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Weed Control and Management in Landscape Planting Beds

Introduction

Establishment of weeds in ornamental landscapes significantly damages the growing system, directly and indirectly damages protected plants, and detracts from the aesthetic of managed planting beds. However, weed control and management in landscape beds can be exceptionally complicated and labor-intensive. This problem is compounded by a number of factors, including constant pressure from new and existing invasive weed species, competitive advantage in weed species' reproduction rates (particularly in unhealthy soil), and diminishing effects of many herbicides as resistance develops over time. To manage this threat, we are building an integrated weed management program tailored to residential landscapes, based on the weaknesses and vulnerabilities of each of the targeted weed species, combined with the relative risks of collateral damage to neighboring landscape plants.

Damage/Effects of Weeds in Landscape Plantings

Weeds in ornamental landscapes present two major problems: direct damage to preferred landscape plants through competition and reduction of the aesthetic appeal of managed landscape beds. Direct competition with most ornamental plant species gives great advantage to hyperaggressive weeds; weeds easily outcompete landscape plants for critical resources like water, light, and soil nutrients. Weed intrusion is particularly damaging soon after installation of new landscape plants, as weeds take advantage of the disturbances of transplanting, beat the installed plants to available resources, and severely stunt young ornamental plants. In addition to competition for resources, many weed species are capable of producing allelopathic chemicals which disturb the root growth of ornamental plants, compounding the above-ground competitive advantage of fast-growing weeds.

Methods for Weed Control and Management in Landscape Planting Beds

In ornamental landscape beds, the most effective weed control and management strategies will generally employ multiple tactics from two or more classes: mechanical control, cultural control, biological control, and chemical control. In residential landscapes, we recommend integration of mechanical, cultural, and chemical control methods to establish a sustainable weed management plan.

- Mechanical Control
  - Hand weeding
  - Cultivation
  - Systematic cutbacks
  - Thermal treatment (flame, steam)
- Cultural Control
  - Mulching
  - Physical Exclusion/Barriers
  - General soil care and nutrition
  - Targeted fertilization and irrigation
  - Proper planting methods/site and transplant preparation
- Chemical Control
  - Nonlethal chemical controls
    - Vinegar/salt

        - Bioherbicides (microbial, oil-based, or plant-derived)
        - Herbicidal soaps
    - Conventional Chemical Control
        - Preemergent herbicides
        - Selective herbicides
        - Nonselective herbicides
        - Systemic herbicides

Identification of Top 10 Common/Damaging Weeds in Landscape Beds

To adequately control common, damaging weeds, we have started to build a database from our clients' properties of what we see most often, most aggressive, and most damaging. From 2023 evaluations, we are starting with a top 10:

Canada Thistle	Asteraceae: *Cirsium arvense*
Crabgrass	Poaceae: *Digitaria* spp.
Garlic Mustard	Brassicaceae: *Alliaria petiolata*
Ground Elder	Apiaceae: *Aegopodium podagraria*
Hedge Bindweed	Convolvulaceae: *Calystegia sepium*
Japanese Stiltgrass	Poaceae: *Microstegium vimineum*
Lesser Celandine	Ranunculaceae*: Ficaria verna*
Mugwort	Asteraceae: *Artemisia vulgaris*
Spotted/Prostrate Spurge	Euphorbiaceae: *Chamaesyce* spp. *maculate/prostrata*
Yellow Nutsedge	Cyperaceae: *Cyperus esculentus*

Canada Thistle (Asteraceae*: Cirsium arvense*)

Biology

- Canada thistle is actually native to Europe, introduced to North America in the 1600s.
- Considered a Class B Noxious Weed in Pennsylvania: severely damaging, widespread, low likelihood of eradication.
- This is an exceptionally fertile species, reproducing by huge amounts of seeds with a long range of dispersal (by wind) and efficient spread by roots.
- Canada thistle is perennial, with a leafy ground-level floret produced in the spring, and a tall, erect, flowering stem developing in mid-summer.
- Above ground, the plant reaches up to 5 feet in height; below ground, the roots can grow 10-12 feet per year, up to 15 feet deep.
- A single flowering shoot produces up to 1,500 seeds (up to 6,000 seeds per plant), and seeds can remain dormant in soil for over 20 years before germination.

