THE OHIO STATE UNIVERSITY EXTENSION

FACT SHEET

Agriculture and Natural Resources

F-70-11

Controlling Non-Native Invasive Plants in Ohio Forests: Japanese Stiltgrass

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Japanese stiltgrass—also known as Napalese browntop (*Microstegium vimineum*)—is an annual grass, native to Asia, that can reach more than 3.5 feet in height and can form extensive colonies. It was likely introduced accidentally as packing material in shipments of goods from its native range. It was first found in North America near Knoxville, Tennessee in 1919.

Japanese stiltgrass is very adaptable. It can tolerate low-light environments with sufficient soil nutrients and moisture; conversely, it can tolerate low-nutrient and low-moisture environments with adequate light. Where there are adequate amounts of nutrients, moisture, and light, it can thrive and out-compete most native understory plants. It commonly establishes along forest edges, logging roads, recreational trails, ditches, and stream corridors (Figure 1). It is also found in floodplains; moist, early-successional fields; and along utility corridors where it is not exposed to full sunlight.

Figure 1. A roadside infestation of Japanese stiltgrass.

Stiltgrass can produce 100–1000 seeds per plant, which can survive in the seedbank for more than three years. These seeds are dispersed by a number of mechanisms including foot traffic, water movement, equipment, and wildlife. Consequently, stiltgrass can spread rapidly, especially when aided by disturbance that exposes bare mineral soil. Where white-tailed deer are abundant, their preferential browsing on native plants and avoidance of stiltgrass may further facilitate the spread of this invasive grass.

Identification

- **Leaves**—Leaves are flat, pale green, asymmetrically lance-shaped, and about 1–3 inches in length. Leaves are sparsely hairy on both sides and along the margins. A shiny, off-center mid-rib is conspicuous on the upper surface (Figure 2). Leaves are arranged alternately along the branched stem and project outward from it. Leaves have a long sheath collar with fine hairs that encircle the stem.
- **Stems**—Stems are branched, slender, wiry, and covered by overlapping leaf sheaths. Nodes and internodes are hairless. Stems are green, changing to purple and brown late in the season.

Figure 2. Stiltgrass foliage. Notice the shiny, whitish, mid-rib and hairs along the margin.

- **Flowers**—Delicate, spikelike flowers up to 3 inches long develop in late summer or early fall in the axils of the leaves or at the apex of the stem. Flowers may be unbranched or with 1–3 lateral branches on a wiry stem. Spikelets are paired.
- **Seeds**—The seed is a tiny, husked, ellipsoid grain. Seed heads are thin and sometimes persist through winter.
- **Roots**—Distinct aerial roots or prop roots can be found at the lower nodes. Root systems are shallow and fibrous (Figure 3). This distinguishes stiltgrass from the native white grass (*Leersia virginica*), which has a stout rhizome.

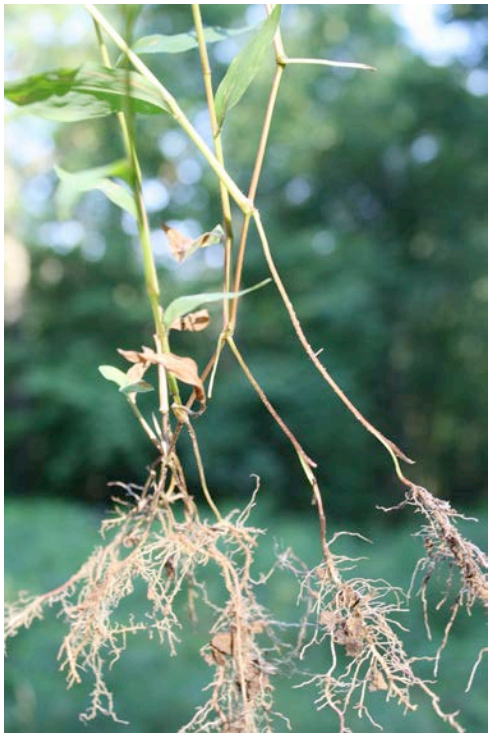

Figure 3. Fibrous root system of stiltgrass. Notice the prop roots extending from the nodes.

Early Detection and Rapid Response

Once Japanese stiltgrass becomes established in an area, it can spread rapidly and form dense monocultures that can suppress most native plant species. These well-established populations can only be controlled with a substantial investment of manpower and resources over a long period of time; therefore, early detection and rapid response are two cost-effective keys to keeping this species at bay. Early establishment nearly always occurs along roadsides, stream

corridors, and trials; rapid expansion usually occurs following disturbances such as timber harvests, extensive flooding, or construction projects; therefore, it is essential to be vigilant and to regularly scout for and control this species, especially prior to a planned harvest or other disturbance activity. It is also very important to monitor recently disturbed areas and control emerging populations before they become established.

Spread Prevention

Since mowing, road maintenance, and timber harvesting equipment can rapidly spread stiltgrass, it is imperative that equipment is inspected and cleaned on a regular basis. When possible, mow non-infested areas prior to mowing areas with known stiltgrass populations, and require loggers and other contractors to sanitize equipment prior to moving on to your property. Care should be taken to prevent movement of any above-ground plant parts. Debris from mowing and road maintenance equipment should be disposed of properly.

Since stiltgrass can be spread by foot traffic, horses, and recreational equipment, boot and equipment cleaning can help to limit the spread of seed into non-infested areas. Place high priority in controlling stiltgrass along trails, especially those leading to non-infested areas. Consider rerouting trails that pass through infested areas.

