Background

Japanese stiltgrass (*Microstegium vimineum*) is a widespread invader of woodlands. It was first reported in 1919, introduced as packing material for imported porcelain from China. Initially documented in Tennessee, it is now found across most of the eastern United States and as far west as Texas. Japanese stiltgrass is an annual grass that germinates in the spring and dies back each fall. A prolific seeder with a sprawling growth habit, it is often found growing along trails and roads, quickly spreading to the forest understory. The tiny seeds are carried on hikers' shoes, cars, ATVs, and logging and road maintenance equipment. Once introduced, it is extremely difficult to remove from a site.

Description

Size: Stems form a dense, tangled mat usually 1 to 3 feet in height, sometimes up to 6 feet.

Leaves: Elongate and lance shaped, each leaf blade is between 1 and 3 inches in length. A silvery, slightly off-center stripe runs the length of each leaf.

Flowers/fruit: A three-branched flower spike emerges in late summer, maturing to carry the small seeds. The spikes are 1 to 2 inches in length.

Stems: The stems are thin, delicate, and wiry with many interconnected via a horizontal runner stem, from which the roots emerge. Each stem is supported by small, stiltlike prop roots, giving the species its name. The stems remain over winter, forming a dense, matted layer, or thatch, over the soil.

Look-Alikes

The native whitegrass (*Leersia virginica*) is very similar in growth habit and site preferences but has two distinct differences from Japanese stiltgrass. Its flower spike is much larger, up to 10 inches long, and its stem has patches of dense white hair around each leaf base. Another trait of Japanese stiltgrass that helps to differentiate it from the majority of native grasses is its smooth leaves; most native grass leaves have a rough texture running lengthwise along the blade.

Dispersal

Japanese stiltgrass spreads exclusively by seed. Each plant can produce up to 1,000 seeds annually. Like most other annual invasive plants, Japanese stiltgrass seed is small and highly mobile, usually arriving in new areas accidentally on contaminated surfaces, such as vehicles. The seeds float and are easily dispersed in roadside ditches, streams, or wetlands by the movement of water. The seeds can also be transported on contaminated soil clinging to heavy equipment, especially along roadsides or in logging operations. Additionally, the seeds can remain viable in the soil for up to five years, germinating when suitable conditions occur.

A. Leaves showing slightly off-center silver stripe down leaf blade.
B. Stilt roots.
C. Three-branched flower spike carrying seeds.
D. Interconnected root growth habit.
E. Severely invaded forest understory.
F. Dry, matted stems during winter covering invaded area.

Photos by Dave Jackson

Site

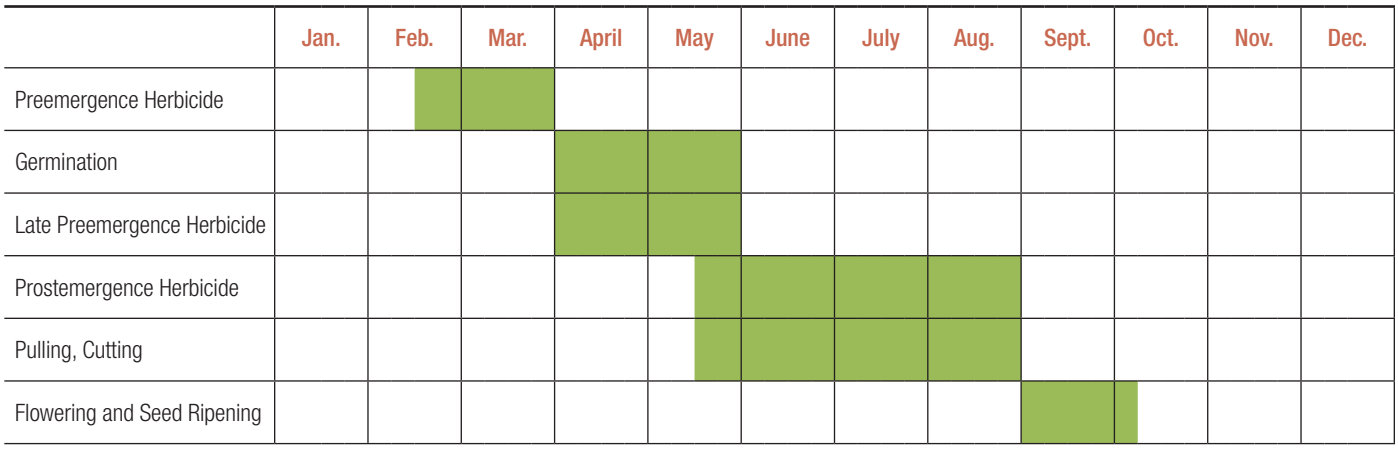
Japanese stiltgrass can grow in most habitats with moist soil, including mature woods, recently harvested sites, floodplains, wetlands, abandoned fields, and roadsides. In woodlands, it is common near roads or trails on which the seed is introduced and spread.

