PennDOT LTAP
technical
INFORMATION
SHEET #184
WINTER/2017

BEST PRACTICES FOR CONTROLLING INVASIVE PLANT SPECIES

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Invasive plant species are a serious ecological threat to Pennsylvania's roadside environment. The introduction of alien plant species can cause economic and environmental damage as well as harm to human health.

Invasive plants displace native plants at a rapid pace resulting in a monoculture of dense exotic vegetation with little or no food value for Pennsylvania's native wildlife. Typically, these invasive species were introduced to our environment unintentionally through shipping and packaging from foreign countries or as novelty plants that innocently had some apparent value at the time they were introduced.

In 1999, President Clinton brought national attention to the evolving challenge of controlling invasive plants by signing Executive Order 13112, which intended to prevent the introduction of invasive species, provide for their control, and minimize the economic, ecological, and human health impacts that invasive species cause.

The Pennsylvania Department of Transportation (PennDOT) addresses invasive plant species within its rights-of-way through the guidance document, *Invasive Species – Best Management Practices* (Publication 756). This document offers best management practices (BMPs) or methods and techniques that have been found to be most effective and practical in preventing and controlling invasive species.

The many benefits to controlling invasive plants include:

- Reduced future maintenance costs
- Enhanced visibility for safety
- Reduced application of herbicides
- Protection of existing plant and wildlife habitat

Before performing operational control of invasive plants, it is important to understand basic plant biology and how some maintenance practices may unintentionally aid in the spread of invasive plants. Municipal road crews should take advantage of opportunities to control invasive plants within the rights-of-way and prevent their spread to adjacent habitats. Most importantly, they should learn how to identify invasive plants to be more effective at controlling their growth and spread.

Understand Basic Plant Biology First

Plant vegetation is classified as grass, broadleaf, or woody. Invasive plants can fit into any one of these three types of vegetation.

Grasses emerge from the ground with a single narrow leaf with parallel veins. They have fibrous root systems, and the growing point is just above the soil surface. Much roadside vegetation management is focused on establishing and maintaining healthy turf grass. Proper mowing height is important so the growing point of the plant is not damaged.

Broadleaves have two leaves as they emerge from the ground; they have net-like veins with the growing point at the end of each stem. Broadleaves are typically targeted for removal since they invade turf grasses.

Woody plants form wood and include brush, shrubs, and trees. They can reduce sight distance in clear zones, block drainage systems, shade the road, and become a safety hazard as a fixed object for motorists.

Plants generally have four growth phases: seedling, vegetative, reproductive, and maturity.

1. **Seedling** – The plant life cycle starts with seed germination, and with the right combination of temperature, water, and oxygen, the plant emerges from the ground.
2. **Vegetative** – The most vigorous growth phase, it is also the most effective time for controlling plant growth either by mowing or applying herbicides.
3. **Reproductive** – In this phase, plant energy is directed to the flower and seed production.
4. **Maturity** – Seeds ripen and drop during this phase.

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Attempts at controlling an invasive plant in either the reproductive or maturity phases will likely result in the spread of seed and propagation of the invasive into larger areas or new locations.

Plant life cycles are categorized as annual, biennial, or perennial. **Annuals** complete all four growth stages in a single year. **Biennials** complete their full life cycle in two years with the seedling and vegetative phases in the first year and reproductive and maturity phases in the second. **Perennials** may complete all four phases in one year, but they live longer than two years.

Although invasive plants may have any one of these three life cycles, many are perennials with strong root systems that can spread. It is best to either control perennials in the vegetative phase or use a means to control the persistent root system.

Best Management Practices for Maintenance Operations

To learn how to control invasive plants, road crews must be able to identify the different species and know their plant biology. The Pennsylvania Noxious Weed Control Law (Act 74 of 1982 as amended) identifies 13 noxious weeds that are considered dangerous to public health, crops, livestock, agricultural land, or other property. They are marijuana, Canada thistle, multiflora rose, Johnsongrass, mile-a-minute, kudzu vine, bull thistle, musk/nodding thistle, shattercane, jimsonweed, purple loosestrife, giant hogweed, and goatsrue.