Gravel, topsoil, seed, and mulches are another way that stiltgrass can be inadvertently moved from one place to another. When possible, purchase these products from certified, weed-free sources or at minimum, check with local suppliers to be sure that products do not come from locations infested with stiltgrass or other non-native invasive plants.

Control Methods

Although many control techniques have been attempted with varying levels of success, there are few cost-effective control methods that have minimal impact on native plant populations. Most control methods will need to be repeated for at least a few growing seasons, since control is rarely 100% effective and the seed of stiltgrass may remain viable in the soil for up to 5 years.

Mechanical Control

Hand-pulling can be an effective method of controlling isolated, small populations of stiltgrass; however, it is rarely practical once stiltgrass becomes well-established.

Hand-pulling is most effective late in the growing season before seeds mature. Pulling earlier in the growing season can be futile, since seeds in the soil can continue to germinate well into the growing season. Pulled plants should be bagged and removed from the site to prevent seeds from maturing after they are pulled.

Mowing is another control mechanism that has been successfully utilized to manage stiltgrass, but its application is limited to roadsides, open areas, and trail systems that will accommodate mowing equipment. A string-type trimmer or weed eater can be utilized to mow sites that are not accessible by larger equipment. To be effective, mowing must take place late in the growing season just prior to the establishment of mature seed heads. Mowing of accessible areas is more effective when combined with other control methods in adjacent, infested areas to minimize re-colonization from neighboring populations.

Biological Control

To date, no biological control methods have been effectively used to control Japanese stiltgrass; however, in 2009 a leaf blight fungal disease (*Bipolaris sp.*) was found on stiltgrass populations in West Virginia. It is currently being evaluated for use as a biological control agent.

Chemical Control

Non-selective foliar herbicides such as Roundup, Accord, and other glyphosate-based products can be applied to the foliage of stiltgrass at any time during the active growing season (Table 1); however, since these products have no residual effect, control is most effective when applied in late summer just prior to seed head development to ensure contact with individuals that germinate later in the growing season. Since non-selective herbicides will kill most plants that are contacted, these treatments should be limited to monocultures of stiltgrass or small, isolated populations of stiltgrass that are not growing in close

proximity to desirable plant populations. Application later in the growing season can also reduce exposure of native spring ephemeral plants to herbicide treatments.

When treating stiltgrass populations in wetlands or along streams, be sure to use a glyphosate product, such as Accord Concentrate, that is approved for use in and around aquatic sites.

Non-selective pre-emergent/residual herbicides with the active ingredient pendimethalin (e.g., Pendulum) can prevent stiltgrass germination but will have no impact on plants that have already germinated (Table 2). They must be applied early in the spring, 2–3 weeks prior to seed germination. Other herbicides, such imazapic (e.g., Plateau and Journey) or sulfometuron (Oust XP) can effectively control stiltgrass and prevent seed germination (Table 2). Treatments can be applied from early in the growing season through mid-summer. These treatments have been shown to effectively control populations; however, they can also eradicate desirable plants and delay their reestablishment.

Selective grass-specific herbicides, such as Fusilade DX with the active ingredient fluazifop-P-butyl, and other herbicides including those with the active ingredients of fenoxaprop-ethyl and sethoxydim have also been effective at controlling stiltgrass (Table 1). The process of photosynthesis in grasses is slightly different than in non-grasses. This makes most grasses susceptible to some herbicides that will not harm other plants. In many cases, stiltgrass is the only susceptible grass that is found in shaded environments, allowing managers to target it without damaging or preventing the germination of desirable, native plants. Additional applications may be needed in subsequent years to control newly established plants that emerge from the seed bank.

Disclaimer

Label recommendations should be followed closely to maximize the potential for successful control and to ensure safe use. Mixing and application instructions on the label supersede any specific instructions provided in this fact sheet. Treated sites should be monitored annually to determine whether control is achieved and to detect re-infestation. Herbicides are approved for specific uses by the U.S. Environmental Protection Agency. Only uses and application methods that are listed and described on the pesticide's label are allowable. The herbicides listed in this fact sheet were appropriately labeled at the time of publication. Because pesticide labeling can change at any time, you should verify that a particular herbicide is currently labeled for your intended use. At the time of this writing, current labels and Material Safety Data Sheets (MSDS) for herbicides discussed in this publication were at the Crop Data Management Systems web site (**www.cdms.net/manuf/manuf.asp**).

This documentation can also be acquired from the herbicide manufacturers.

Table 1. Herbicides recommended for foliar treatment of Japanese stiltgrass.

Herbicide	Example Brand Names	Comments
glyphosate	Roundup herbicides; Accord herbicides	Non-selective; 1–2% solution in water (vol/vol); when leaves are green; add surfactant if not in herbicide
fluazifop-P-butyl	Fusilade DX	Selective grass herbicide; 16–24 oz per acre or 0.5% solution in water (vol/vol); add non-ionic surfactant; retreatment may be necessary
sethoxydim	Poast	Selective grass herbicide; 1.0–1.5% in water (vol/vol)

Table 2. Herbicides recommended for pre-emergent treatment of Japanese stiltgrass.

Herbicide	Example Brand Names	Comments
pendimethalin	Pendulum AquaCap	4.2 qts/acre; apply 2–3 weeks prior to germination; will not affect plants that have germinated
imazapic	Plateau	4–6 oz/acre; treat when plants are less than 4 inches tall; both pre- and post-emergence control
sulfometuron	Oust XP	1 1/3–3 oz/acre; pre-and post-emergence activity

References

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