



Common Weeds in Container Nursery Production

Isha Poudel and Anthony Witcher
Otis L. Floyd Nursery Research Center
awitcher@tnstate.edu

Weed Management Practices in Nursery Container Production

Effective weed control in container nurseries is best achieved through an integrated weed management approach. Weeds are introduced into the nursery in a number of ways and can rapidly spread throughout the nursery. Weed seeds can be dispersed by wind, water, natural propulsion (certain weed species), and by nursery workers. Some weed species can produce seeds in 4 to 6 weeks after germination so weed populations can explode quickly. Sanitation practices, scouting, hand weeding, and herbicides are all part of a successful weed management program.

Cultural Practices

While often overlooked, sanitation is the best method for preventing new weed infestations and spreading of existing weed problems. Sanitation practices include inspecting and weeding new liners, removing weeds prior to transplanting into larger containers, thoroughly washing containers before re-use, and storing pine bark substrate on a concrete pad with side walls. Sanitation should also include removing and preventing weeds in non-crop areas such as:

- potting areas
- pine bark storage areas
- container production areas
- propagation areas
- roadways
- drainage ditches
- irrigation ponds



Figure 1. Properly stored pine bark substrate on a concrete pad with side walls.



Figure 2. More frequent hand weeding (plant at far left) increases crop growth and reduces labor compared to less frequent hand weeding (two plants on right).

Growers should periodically scout for weeds in nursery containers and production areas to properly identify weed species and to select the most effective control method. Research has shown that more frequent hand weeding in nursery containers can save labor costs over time as small weeds are easier to pull compared to removing overgrown weeds. Hand weeding conducted at routine intervals (every 2-3 weeks) also reduces weed seed banks by removing weeds prior to flowering and seed formation.

Weed Management Practices in Nursery Container Production (cont.)

Herbicides

Herbicides are widely used for controlling weeds in nursery containers, but proper selection is required to maximize control and minimize crop damage. Post-emergence weed control is limited to the use of grass-selective post-emergence herbicides in broadleaf crops due to the wide variety of ornamental crop species. Pre-emergence herbicides are used to prevent the germination of new weeds and work by creating a chemical barrier on the substrate surface. In order to improve efficacy of pre-emergence herbicides, applications should be made to weed free containers and applied evenly to the entire substrate surface. New transplants should be irrigated thoroughly to settle substrate around the roots prior to pre-emergence herbicide application. After application, containers should receive at least 0.5 inch of irrigation to activate most pre-emergence herbicides.

Pre-emergence herbicides should be re-applied periodically (every 2-4 months; varies by product and environmental conditions) to maintain adequate control. Pre-emergence herbicides are safe for numerous nursery crop species but growers must refer to the product label to avoid potential phytotoxicity. Granular formulations are considered safer for many crop species but must be applied when crop foliage is dry. Sprayable formulations may be more cost effective for larger container sizes, but crop foliage may need to be irrigated after application to minimize phytotoxicity (refer to product label). Pre-emergence herbicides vary in effectiveness depending on weed species, with some products being more effective against grassy or broadleaf weeds. Proper weed identification is key to selecting the most effective pre-emergence herbicide, thus weed efficacy should be prioritized (Table 1). Additionally, growers should rotate pre-emergence herbicides from different chemical families to prevent weed shifts and development of herbicide resistance.



Common Name: Bittercress
Scientific Name: *Cardamine spp.*
Family: Brassicaceae

Life Cycle/Habitat

Bittercress is a cool season annual and can complete a lifecycle in 5-6 weeks. It is commonly found growing during the fall and winter when temperatures are cooler, but it can persist year-round in moist, shaded environments. Bittercress is commonly found in damp, recently disturbed soil, open ground, landscapes, and turf but is also a major problem in nursery containers, container production areas, greenhouses, and shade houses.

