazon or from  
Cornell University Press

## Questions?



Format and content of a species description:

**Common name** (*Scientific name*)

SYNONYMS:

**GENERAL DESCRIPTION:** A summary of the weed's life cycle, growth habit, size, and special characteristics, including poisonous compounds and effects.

**PROPAGATION / PHENOLOGY:** How the weed propagates and spreads, when plants emerge, and what climatic or other factors affect germination, growth, and development (when information is available).

**SEEDLING:** A description of the seedling or of the emerging shoots of perennial weeds.

**MATURE PLANT:** A description of the vegetative characteristics of mature plants.

**ROOTS AND UNDERGROUND STRUCTURES:** A description of underground structures, with particular attention to vegetative propagules of perennial weeds.

**FLOWERS AND FRUIT:** A description of the flowers, fruit, and seeds, as well as the season(s) of occurrence.

**POSTSENESCENCE CHARACTERISTICS:** A description of the weed in the dormant season and any persistent characteristics of dead or dormant plants that may be useful in identification.

**HABITAT:** A description of the environs in which the weed is frequently found and of cropping systems, soil types, and management inputs that affect its distribution and spread.

**DISTRIBUTION:** Information on where the weed occurs in North America and (when available) where it is a serious problem.

**SIMILAR SPECIES:** Descriptions of species that resemble the weed, whether related to it or not. For each similar species, if there is a full description elsewhere in the book, or if the species is described in a table, the common and scientific name are listed. If there is no full description, the common and scientific name, as well as the authority, are provided in the description of the species it most closely resembles.

# Species descriptions

# Dandelion

## *Taraxacum officinale*



Dandelion habit



Dandelion seedlings



Dandelion seedhead



Dandelion achenes



Carolina falsedandelion plant



Coltsfoot flowers and fruit are similar to dandelion, but foliage is different

- General description: A **tap-rooted perennial** from a **basal rosette of leaves**. Yellow flowers are produced on leafless stalks.
- Propagation/phenology: Reproduction is by **wind-blown seeds** and by new shoots that develop from broken segments of the taproot. Seeds germinate in the top 2 cm of soil. Seedlings emerge from late spring to early autumn.
- Habitat: Dandelion is a weed of turfgrass, orchards, nursery crops, alfalfa, and other perennial crops. It tolerates many soil types and cultural practices but does not tolerate cultivation.
- Distribution: Widespread throughout North America.

# Purple loosestrife

## *Lythrum salicaria*



Purple loosestrife habit in cranberries

R. Uva



Purple loosestrife vegetative stems



Purple loosestrife with whorled leaves

J. DiTomasso



Garden loosestrife flowers

J. DiTomasso



Purple loosestrife flowering



Garden loosestrife young plant

J. DiTomasso



Purple loosestrife seeds, 0.5

- Mature plant: **Stems are square, sometimes 6-sided.** Stems and leaves either lack hairs or, more often, have short, upward-pointing hairs. **Leaves are sessile**, lanceolate to linear, 3–10 cm long, **opposite or in whorls of 3.** Larger leaves are heart-shaped at the base.
- Roots and underground structures: **Thick, fleshy roots** and a fibrous root system are produced. Forms a **large, woody crown** with age.
- Flowers and fruit: **Purple-magenta flowers** are produced from July to September in **conspicuous 10–40 cm long terminal spikes.** Fused sepals form a tube surrounding the ovary. Petals (5–7) and stamens (10–14) are attached to the top of the fused sepals. Numerous small, reddish-brown seeds (1 mm long) are contained within the capsules. A single plant can produce more than 2 million seeds a year.

# Japanese knotweed

## *Fallopia japonica*



Japanese knotweed habit

J. Neal



Japanese knotweed flowering shoot

J. Neal



Giant knotweed foliage and flowers



Japanese knotweed shoots from rhizomes

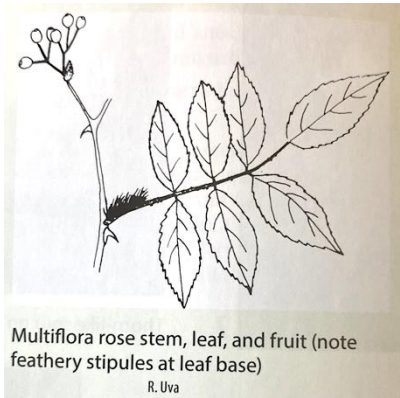
R. Uva



Japanese knotweed seeds, 3 mm, and seed capsule

J. DiTomasso

- Habitat: Introduced to North America from Japan as an ornamental, Japanese knotweed has escaped cultivation and become a weed of landscapes, sodded storm drains, and riverbanks. It also grows in roadsides, waste areas, and untended gardens. It thrives on moist, well-drained, nutrient-rich soil, particularly on shaded banks.
- Distribution: found throughout the Northeast, west to California, and south to Georgia.