Damage/Impact

- Canada thistle aggressively crowds and outcompetes native, protected, preferred, and ornamental plants.
- Colonies of thistle rapidly deplete critical soil nutrients and soil moisture, making soil conditions inhospitable to preferred plants.
- In addition to direct competition with surrounding plants, Canada thistle roots produce allelochemicals which directly inhibit growth of plants within 6 feet of individual thistle stems.
- Infestation with Canada thistle severely damages the aesthetic of ornamental landscape plantings.

Control

For management of Canada thistle (and nearly all other invasive weeds), maintaining adequate soil health provides the foundation for effective suppression.

- *Manual*
    - Repeated digging, hand-pulling, or cutting of mature stems prior to seed production can help in small-patch eradication; this process may take up to 2 years to fully deplete the reproductive potential of the root system.

- *Low Toxicity*
    - Application of low-toxicity materials like vinegar, salt solution, citric acid, or iron HEDTA can shorten the time needed for manual/nontoxic control.

- *Conventional Chemical Control/Herbicides*
    - Many conventional herbicides effectively control Canada thistle, both in nonselective and selective modes of action. Use of chemical herbicides in ornamental landscapes is a high-risk/high-reward proposition, often causing severe collateral damage to surrounding landscape plants and trees. In general, we recommend that herbicides be applied by a licensed commercial applicator, that they are used as a short-term fix to gain control, and are followed by a sustainable, integrated weed management plan.

Crabgrass (Poaceae: *Digitaria* spp.)

Biology

- There are two types of crabgrass commonly found in our area: smooth crabgrass (*Digitaria ischaemum*) and large crabgrass (*Digitaria sanguinalis*). Both originated in Europe.
- Crabgrass grows in lawns, ornamental landscapes, and vegetable gardens. Large crabgrass can also be found in orchards, vineyards, and other agricultural areas.
- Crabgrass will begin to germinate when the temperature in the upper inch of soil reaches 55 to 58 degrees at daybreak for four to five days straight.
- Crabgrass reproduces by seeds, and it has a prolific tillering or branching habit. A single plant is able to produce 150 to 700 tillers and up to 150,000 seeds.
- Crabgrass seeds can remain viable and dormant in soil for up to 3 years.

Damage/Impact

- Infestation with crabgrass severely damages the aesthetic of ornamental landscape plantings, with single-plant patches reaching up to 2 feet in diameter.
- Crabgrass aggressively crowds and outcompetes native, protected, preferred, and ornamental plants.
- Crabgrass can damage the soil structure as the shallow root system of crabgrass does not hold soil in place, making your landscape susceptible to erosion caused by heavy rainfall.
- Large patches of crabgrass rapidly deplete critical soil nutrients and soil moisture, making soil conditions inhospitable to preferred plants.
- Crabgrass thrives in poor soil conditions and the toughest growing conditions of the year (mid-summer), contributing to its ability to compete for resources with ornamental plants.

Control

For management of crabgrass (and nearly all other invasive weeds), maintaining adequate soil health provides the foundation for effective suppression.

- *Manual*
    - Repeated digging or cutting of mature stems prior to seed production can help in small-patch eradication; this process may take up to 2 years to fully deplete the reproductive potential of the root system.
    - Crabgrass is relatively shallow-rooted and has tough fibrous roots, so in softer soil of ornamental landscape beds, hand-pulling can be an effective weed control strategy as new sprouts come up.

- *Low Toxicity*
    - Application of low-toxicity materials like vinegar, salt solution, citric acid, or iron HEDTA can shorten the time needed for manual/nontoxic control.