Biological Description

Bittercress is a broadleaf weed, originally from Eurasia but present throughout the continental United States. It has a dense basal rosette, producing flowering stems that are erect, smooth, and with few leaves. First true leaves are simple and heart-shaped to kidney-shaped and subsequent leaves have 2-4 pairs of alternately arranged leaflets. Flowers are small and arranged in dense racemes at the end of the stems with four white petals and fruit is a flattened capsule. Each seedpod may contain approximately 20 seeds and average seed number per plant is 600, yet large plants may yield several thousand seeds. Additionally, seeds can be dispersed several feet away via explosive dehiscence which enhances weed spread. The root system is shallow and fibrous with a branched taproot.



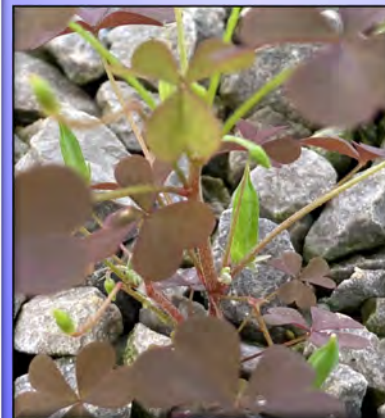
Common Name: Creeping woodsorrel
Scientific Name: *Oxalis corniculata*
Family: Oxalidaceae

Life Cycle/Habitat

Creeping woodsorrel is an annual or short-lived perennial that can persist throughout the growing season and survive year-round in protected areas. Creeping woodsorrel is common in many habitats including lawns, gardens, and mulched landscape areas but is also a major problem in nursery containers, greenhouses, and shade houses. Plants prefer disturbed areas with little competition where the surface of the soil has been exposed.

Biological Description

Creeping woodsorrel is a broadleaf plant that likely originated in southeast Asia but is found throughout most of the United States. Plants grow to 8 inches tall with trailing stems that root at the leaf nodes, allowing them to spread rapidly forming a mat reaching 12 inches wide or more. Leaves are dark green to reddish purple in color, clover-like in appearance and palmate with 3 notched, heart-shaped leaflets. Leaves are arranged alternately along the stem and usually fold up at night and midday. Flowers are yellow with 5 petals and 0.25 inch across. Fruits consist of green cylindrical capsules (similar to pods) that are 0.5 inch in length, splitting into five parts. Seeds are very small (0.04-0.06 inch), egg shaped, flat, brown, and with transverse ridges. Seeds are spread by an explosive opening of the seed capsules and can be dispersed over 15 feet away and a single plant can produce nearly 5000 seeds in one season. Creeping woodsorrel has a fleshy taproot and produces an extensive root system spread via stolons which can grow over 1.5 ft long. Hand weeding larger plants can be ineffective and plants readily regrow from roots.





Common Name: Yellow woodsorrel, common yellow oxalis
Scientific Name: *Oxalis stricta*
Family: Oxalidaceae

Life Cycle/Habitat

Yellow woodsorrel is a perennial plant that can persist year-round in protected areas and spreads by rhizomes and seeds. Yellow woodsorrel is common in open woodlands, grassy meadows, lawns, gardens, and edges of sidewalks/driveways, but has become a persistent weed in container-grown nursery stock production and propagation.

Biological Description

Yellow woodsorrel is a broadleaf herbaceous plant native to North America and parts of Eurasia and is found throughout most of the eastern and central United States. Leaves are alternate and have a long petiole which consist of 3 heart-shaped leaflets that are light green in color and resemble clover but are not in the same botanical family. Leaves are 0.4-0.8 inch wide and smooth, but the margins are fringed with hairs and leaflets lie flat during the daytime but fold up at night. Stems are green to purple, hairy, and usually erect and can be unbranched or have several branches near the base. Flowers have yellow petals and are produced in clusters that arise from the long stalk at the leaf axils. Fruits are a hairy capsule, cylindrical (0.75-1 inch long) and pointed resembling an okra fruit. Seeds are brown to maroon, oval, long, flattened and have a sticky coating. Seeds are dispersed from the fruit via explosive dehiscence which spread the seed up to 13 ft away. A single plant can produce nearly 5000 seeds in one year. Plants produce a taproot then develop white to pink rhizomes with a secondary fibrous root system. Manually pulling yellow woodsorrel weeds may be ineffective unless all roots/rhizomes are removed from the nursery container which is virtually impossible for larger weeds.