Control

Small infestations of stiltgrass are easily pulled, as the roots are very shallow. Cutting plants off at ground level using a string trimmer is also effective because it removes all stem tissue, making stiltgrass unable regrow. Mowing is not as effective as string trimming; stiltgrass will regrow from remaining stem nodes. When applying mechanical removal techniques for

Management Calendar

The objective of stiltgrass management is to prevent seed set and limit competition with other plants by controlling it early in the season.



Treatment and Timing

Prescriptions for managing Japanese stiltgrass focus on preventing seed set and limiting the period of competition with desirable species. Stiltgrass is susceptible to a number of herbicides. Small infestations can be hand-pulled or cut at ground level. Trade names are provided to give specific information. Penn State Extension does not endorse or guarantee any product or recommend one product over another that might be similar. When products with the recommended active ingredients are available on Pennsylvania state contract, those trade names are provided below. Other formulations with identical efficacy may be available.

Treatment	Timing	Herbicide	Product Rate	Comments
Preemergence	Late winter/early spring	ProClipse* (prodiamine) or Pendulum AquaCap* (pendimethalin)	16 to 32 ounces/acre or 64 to 128 ounces/acre	Selective preemergence applications of prodiamine or pendimethalin prevent stiltgrass establishment and have little effect on plants that are already present. These herbicides move very slowly into the soil, and if used alone need to be applied 2 to 3 weeks prior to germination. This approach is also effective against mile-a-minute (*Persicaria perfoliata*).
Late Preemergence	April through early May	Preemergence herbicide plus Plateau* (imazapic) or Oust XP (sulfometuron)	Preemergence herbicide plus 1 ounce/acre or 0.25 to 0.5 ounce/acre	Adding a very low rate of imazapic or sulfometuron to a preemergence mix allows you to apply closer to or even after stiltgrass germination with minimal injury to desirable vegetation. Both these herbicides are soil active and have postemergence activity. Small emerged seedlings will be controlled and there will be a short window of residual activity to allow the preemergence herbicide to move into the soil to prevent subsequent germination. Caution: imazapic and sulfometuron are safe to woody plants but will injure some desirable herbaceous species.
Pre- and Postemergence	Early March through May	Plateau* (imazapic) or Oust XP (sulfometuron)	8 to 12 ounces/acre or 1 to 4 ounces/acre	Imazapic and sulfometuron have pre- and postemergence activity against stiltgrass. Preemergence applications will cause less damage to nontarget species than postemergence applications. Sulfometuron has significant activity on a broad spectrum of herbaceous species and is best used where forest regeneration is the objective. Imazapic can be used in specific herbaceous plantings, as some native warm-season grasses and forbs are tolerant.
Postemergence	Mid-May through August	Aquaneat (glyphosate) or Finale* (glufosinate) or Assure II* (quizalofop)	8 to 96 ounces/acre or 64 ounces/acre or 4 ounces/acre	There comes a point in the season when it is more valuable to use an herbicide that is not soil active to reduce impact on nontarget plants. Glyphosate and glufosinate are nonselective herbicides with no soil activity. Glufosinate only injures the parts of the plant it contacts, while glyphosate is systemic and will kill the entire plant. Quizalofop only affects grasses, but the rate used for stiltgrass is low enough that desirable grasses such as whitegrass (*Leersia virginica*), deertongue (*Dichanthelium clandestinum*), and nimblewill (*Muhlenbergia schreberi*) are only temporarily affected.