- *Conventional Chemical Control/Herbicides*
    - Many conventional herbicides effectively control crabgrass, both in nonselective and selective modes of action. Use of chemical herbicides in ornamental landscapes is a high-risk/high-reward proposition, often causing severe collateral damage to surrounding landscape plants and trees. In general, we recommend that herbicides be applied by a licensed commercial applicator, that they are used as a short-term fix to gain control, and are followed by a sustainable, integrated weed management plan.

Garlic Mustard (Brassicaceae: *Alliaria petiolate*)

Biology

- Garlic mustard is originally from Europe and Asia but was first introduced to North America in the 1800s for its herbal and medicinal benefits and for erosion control.
- A vigorous garlic mustard plant can produce up to 8,000 seeds.
- During its first year of growth, garlic mustard leaves are rounder and they take on a rosette formation at ground level. During its second year, the leaves grow up a flowering stem and they become more triangular and heart-shaped with toothed edges.
- Considered a Class B Noxious Weed in Pennsylvania: severely damaging, widespread, low likelihood of eradication.
- Recent findings have shown that garlic mustard can establish and spread even in pristine landscape areas.
- The plant is called garlic mustard because when crushed, the leaves have a garlic smell.

Damage/Impact

- Garlic mustard can damage entire ecosystems, its roots release chemicals that alter the vital underground network of fungi that connect nutrients between native plants, restricting the growth of other native plants.
- Garlic mustard spreads its seeds in the wind and gains population in fields and forests by emerging earlier in spring than many native plants. By the time native species are ready to grow, garlic mustard has blocked their sunlight and outcompeted them for moisture and necessary nutrients.
- Insects, including some butterflies, may be affected through the loss of diversity in plants and the loss of suitable egg-laying conditions.
- Garlic mustard can have negative effects on tree composition by creating a barrier that some seedlings, including the chestnut oak (*Quercus prinus*), may not be able to overcome. These changes in tree composition could have significant long-term effects.

Control

For management of garlic mustard (and nearly all other invasive weeds), maintaining adequate soil health provides the foundation for effective suppression.

- *Manual*
    - When hand-pulling methods are used, they must remove at least the upper half of the root to prevent the emergence of a new stalk. This is most easily accomplished when the soil is soft in the spring. Hand-pulling should be performed before seeds form and needs to be continued for up to five years to deplete any established seed bank in the soil.

- *Low Toxicity*
    - Application of low-toxicity materials like vinegar, salt solution, citric acid, or iron HEDTA can shorten the time needed for manual/nontoxic control.

- *Conventional Chemical Control/Herbicides*
    - Many conventional herbicides effectively control Garlic mustard, both in nonselective and selective modes of action. Use of chemical herbicides in ornamental landscapes is a high-risk/high-reward proposition, often causing severe collateral damage to surrounding landscape plants and trees. In general, we recommend that herbicides be applied by a licensed commercial applicator, that they are used as a short-term fix to gain control, and are followed by a sustainable, integrated weed management plan.

Ground Elder (Apiaceae: *Aegopodium podagraria*)

Biology

- Ground elder has many other common names such as bishop's weed, goutweed, snow-in-the-mountain, masterwort, and herb gerard.
- Ground elder was introduced to North America from Europe, with distribution documented to Roman times.
- Known as herbaceous perennial weed and can grow to a heigh of over 3 feet and is not considered to be a prolific seed producer. This weed flowers in early spring and summer.
- Ground elder is not listed on PA Class B Noxious Weed List, but is on invasive, banned, and prohibited lists in New England states and upper Great Lakes states.
- The primary vector for dispersal to new areas is human plantings as ornamental, medicinal or vegetable plants, as well as the accidental spreading of rhizomes by dumping of garden waste.

Damage/Impact

- Ground elder aggressively crowds and outcompetes native, protected, preferred, and ornamental plants.
- Infestation with ground elder severely damages the aesthetic of ornamental landscape plantings.
- Once established, ground elder is able to spread throughout the landscape very quickly by underground rhizomes, commonly growing into and entangling with the root systems of preferred plants.