Common Name: Spotted spurge, prostrate spurge, creeping spurge
Scientific Name: *Euphorbia maculata*
Family: Euphorbiaceae or commonly known as the Spurge family

Life Cycle/Habitat

Spotted spurge is a warm season annual weed and thrives in hot temperatures and high amounts of sunlight. Habitats include cropland, gravel areas along roadsides, lawns, gardens, and cracks in sidewalks/pavement, but is commonly found in container-grown nursery stock and persists in container production areas and pine bark piles.

Biological Description

Spotted spurge is a broadleaf weed native to North America and is found in the eastern United States, west of North Dakota and Texas and into California and Oregon. It is a low growing plant, branched at the base, forming a low-growing dense mat up to 3 ft across. The leaves are small, oval in shape, opposite along the stem, and there is usually a red spot in the center. The stems are slender and round and are more or less covered with hairs, often turn pale red in the presence of bright sunlight, and a milky sap oozes when the stem is broken. Flowers of spotted spurge are very small and white in color and are extremely unnoticeable. Fruits are black to brown in color, 3-lobed, stalked capsule and covered with short, soft hairs. Seeds are light brown in color, ovoid and transversely wrinkled and can produce several thousand seeds per plant and are forcefully dispersed from the plant. Seeds have little or no seed dormancy leading to rapidly increasing populations. The root system consists of a slender taproot. When hand weeding (gloves are suggested), the entire plant and root system must be removed or regrowth will occur.





Common Name: Mulberry weed
Scientific Name: *Fatoua villosa*
Family: Moraceae

Life Cycle/Habitat

Mulberry weed is a warm season annual weed that can be found in disturbed areas and wetlands. It has become an issue in landscapes, greenhouses, shade houses, and nursery containers where it thrives in moist shaded areas.

Biological Description

Mulberry weed is an herbaceous broadleaf plant native of eastern Asia and distributed throughout the eastern United States and in California and Washington. Plants have an upright growth habit, can grow to over 3 ft tall, and look similar to a mulberry tree seedling. Leaves are triangular in shape, alternate along the stem, yellow green in color, and broad ovate with toothed margins. Plants have hairy stems that are tall, branched, thin, and relatively weak. Plants produce small flowers in dense clusters in the leaf axil and flowers are purple turning to dark brown with age. Fruits are a three-angled achene and white in color. Seeds are light to dark brown and are 0.04 inch long and triangular in shape. The plant produces an abundant number of seeds and are explosively dehiscent and can be thrown up to 5 ft away while most of them are dropped near the mother plant. Plants have light brown fibrous roots forming from a taproot.



Common Name: Northern willowherb, fringed willowherb
Scientific Name: *Epilobium ciliatum*
Family: Onagraceae

Life Cycle/Habitat

Northern willowherb is a multi-season perennial weed. It is mostly found in moist places (such as ditches, ponds, landscape areas, etc.) but is highly adaptable to dry conditions. Although not widely distributed across Tennessee, it has been identified in the region and is a troublesome weed in nursery stock (container- and field-grown) and gravel container pads.

Biological Description

Northern willowherb is a broadleaved herbaceous plant native to the southern part of Canada and most of the United States. It is a clumping perennial, forming a basal rosette in winter then bolting in warm weather with erect stems often exceeding 5 ft in height. Leaves are mostly opposite though sometimes alternate on the upper stem, 2-4 inches long, narrowly lanceolate to ovate, fine-toothed, bright green and may have new purple growth. The foliage, stem, and inflorescence are covered with bristly hairs and glands. The flowers are trumpet-shaped and have four petals which are so deeply notched that they look like four pairs. Flowers are white to light purple or pink in color with dark veining. The fruits are a capsule about 4 inches long and held on a long stalk, narrow, hairy, and with four chambers. Seeds have an attached tuft of hair and can float for long distances with the wind and plants can produce over 60,000 seeds per year. Root system is fibrous.