Multiflora rose stem, leaf, and fruit (note feathery stipules at leaf base)  
R. Uva

# Multiflora rose *Rosa multiflora*



Multiflora rose habit  
J. Neal



Multiflora rose flowering shoot  
R. Uva



Feathery stipules at the leaf base of multiflora rose  
J. Neal



Multiflora rose flowers  
S. Morris



Multiflora rose, mature fruit  
A. DiTommaso

- General description: A rapidly growing, **prickly-stemmed shrub** (1–3 m tall) that can form thickets or scramble over other plants with its arching stems. The **compound leaves** are alternate, subtended by **large, fringe-like stipules**, and are composed of 7–9 serrate leaflets (2–4 cm long). Once established, multiflora rose is difficult to control.
- Propagation: Reproduction is by **seeds and runners (stems)**, which form adventitious roots. **Seeds are spread by birds and other animals** that eat the fruit. Runners from existing plants can quickly transform unmanaged areas into impenetrable thickets.
- Similar species: Multiflora rose can be distinguished from **other roses** by the presence of fringed stipules on the leaf petiole.

# Palmer amaranth *Amaranthus palmeri*



Palmer amaranth habit



Palmer  
amaranth  
seedling  
L. Sosnoskie



Palmer amaranth young  
foliage with chevron



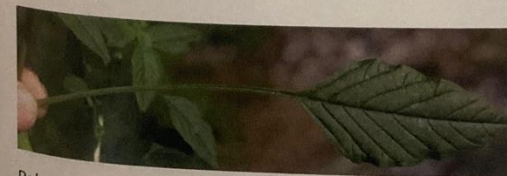
Palmer amaranth hairless stem



Palmer amaranth  
male inflorescence



Palmer amaranth  
spiny female  
inflorescence



Palmer amaranth petiole equal to or longer  
than leaf blade













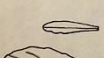



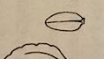



Palmer amaranth seeds  
and bracts

General description: Troublesome, summer annual weed in southern agricultural crops and spreading into the Northeast. Plants are upright and branched, to more than **2 m in height**, with very rapid seedling growth rates. Stems and leaves lack hairs. **Petioles are equal to or longer than leaf blades**. Otherwise the leaf blades are similar to many other pigweeds. **Herbicide-resistant populations are widespread**, including many that are resistant to multiple modes of action.

# Comparison tables

Table 9. Comparison of selected speedwell species (*Veronica* spp.)

Species	Life cycle	Leaf shape, margin, and surface	Leaf arrangement		Flower arrangement
			Lower	Upper	
Field speedwell ( <i>V. agrestis</i> )	Annual		Opposite	Alternate	
Corn speedwell ( <i>V. arvensis</i> )	Annual		Opposite	Alternate	
Germander speedwell ( <i>V. chamaedrys</i> )	Perennial		Opposite	Opposite	
Slender speedwell ( <i>V. filiformis</i> )	Perennial		Opposite	Alternate	
Ivyleaf speedwell ( <i>V. hederifolia</i> )	Annual		Opposite	Alternate	
Common speedwell ( <i>V. officinalis</i> )	Perennial		Opposite	Opposite	
Purslane speedwell ( <i>V. peregrina</i> )	Annual		Opposite	Alternate	
Persian speedwell ( <i>V. persica</i> )	Annual		Opposite	Alternate	
Thymeleaf speedwell ( <i>V. serpyllifolia</i> )	Perennial		Opposite	Alternate	

Notes: Drawings by Bente Starcke-King.