Control

For management of Ground elder (and nearly all other invasive weeds), maintaining adequate soil health provides the foundation for effective suppression.

- *Manual*
  - Repeated digging, hand-pulling, or cutting of mature stems prior to seed production can help in small-patch eradication; this process may take up to 2 years to fully deplete the reproductive potential of the root system.

    - Manual removal can be accelerated by screening dug soil and sifting back into ornamental beds to remove rhizome fragments efficiently.
    - Pulled plant parts (both above- and below-ground structures) should not be put into a composting system, since rhizomes are highly likely to survive and spread with compost distribution.
    - In some studies, Mexican marigold has been shown to outcompete ground elder through its own allelopathic root suppression.

- *Low Toxicity*
    - Application of low-toxicity materials like vinegar, salt solution, citric acid, or iron HEDTA can shorten the time needed for manual/nontoxic control.

- *Conventional Chemical Control/Herbicides*
    - Many conventional herbicides effectively control ground elder, primarily in non-selective mode of action. Use of chemical herbicides in ornamental landscapes is a high-risk/high-reward proposition, often causing severe collateral damage to surrounding landscape plants and trees. In general, we recommend that herbicides be applied by a licensed commercial applicator, that they are used as a short-term fix to gain control, and are followed by a sustainable, integrated weed management plan.

Hedge Bindweed (Convolvulaceae: *Calystegia sepium*)

Biology

- Hedge bindweed (and its cousin, field bindweed) are in the morning glory family, differentiated by leaf structure and flower color (bindweed flowers are white to pink, morning glory flowers are purple).
- Hedge bindweed reproduces via roots, rhizomes, stem fragments, and seed.
- Most research to date has been done on field bindweed, but assuming similar biology, a single plant can produce up to 600 seeds, and these seeds may remain viable in the soil seedbank for up to 50 years.
- Seeds of bindweed are exceptionally resilient and impermeable and can survive inside the digestive tract of birds for up to 6 days.
- Bindweed roots spread widely underground, vertically and horizontally, forming dense mats. Flowering is indeterminate, so flowers continue to develop along stems until the first frost.
- It is a deep-rooted perennial vine, grows along the ground until it comes in contact with other plants or structures, then will climb aggressively.
- Can grow in a wide range of conditions, from full sun to full shade, and is drought-tolerant.

Damage/Impact

- Hedge Bindweed aggressively crowds and outcompetes native, protected, preferred, and ornamental plants.
- Once established this weed can be nearly impossible to eradicate.
- Infestation with climbing hedge bindweed severely damages the aesthetic of ornamental landscape plantings.
- If left unmanaged, hedge bindweed will form a dense mat of vines and leaves that smothers other plants and has little food value to native animals and insects.

Control

For management of Hedge Bindweed (and nearly all other invasive weeds), maintaining adequate soil health provides the foundation for effective suppression.

- *Manual*
    - Repeated digging, hand-pulling, or cutting of mature stems is not recommended. Avoid digging or tilling the soil around mature field bindweed roots. Remove seedlings before they establish large root systems and produce seeds. Don't dispose of in backyard compost piles, because bindweed can resprout from cuttings. City-provided yard waste bins are suitable for disposal.
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- *Low Toxicity*
    - Application of low-toxicity materials like vinegar, salt solution, citric acid, or iron HEDTA can shorten the time needed for manual/nontoxic control but are generally NOT effective on this weed. Conventional chemical control stands to be the best control method.
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- *Conventional Chemical Control/Herbicides*
    - Many conventional herbicides effectively control Hedge Bindweed, mostly in a nonselective mode of action. Use of chemical herbicides in ornamental landscapes is a high-risk/high-reward proposition, often causing severe collateral damage to surrounding landscape plants and trees. In general, we recommend that herbicides be applied by a licensed commercial applicator, that they are used as a short-term fix to gain control, and are followed by a sustainable, integrated weed management plan.