Pennsylvania has many additional non-native plant species that tend to invade roadsides and require control. Some of these species include tree of heaven (ailanthus), exotic bush honeysuckles, oriental bittersweet, poison hemlock, Japanese knotweed, narrowleaf and hybrid cattails, and phragmites. Photos, information, and BMPs for control are outlined in PennDOT Publication 756.

Many BMPs can be followed during maintenance operations to help control invasive species. Following are specific BMPs to consider:

Pre- and Post-Season Planning

- Develop a plan to identify and map roadsides with new and existing areas of invasive plants. Keep the entire crew engaged in the identification of new areas. It is much easier to eradicate a small, new area of invasives than an established, large one. Establish a schedule and prioritize your approach depending on the best time to control.
- Develop species-specific control plans that include when to use herbicides or when to mow and/or control in the vegetative phase. Repeat control for aggressive species, especially perennials.
- Monitor the areas after treatment for at least two years. Return to re-treat, as needed.

Movement and Maintenance Equipment

- If work is performed where invasives occur, bring in maintenance equipment from areas not infested with invasives whenever possible. This commonly occurs in ditch-cleaning operations.
- Use staging areas free of invasives to avoid spreading seeds or clippings.
- If working in areas with invasives, clean all equipment, clothing, and hand tools of all soil and plant material before leaving the site. Use high-pressure blowers, brushes, brooms, or water that is contained.

Mowing

- Mow invasive plants before August 7 while the plants are still growing in the vegetative phase. Basically, mow the plants before flowering and seed formation.
- Clean mowing equipment of invasive plant fragments and seeds before transporting it to a new operation.

Disposal of Plants

- Properly dispose of all cut, treated, or removed invasive plants. Options include drying, brush piling, burying, burning (check local ordinances), or treating with herbicide. Review recommended disposal options of the specific species before disposal.
- Cover invasive plant material during transport.

Some non-native plant species

Japanese knotweed

Shattercane

Purple loosestrife

Tree of heaven

that tend to invade roadsides:

Mile-a-minute

Kudzu vine

Bull thistle

Poison hemlock

Soil and Excavated Material

- Minimize soil disturbance and monitor excavation sites for emerging invasives for at least two years.
- Avoid transporting soil, fill, stone, hay, or other materials from an area known to have invasives. If you cannot verify that these materials are free of invasive plant fragments or seeds, monitor the site with this deposited material for emergence of invasives for at least two years.
- Stabilize disturbed soils as soon as practical with acceptable seeding and mulch.
- Do not use excavated material elsewhere unless it is free of invasive plant fragments or seeds.
- Wherever possible, avoid excavation in areas containing Japanese knotweed, giant knotweed, purple loosestrife, and phragmites. Plants will emerge from their root fragments.
- Stockpile any excavated material containing invasive species on an impervious surface until the plant material is destroyed.
- Whenever transporting soil or fill materials containing invasives, cover the load during transport.

Remember that invasive plant species crowd out and prevent the growth of native plants, which eliminates habitat for both native plants and wildlife. Roadsides provide a desirable habitat for invasive plants due to ample sunshine, disturbed and bare soils, and moist drainage channels. If bare areas are present or if vegetation is eliminated due to herbicide treatments, it is important to reestablish desirable vegetation, such as turf grasses or native plants, before non-native plants invade the area.

Most invasives are extremely viable by producing abundant seeds, spreading root systems, and rooting plant fragments. Control through mowing and applying herbicide before the plants reach the reproductive and maturity phases of growth. Mowing of mature plants will only aid in the spread of viable seed.

Understanding invasive plants and their biology is essential to prevent and control them and to minimize the economic, ecological, and human health impacts that invasive species cause.

Reference materials

- Invasive Species: Laws & Regulations – Executive Order 13112
- PennDOT Publication 756, Invasive Species – Best Management Practices
- PA Department of Agriculture, Bureau of Plant Industry

Mow invasive plants when they are in their vegetative phase.

If you have any questions, you can call LTAP at 1-800-FOR-LTAP for assistance.