Pigweeds and amaranths

Weeds in the carrot family

Weeds with finely dissected leaves

Sowthistles and weedy lettuces

Bindweeds and wild buckwheat

Wild Cucurbitaceae and similar species

Weedy trifoliolate legumes and woodsorrel

Weedy buttercups

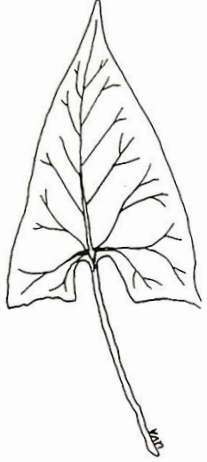
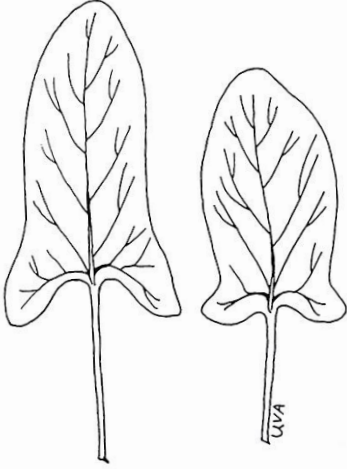
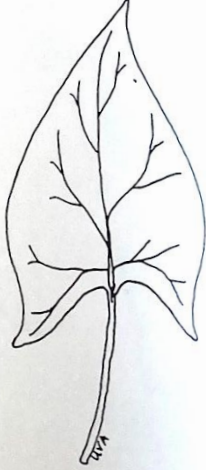
Speedwell species

Groundcherries, nightshades, and related species

Bush honeysuckles

Weedy privets

**Table 5.** Comparison of bindweeds and wild buckwheat

Character	Hedge bindweed ( <i>Calystegia sepium</i> )	Field bindweed ( <i>Convolvulus arvensis</i> )	Wild buckwheat ( <i>Fallopia convolvulus</i> )
Life cycle	Perennial	Perennial	Annual
Leaf shape			
Ocrea	Absent	Absent	Present
Flower	Usually white, sometimes pink; petals fused into a funnel-shaped tube 3–6 cm long	Similar to hedge bindweed, but 1.2–2.5 cm long	Greenish-white, inconspicuous, about 4 mm long
Bracts below flower	Very large, concealing the sepals	Small, well below the sepals	Absent

Drawings by R. Uva



Hedge bindweed  
(R. Prostak)



Field bindweed  
(R. Uva)



Wild buckwheat  
(J. Neal)



Species	Life cycle / growth form	Leaflet shape	Terminal leaflet stalk	Petiole length	Flower color	Flower head
Woodsorrel ( <i>Oxalis</i> spp.)	Erect to prostrate, annual or perennial	Heart-shaped	Absent	Longer than leaflets	Yellow	Individual flowers, branched inflorescence
Annual lespedeza ( <i>Kummerowia striata</i> )	Prostrate to ascending, summer annual	Elliptic to oblong	Absent	Shorter than leaflets	Lavender to pink	No heads, 1-3 flowers from leaf axils
Birdsfoot trefoil ( <i>Lotus corniculatus</i> )	Prostrate to suberect, perennial	Elliptic to oblanceolate	Absent	Shorter than leaflets	Yellow	4-8 flowers, each 1.5 cm long
Black medic ( <i>Medicago lupulina</i> )	Prostrate to ascending, summer annual	Elliptic to obovate	Present	Shorter than leaflets	Yellow	10-50 flowers, globose
Rabbitfoot clover ( <i>Trifolium arvense</i> )	Erect, annual	Oblong	Absent	Shorter than leaflets	Pink to white	Numerous flowers, cylindrical
Hop clover ( <i>T. aureum</i> )	Ascending, annual	Oblong to obovate	Absent	Shorter than leaflets	Yellow	>20 flowers per head, cylindrical
Large hop clover ( <i>T. campestre</i> )	Low, spreading, winter annual	Obovate	Present	Usually shorter than leaflets	Yellow	>20 flowers per head, globose
Low hop clover ( <i>T. dubium</i> )	Low, spreading, winter annual	Obovate	Present but short	Shorter than leaflets	Yellow	5-10 flowers per head, globose
Strawberry clover ( <i>T. fragiferum</i> )	Creeping, perennial	Obovate	Absent	Longer than leaflets	Pink to rose	Numerous flowers, globose to ovoid
Alsike clover ( <i>T. hybridum</i> )	Ascending, perennial	Oval to elliptic	Absent	Longer than leaflets	White to pink	Numerous flowers, globose
Red clover ( <i>T. pratense</i> )	Ascending, short-lived perennial	Oval	Absent	Shorter than leaflets	Red or magenta to pink	Numerous flowers, globose
White clover ( <i>T. repens</i> )	Creeping, perennial	Broadly elliptical to obovate, rounded tip	Absent	Longer than leaflets	White, or tinged with pink	Numerous flowers, globose