Japanese Stiltgrass (Poaceae: *Microstegium vimineum*)

Biology

- Japanese stiltgrass is an annual grass that is native to India, Malaysia, China, Korea, Japan, and the Caucasus Mountains. It was introduced to North America around 1919. It is considered an invasive species in Europe, Africa, Australia, New Zealand, South America, Mexico, and many island nations.
- Considered a Class B Noxious Weed in Pennsylvania: severely damaging, widespread, low likelihood of eradication.
- A single plant can yield 1,000 seeds annually. Large patches of Japanese stiltgrass can quickly cover a forest floor or landscape planting bed, shading out and inhibiting germination of other vegetation.
- Each spike of flowers (inflorescence) can either require pollination or be self-fertile, depending on soil moisture and sunlight.
- Unlike many invasive weeds that prefer full sun, Japanese stiltgrass thrives in full shade to partial shade, taking advantage of higher soil moisture and areas prone to disturbance.
- When the mature plant dies, seeds can remain in the soil seed bank for 3-5 years and can quickly germinate upon disturbance.

Damage/Impact

- Infestation with Japanese stiltgrass severely damages the aesthetic of ornamental landscape plantings.
- Japanese stiltgrass is known to invade a variety of ecosystems, including forested floodplains, forest edges, stream banks, fields, trails, ditches, and even ornamental landscapes, often displacing native vegetation.
- This species can dramatically alter soil chemistry to its benefit by rapidly increasing soil pH, robbing resources from ornamental plants and the soil biome, which (in the mid-Atlantic) thrive in neutral to slightly acidic soil.
- Infestation with Japanese stiltgrass has been shown to both deplete available carbon in soil and increase available

phosphorus, causing significant deficiencies in critical micronutrients like zinc, iron, and calcium.

Control

For management of Japanese stiltgrass (and nearly all other invasive weeds), maintaining adequate soil health provides the foundation for effective suppression.

- *Manual*
  - Japanese stiltgrass is relatively short-rooted, and hand-pulling of newly emerged weeds can be effective, especially if patches are small.
  - Hand-pulling methods must remove at least the upper half of the root to prevent a new stalk from emerging. This is most easily accomplished in the spring when the soil is soft.
  - Hand-pulling should be performed before seeds are formed (mid-August) and needs to be continued for up to five years to deplete any established seed bank in the soil.

- *Low Toxicity*
  - Application of low-toxicity materials like vinegar, salt solution, citric acid, or iron HEDTA can shorten the time needed for manual/nontoxic control.

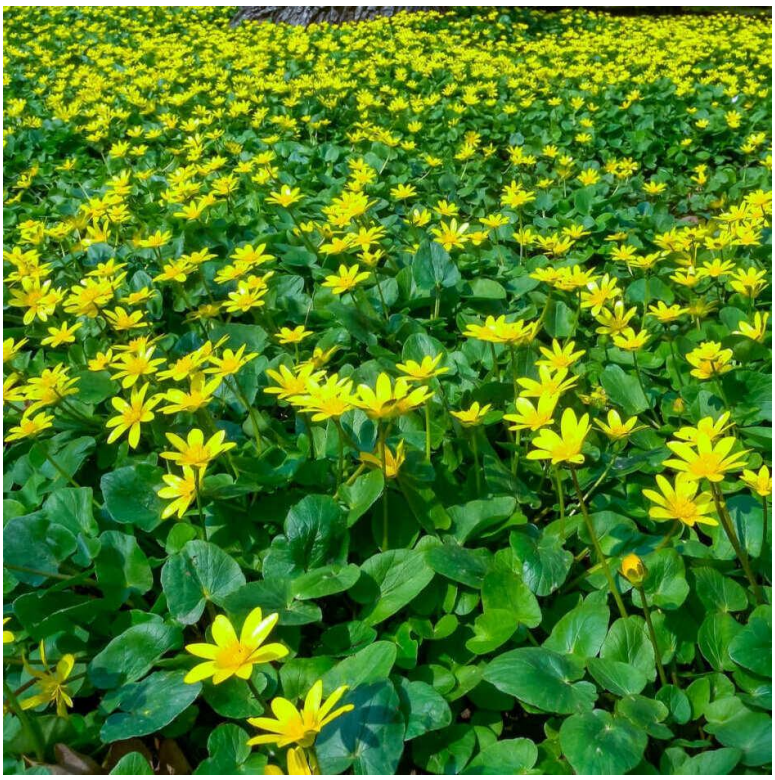
- *Conventional Chemical Control/Herbicides*
  - Many conventional herbicides effectively control Japanese stiltgrass, both in nonselective and selective modes of action. Use of chemical herbicides in ornamental landscapes is a high-risk/high-reward proposition, often causing severe collateral damage to surrounding landscape plants and trees. In general, we recommend that herbicides be applied by a licensed commercial applicator, that they are used as a short-term fix to gain control, and are followed by a sustainable, integrated weed management plan.