Common Name: Common chickweed, chickenwort

Scientific Name: *Stellaria media*

Family: Caryophyllaceae

Life Cycle/Habitat

Common chickweed is a cool-season annual plant active in fall, winter, and spring but may persist into summer. It grows in full sun to part shade and prefers disturbed and damp habitats. Common chickweed can be found in lawns, landscapes, and wooded areas, but is also a problem in container-grown nursery crops.

Biological Description

Common chickweed is an herbaceous broadleaf weed native to Eurasia and found throughout the United States. It grows as a ground cover or a mat and can climb into the canopy of low-growing plants. Leaves are opposite, broadly elliptic to egg-shaped and pointed at the apex. Plants produce 2.5 ft long stems that can be upright or sprawling across the ground. Stems are somewhat succulent and green or burgundy in color often with lines of white hairs. Flowers are white with 5 white petals and less than 0.5 inch wide. Fruits are tiny, non-fleshy, egg-shaped and contain numerous minute seeds. Seeds are 0.04-0.05 inch in diameter, flattened, circular with marginal notch, light brown to reddish brown. Common chickweed seed production can reach 15,000 seeds per plant. Insects and mammals spread the seeds in their feces which facilitates the dispersal of seed. Root system is fibrous and shallow.



Common Name: Eclipta, pie plant, false daisy

Scientific Name: *Eclipta prostrata*

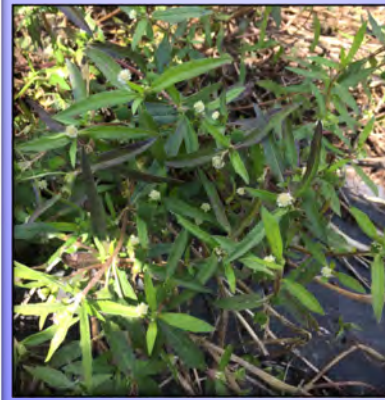
Family: Asteraceae

Life Cycle/Habitat

Eclipta is a summer annual that persists in full sun and can be found from spring to fall. Plants prefer moist, disturbed areas and grow in moist lawns and landscapes. Eclipta is also a problem in nursery containers and production areas especially in areas under overhead irrigation. Plants are commonly found in drain holes of containers or near irrigation risers.

Biological Description

Eclipta is a broadleaf weed and thought to be native to Asia but is widely naturalized around the world and distributed throughout most of the U.S. Plants can have a prostrate to upright growth habit to 3 ft tall. Mature leaves are simple, opposite, dull green, and ovate (oval shaped) to lanceolate (narrow oval shape tapering to a point) in shape. Leaf margins can be entire (smooth) or slightly serrate (toothed), mostly hairy and without petiole. Stems are reddish to purple in color and are covered with short, stiff hairs and roots can form at the lower nodes of the stem. Flowers are 0.4 inch in diameter consisting of small, white ray-and-disc flowers on stalks and occur singly or in pairs. Each flower head produces multiple achenes that turn light brown to black as they begin to mature and then fall, leaving behind small cup-like structures. In one growing season, an eclipta plant can produce over 17,000 seeds. These seeds are carried by running water especially during the flooding period. Plants develop a shallow taproot with an extensive fibrous root system that is difficult to remove by hand weeding and plants should be removed when young.





Common Name: Large crabgrass
Scientific Name: *Digitaria sanguinalis*
Family: Poaceae

Life Cycle/Habitat

Large crabgrass is a warm season annual growing spring through early fall. Plants grow in full to part sun and are adapted to moist and poor soils. Large crabgrass establishes readily in disturbed areas but is a common weed of lawns, landscapes, and nursery crops (container and field-grown).