Left to right: strawberry clover, white clover, alsike, and red clover

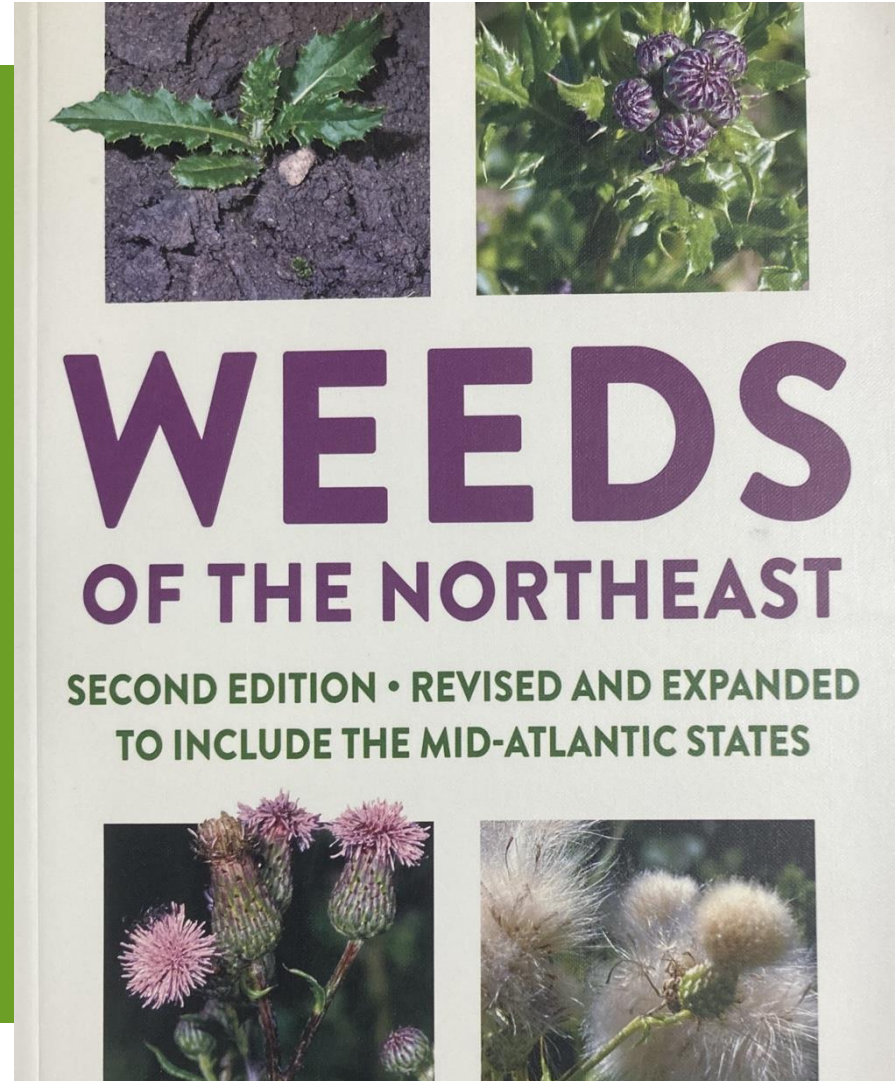


Left to right: white clover, black medic, yellow woodsorrel, and birdsfoot trefoil

# Thank you!

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many others



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available on Amazon or from  
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## Questions?

# Some Questions for You



# Upcoming Webinars

## [Working with Museums, Libraries, and Archives to Use IPM to Prevent and Combat Infestations](#)

October 26, 2023, at 2:00 p.m. EDT

**Presenter:** Rachael Perkins Arenstein

**Description:** Join us to learn how museums, libraries, archives, and other cultural heritage institutions have adapted agricultural integrated pest management techniques to suit their specific collection risks and work practices.

<https://www.northeastipm.org/ipm-in-action/the-ipm-toolbox/>



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# Recording of IPM Toolbox Webinar Series



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# Land Acknowledgment

The Northeastern IPM Center is based at Cornell University in Ithaca, New York.

Cornell University is located on the traditional homelands of the Gayogohó:nq' (the Cayuga Nation). The Gayogohó:nq' are members of the Haudenosaunee Confederacy, an alliance of six sovereign Nations with a historic and contemporary presence on this land. The Confederacy precedes the establishment of Cornell University, New York state, and the United States of America. We acknowledge the painful history of Gayogohó:nq' dispossession, and honor the ongoing connection of Gayogohó:nq' people, past and present, to these lands and waters.

This land acknowledgment has been reviewed and approved by the traditional Gayogohó:nq' leadership.



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