Lesser Celandine (Ranunculaceae*: Ficaria verna*)

Biology

- Native to Europe, Asia and northern Africa, lesser celandine was likely introduced as an ornamental plant. The earliest herbarium specimen dates to 1867 from Pennsylvania.
- Lesser celandine has been reported throughout the northeastern United States and west to Missouri, and in the Pacific Northwest.
- Considered a Class B Noxious Weed in Pennsylvania: severely damaging, widespread, and low likelihood of eradication.

- Lesser celandine is quick to emerge but is short-lived, and its emergence is triggered by increased light availability in the early spring. Shoots typically begin from late-March to mid-April depending on environmental conditions, and flowering depends on water availability and rainfall.
- Lesser celandine is a low-growing weed with dark green kidney shaped leaves. As it takes hold, will creep along the ground to spread throughout landscape beds.
- Some plants produce seeds, but a majority of the spread of lesser celandine is achieved through fertile bulblets on plant stems and masses of loose tubers at the root crown.



Damage/Impact

- Lesser celandine emerges earlier than most native plants and may inhibit the development and reproduction of other spring desired flowers or small ornamentals.
- The bare ground left behind after lesser celandine withers in late spring may be taken over by other weedy species.
- An infestation with lesser celandine can severely damage the aesthetics of ornamental landscape beds.

- This weed is toxic to cats, dogs, horses and all livestock.
- The poisoning is most often due to ingestion of the plant, and the most toxic part of the plant is its yellow flowers due to high levels of the toxin protoanemonin.

Control

- *Manual*
    - Manual weed control methods such as pulling/raking can be done to control small infestations.
    - Hand-digging of plants can be effective but requires thorough removal of all tubers below ground.
    - Mowing, cutting, and tilling are not recommended for control of celandine, and may lead to accidental spread through soil disturbance and tuber distribution.

- *Low Toxicity*
    - Application of vinegar, salt solution, citric acid or Iron HEDTA can reduce the need for manual removal.

- *Conventional Chemical Control/Herbicides*
    - There are many pre- and post-emergent herbicides available for the control of lesser celandine. Use of chemical herbicides in landscapes is a high-risk/high-reward proposition, often causing collateral damage to surrounding landscape plants and trees. In general, we recommend that herbicides be applied by a licensed commercial applicator, that they are used as a short-term fix to gain control, and are followed by a sustainable, integrated weed management plan.

Mugwort (Asteraceae: *Artemisia vulgaris*)

Biology

- Mugwort is originally native to Europe and eastern Asia, where it has historically been used as a medicinal herb. Seed may have been first introduced to North America as early as the 16th century by Jesuit missionaries in Canada.
- A single plant, depending on environment, can produce up to 200,000 seeds, however seed is not the plant's primary form of spreading.
- Mugwort spreads largely through vegetative expansion and human spread of root rhizomes.
- This weed can grow up to 4ft tall, often a reddish-brown color and stems can become woody-like with age.