Biological Description

Large crabgrass is an herbaceous grass native to Europe but widely distributed throughout the United States. Plants have a prostrate to spreading growth habit and flower in later summer/early fall. Leaves are alternate, light green, smooth, and usually hairy near the base. Stems can grow to 3 ft tall, vary in color from green to purple, and are capable of rooting at the nodes. The inflorescence (flowering structure) is composed of multiple branches attached to the stalk in a whorl, producing flowers that are pale grey or slightly purple in color. Seeds are yellowish brown, narrow oval to lance-shaped and a single plant can bear more than 150,000 seeds. Seeds are easily dispersed by mowers and other equipment, or may lodge on shoes, and in hairs of animals. The root system is fibrous and sometimes the nodes of the lower stems will form new fibrous roots.



Common Name: Annual bluegrass
Scientific Name: *Poa annua*
Family: Poaceae

Life Cycle/Habitat

Annual bluegrass is a cool season annual that germinates late summer through early spring when soil temperatures are below 70°F but plants decline in summer. Plants prefer moist shaded areas and are commonly found in lawns and landscapes. Annual bluegrass is also a problematic weed in container-grown nursery crops and persists in gravel shade house floors and container production pads.

Biological Description

Annual bluegrass is an herbaceous grass native to Eurasia but distributed throughout the United States. It is an upright, clump-forming weed that expands through the development of aggressive tillers and grows 6-8 inches tall. Leaves are blue-green to light green with boat-shaped leaf tips, leaf blades are often crinkled part way down and can be 1-3 inches long. Stems are flattened, light green in color, and are bent at the base. Its stems are often rooted at the lower joint. The inflorescence (flowering structure) has branched seed clusters (panicles) that are 1-4 inches long. Seed heads are white, can set seed within six weeks, and a single plant can produce up to 2000 seeds. Seeds are dispersed either naturally or through water, animal excretion, shoes, and farm equipment. Annual bluegrass has a fairly weak and shallow root system and needs frequent rainfall or irrigation to survive.





Common Name: Yellow nutsedge, chufa, nutgrass, watergrass

Scientific Name: *Cyperus esculentus*

Family: Cyperaceae

Life Cycle/Habitat

Yellow nutsedge is a warm-season perennial that spreads by rhizomes, tubers and seed. Plants proliferate in hot weather, moist soil, and full sun but are adaptable to dry conditions and poor soil. Yellow nutsedge is common in lawns, landscapes, and around walkways/driveways. It can also be an issue in field-grown nursery crops and nursery container production areas (gravel pads, drainage ditches, irrigation ponds, pine bark piles, etc.).



Biological Description

Yellow nutsedge is an herbaceous sedge native to North America and Eurasia and is found throughout the United States. It has ascending, erect and mounding growth habit forming colonies. Leaves are light green to yellowish in color, very glossy, and arranged in groups of three which distinguishes it from grasses. Each leaf has a long, tapered tip with a prominent midrib. Stems are triangular in shape (distinguishing feature of a sedge) and produce an umbel or compound umbel of floral spikes with feathery, umbrella-like flower clusters. Fruits are yellowish-brown in color, less than 0.08 inch long, single seeded, smooth, and oblong-shaped. Plants may produce up to 1,500 seeds but seed viability is relatively low. Plants produce a shallow fibrous root system and spread by rhizomes and tubers. Hand weeding will not remove all the roots and plants will grow back rapidly and cultivation only increases dispersal. Sanitation practices must be used to prevent infestation in nursery containers.



Table 1. List of pre-emergence herbicides labeled for use in container-grown nursery crops for control of the listed weed species.