*Product contains a non-crop-site label and is not approved for application on forested sites. Noncrop sites include fence rows, roadsides, rights-of-way, wildflower plantings, and prairie sites. Be sure to check the product label to ensure the site to which you are applying is listed.

Japanese stiltgrass, timing is critical. Current recommendations are to delay mechanical operations until June to avoid a second flush of germination, and complete them before seed head emergence in late August.

Preemergence herbicides prevent seeds from germinating; several are effective against stiltgrass. Prodiamine or the similar active ingredient pendimethalin can be used for selective preemergence suppression. These herbicides only affect germinating seedlings and do not injure established vegetation. To be effective, preemergence herbicides should be applied at least two to three weeks prior to expected germination. They must already be present in the soil at the time of germination to be effective. Application timing is a challenge, as germination is based on soil temperature, which varies from year to year. A general guideline is to apply these preemergence herbicides by mid-March (or late February in an early spring).

To make preemergence applications more flexible, add a low rate of imazapic or sulfometuron to the mixture. These herbicides will control emerged and germinating seedlings long enough to allow the less-soluble preemergence herbicides time to move into the germination zone. This combination retains much of the selectivity of preemergence herbicides alone, but lets you apply closer to or even after germination. Additionally, these combinations are also effective against mile-a-minute vine (*Persicaria perfoliata*), which commonly occurs on the same sites with stiltgrass.

Imazapic and sulfometuron have both pre- and postemergence activity against stiltgrass. These products control grasses and herbaceous broadleaf vegetation. Sulfometuron poses little risk to hardwood and conifer seedlings and can be applied directly over the top of existing woody vegetation, except during periods of active new growth in the spring. Many native warm-season grasses, wildflowers, legumes, and trees are tolerant of imazapic.

Postemergence herbicides—chemicals that control the plant after germination—are also effective against stiltgrass. These include glyphosate, glufosinate, and quizalofop. Glyphosate is nonselective, systemic, and will injure all treated vegetation. However, glyphosate can be applied at very low rates that will limit injury to nontarget species.

Glufosinate is also nonselective but has less movement through the plant's vascular system, so damage to treated plants will typically be limited to where the spray contacted the plant. Stiltgrass will be controlled, but most perennial plants will regrow following treatment.

The herbicide quizalofop is grass selective and does not affect broadleaf plants. Stiltgrass is affected by quizalofop at low rates, so you can control stiltgrass but leave most native grasses largely intact. Several grass-only herbicides, including clethodim, fluazifop, sethoxydim, and fenoxaprop, would provide similar effects as quizalofop. It is important to note that postemergence herbicide treatments using glyphosate, glufosinate, or quizalofop do not affect seed that is stored in the soil.

Where stiltgrass is well established, efforts should be directed toward temporary suppression to create a window of opportunity to establish meadow plantings, early successional habitat, or forest regeneration. Your objective in this scenario is to release native plants and allow them to become vigorous enough to successfully compete with the stiltgrass and tolerate its presence after suppression treatments have stopped. This can only occur where deer impact on native vegetation is low. Numerous studies have demonstrated increased stiltgrass infestation under high-deer-impact scenarios where deer continue to heavily browse out native vegetation. An otherwise ecologically functional plant community with stiltgrass present may be the best we can expect in most areas where significant deer impact cannot be alleviated.

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Penn State College of Agricultural Sciences research and extension programs are funded in part by Pennsylvania counties, the Commonwealth of Pennsylvania, and the U.S. Department of Agriculture.

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This publication is available in alternative media on request.

Produced by Ag Communications and Marketing

Code EE0392 07/20pod