Damage/Impact

- Mugwort produces several terpenoids and potential allelochemicals, disturbing root growth of surrounding plants.
- Decaying mugwort foliage has been shown to inhibit the growth of red clover.
- The weed can displace native species and can delay or disrupt succession in natural environments.
- Infestation with mugwort severely damages the aesthetics of ornamental landscape plantings.

Control

For management of mugwort (and nearly all other invasive weeds), maintaining adequate soil health provides the foundation for effective suppression.

- *Manual*
  - Hand-pulling immature mugwort (before rhizomes form) can be an effective management strategy.
  - Pulling mature mugwort is ineffective and can even promote growth by leaving residual rhizome fragments in the

soil, stimulating further spread of this species.
    - Landscape fabrics and dense mulch can be effective in suppressing sprouting and spread of mugwort.
    - Mugwort can tolerate cutting and mowing: even 3-4 mowings per year for several consecutive has been shown to only reduce patch density of mugwort by 20%.

- *Low Toxicity*
    - Application of low toxicity materials like vinegar, salt, citric acid, or iron HEDTA can limit the need for conventional chemical control.

- *Conventional Chemical Control/Herbicides*
    - Conventional chemical control stands as the best way to control mugwort. Many herbicides control mugwort, both with non-selective and selective modes of action. Use of chemical herbicides in landscapes is a high-risk/high-reward proposition, often causing collateral damage to surrounding landscape plants and trees. In general, we recommend that herbicides be applied by a licensed commercial applicator, that they are used as a short-term fix to gain control, and are followed by a sustainable, integrated weed management plan.

Spotted/Prostrate Spurge (Euphorbiaceae: *Chamaesyce* spp. *maculata/prostrata*)

Biology

- Spotted spurge is native to the eastern United States.
- It often grows in poor, compacted soil and generally in full sun. This summer weed can overgrow and smother desirable plants.
- As growth continues, the leaves form a dense mat that can grow up to 3 feet in diameter.
- Spotted spurge germinates best when temperatures are 75°F to 85°F, but germination can occur at temperatures as low as 60°F and as high as 100°F.
- Spotted spurge can produce seeds 5 weeks after germination, causing fast spreading of the plant.
- A single spotted spurge can produce several thousand seeds, which can remain dormant in the soil until conditions are suitable for germination. Seeds produced in the summer germinate immediately while those produced in late fall mostly will lie dormant until spring.

Damage/Impact

- Spotted spurge overgrows sparse turf areas and low-growing ground covers, invades open areas in gardens and landscapes, and can grow readily in sidewalk cracks.
- Spotted spurge reduces visual aesthetics and turf quality, provides a habitat for undesirable insects, and attracts ants with its seed.
- Spotted spurge has a sap that can cause minor skin and eye irritation and can be toxic if ingested.
- Infestation with spotted spurge severely damages the aesthetics of ornamental landscape plantings and invades fertile cracks and joints of hardscapes.

Control

For management of spotted spurge (and nearly all other persistent weeds), maintaining adequate soil health provides the foundation for effective suppression.

- *Manual*
  - One of the ways to control spurge is before it starts. Applying organic mulches, such as shredded bark, compost, or straw 2″ thick can eliminate the light needed for spotted spurge seed germination.
  - Mechanical control of this weed can be performed but consistent monitoring is required to remove new plants before they produce seeds and further the spread.

- *Low Toxicity*
  - Application of low toxicity materials like vinegar, salt, citric acid, or iron HEDTA can limit the need for conventional chemical control.

- *Conventional Chemical Control/Herbicides*
  - Many herbicides control spotted spurge, both in non-selective and selective modes of action. Use of chemical herbicides in landscapes is a high-risk/high-reward proposition, often causing collateral damage to surrounding landscape plants and trees. In general, we recommend that herbicides be applied by a licensed commercial applicator, that they are used as a short-term fix to gain control, and are followed by a sustainable, integrated weed management plan.