Herbicide (Active Ingredient)	Herbicide (Trade Name)	Hairy Bittercress	Creeping Woodsorrel	Yellow Woodsorrel	Spotted Spurge	Mulberry Weed	Northern Willowherb	Common Chickweed	Eclipta	Large Crabgrass	Annual Bluegrass	Yellow Nutsedge
dimethenamid-P	Tower	X ¹		O	X			X	O	X	X	X
dithiopyr	Dimension	X	O	O	X			X		X	X	
flumioxazin	Broadstar/Sureguard	X		X	X	X	X	X	O			
indaziflam	Marengo G	X	O		X	X	X	X	X	X	X	
isoxaben	Gallery	X	O	X		O		X				
oryzalin	Surflan	X		X	O	O	O	X		X	X	
oxadiazon	Ronstar G	X	O	X			O			X	X	
oxyfluorfen	Goal	O		X		O						
pendimethalin	Pendulum			X				X		X	X	
prodiamine	Barricade/Regalkade			X	O	O		X		X	X	
S-metolachlor	Pennant Magnum									X	X	X
trifluralin	Treflan							X		X	X	
benefin + oryzalin	XL 2G							X		X	X	
dimethenamid-P + pendimethalin	Freehand	X		X	X	O	O	X	O	X	X	
oxyfluorfen + oryzalin	Rout	X		X	O	O		X		X	X	
oxyfluorfen + oxadiazon	Regal O-O	X		X		O	O			X	X	
oxyfluorfen + pendimethalin	OH2	X		X	O	O		X		X	X	
oxyfluorfen + prodiamine	Biathlon	X		X	O	O		X		X	X	
prodiamine + isoxaben	Gemini	X			X	O		X		X	X	
trifluralin + isoxaben	Snapshot TG	X	O	X		O		X		X	X	

¹X = controls the listed weed species based on herbicide label; O = controls the listed weed species based on research results.

References:

- Altland., J. 2003. Weed Control in Container Crops. Oregon St. Univ. Coop. Ext. Serv. EM 8823.
- Bryson, C. T. 2009. Weeds of the South. Athens, Ga: Univ. of Georgia Press.
- Chong, J., J. Williams-Woodward, J.C. Neal, and M.T. Springer. 2017. Southeastern U.S. Pest Control Guide for Nursery Crops and Landscape Plantings. Southern Nursery IPM Working Group.
- Murphy, T.R., D.L. Colvin, R. Dickens, J.W. Everest, D. Hall, and L.B. McCarty. 1992. Weeds of Southern Turfgrasses. University of Florida.
- Neal, J. 2016. Weed Control in Woody Plant Propagation and Containerized Liner Production. N. Carolina St. Univ. Coop. Ext. Bul. AG-287.
- Neal, J.C. and J.F. Derr. 2005. Weeds of Container Nurseries in the United States. Raleigh, NC: North Carolina Assoc. of Nurserymen, Inc.
- Stringfield, D. 2005. Panel Discussion: Weed Management. National Proceedings: Forest and Conservation Nursery Associations 2004.
- Uva, R.H., J.C. Neal, and J.M. DiTomaso. 1997. Weeds of the Northeast. Ithaca, NY: Cornell University Press.
- Vargas Jr, J.M. and A.J. Turgeon. 2003. Poa annua: Physiology, Culture, and Control of Annual Bluegrass. John Wiley & Sons.

Dean—Dr. Chandra Reddy, Associate Dean for Extension—Dr. Latif Lighari

TSU-21-182(B)-3-82047 - Tennessee State University does not discriminate against students, employees, or applicants for admission or employment on the basis of race, color, religion, creed, national origin, sex, sexual orientation, gender identity/expression, disability, age, status as a protected veteran, genetic information, or any other legally protected class with respect to all employment, programs and activities sponsored by Tennessee State University. The following person has been designated to handle inquiries regarding non-discrimination policies: Natasha Dowell, Office of Equity and Inclusion, ndowell1@tnstate.edu, 3500 John Merritt Blvd., General Services Building, Second Floor, Nashville, TN 37209, 615-963-7435. The Tennessee State University policy on nondiscrimination can be found at www.tnstate.edu/nondiscrimination.