Yellow Nutsedge (Cyperaceae: *Cyperus esculentus*)

Biology

- Yellow nutsedge is native to North America and Eurasia but is found throughout the world. Although it is of subtropical origin, this weed has spread north into temperate regions. Prior to 1950, it was found mostly in native habitats, but today it is considered one of the world's worst weeds.
- Yellow nutsedge is an erect, grass-like perennial, characterized by its yellowish green leaves, triangular stem, and golden-brown flower head. Upright leaves of this plant can grow to 12-24 inches tall, and flower stems (July-September) can reach 3 feet.
- Sedges are perennial plants and can reproduce by both seeds and root structures. Dormant tubers can live in soil for 3 years before sprouting. Seed germination success is very low, and a majority of colonization and spread of these weeds is through rhizomes and underground tubers.
- Yellow nutsedge is self-sterile and depends on wind pollination for seed production. Seed germination success is very low, and a majority of colonization and spread of these weeds is through rhizomes and underground tubers.
- In general, yellow nutsedge thrives in high-moisture areas in full sun to partial shade, often indicative of poor soil structure and drainage.

Damage/Impact

- Yellow nutsedge is an exceptionally competitive weed species, outperforming most preferred grasses and low-growing ornamental species. It has a profoundly negative effect on the aesthetic appeal of turfgrass and lawns, ornamental plants, and open areas of mulched beds.
- Below-ground portions of yellow nutsedge (roots,

rhizomes, and tubers) are highly allelopathic either when live or decomposing, disrupting root development in maturing plants and interfering with seed germination of ornamental species.
- Yellow nutsedge is commonly considered a serious weed pest of turfgrass, but lawn infestations quickly expand to ornamental beds at the margin between grass and mulch, and take over plants with difficult-to-access lower stems, like liriope (which it outcompetes vertically) and roses (which protect the weed with a thorny barrier to removal).

Control

For management of yellow nutsedge (and nearly all other persistent weeds), maintaining adequate soil health provides the foundation for effective suppression.

- *Manual*
  - Young plants can be pulled by hand (May-June), prior to development of new tubers.
  - In landscape beds, plants can be dug out to remove below-ground reproductive structures, but recommendations are fairly severe: at least 10 inches deep and 10 inches beyond all edges of the patch of weed plants.
  - Consistent tillage is effective in field crops, and turning soil repeatedly will dry out and kill dislodged tubers.
  - Yellow nutsedge is not shade-tolerant; in ornamental beds, establishment of a contiguous overstory higher than 24" will prohibit establishment of this weed.

- *Low Toxicity*
  - Application of low toxicity materials like vinegar, salt, citric acid, or iron HEDTA can limit the need for conventional chemical control.
  - Top-dressing problem areas with wheat bran has been shown to suppress development and spread of yellow nutsedge.

- *Conventional Chemical Control/Herbicides*
  - As a globally-important weed species, many herbicides have been developed to control yellow nutsedge, both in non-selective and selective modes of action. Use of chemical herbicides in landscapes is a high-risk/high-reward proposition, often causing collateral damage to surrounding landscape plants and trees. In general, we recommend that herbicides be applied by a licensed commercial applicator, that they are used as a short-term fix to gain control, and are followed by a sustainable, integrated weed management plan.

The foundation of integrated pest management is a program of periodic inspections, during which all plants are assessed in terms of insect, disease, nutritional, and physiological health. After inspection, plants are treated as needed with the most advanced biological, chemical, and cultural management tools, and the findings of each visit are summarized and reported to you in writing. At Burkholder Plant Health Care, our approach is to put our training and experience to work for you, ensuring that your landscape gets the attention and tailored management that it deserves. For comprehensive and effective plant health care for your landscape, such as weed control and management in landscape planting beds, trust Burkholder PHC.