Invasive Plants in Your Backyard:

The Good, the Bad, and the Ugly (But not in that order)

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Objectives

- Native plants vs. non-native plants
- INVASIVE PLANTS
  - What are they?
  - Why should we care?
  - Who are they?
  - How do we deal with them?
- Native alternatives to invasive plants
- How to plan for deer impacts

What is a Native Species?

- Definition: A species that occurred in Pennsylvania before European civilization.
- Examples:
  - Eastern Hemlock (*Tsuga canadensis*)
  - Mountain Laurel (*Kalmia latifolia*)
  - Bee Balm (*Mondarda didyma*)

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How many **plant** species in PA?

- 3432 Vascular Plants in PA
  - How many are native?

    2151

    28% of native species are listed as **Endangered, Threatened, or of Conservation Concerns in PA.**
  - Leaves **1281 or 37%** plant species **not native** to PA.
- Not all non-native species are bad!

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What is an **invasive species**?

- Non-native species that causes **harm to the environment, economy, or human health**
- Considered #2 threat to biodiversity after direct habitat loss.
- DCNR recognizes 85 invasive species and 25 species on an ‘invasive watch’ list

Purple Loosestrife
(*Lythrum salicaria*)

Japanese Barberry
(*Berberis thunbergii*)

Burning Bush
(*Euonymus alatus*)

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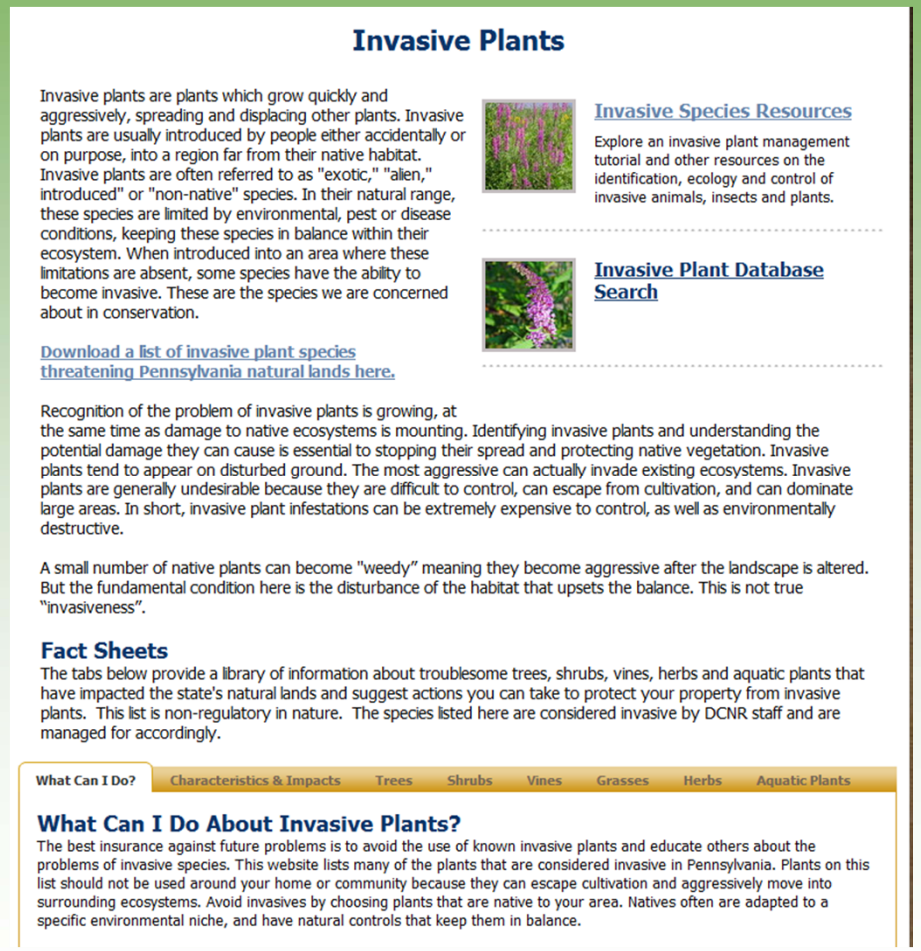
www.dcnr.state.pa.us/forestry/plants/invasiveplants/index.htm



Invasive Plants

Invasive plants are plants which grow quickly and aggressively, spreading and displacing other plants. Invasive plants are usually introduced by people either accidentally or on purpose, into a region far from their native habitat. Invasive plants are often referred to as "exotic," "alien," introduced" or "non-native" species. In their natural range, these species are limited by environmental, pest or disease conditions, keeping these species in balance within their ecosystem. When introduced into an area where these limitations are absent, some species have the ability to become invasive. These are the species we are concerned about in conservation.

Download a list of invasive plant species threatening Pennsylvania natural lands here.

Invasive Species Resources

Explore an invasive plant management tutorial and other resources on the identification, ecology and control of invasive animals, insects and plants.

Invasive Plant Database Search

Recognition of the problem of invasive plants is growing, at the same time as damage to native ecosystems is mounting. Identifying invasive plants and understanding the potential damage they can cause is essential to stopping their spread and protecting native vegetation. Invasive plants tend to appear on disturbed ground. The most aggressive can actually invade existing ecosystems. Invasive plants are generally undesirable because they are difficult to control, can escape from cultivation, and can dominate large areas. In short, invasive plant infestations can be extremely expensive to control, as well as environmentally destructive.

A small number of native plants can become "weedy" meaning they become aggressive after the landscape is altered. But the fundamental condition here is the disturbance of the habitat that upsets the balance. This is not true "invasiveness".

Fact Sheets

The tabs below provide a library of information about troublesome trees, shrubs, vines, herbs and aquatic plants that have impacted the state's natural lands and suggest actions you can take to protect your property from invasive plants. This list is non-regulatory in nature. The species listed here are considered invasive by DCNR staff and are managed for accordingly.

What Can I Do? | Characteristics & Impacts | Trees | Shrubs | Vines | Grasses | Herbs | Aquatic Plants

What Can I Do About Invasive Plants?

The best insurance against future problems is to avoid the use of known invasive plants and educate others about the problems of invasive species. This website lists many of the plants that are considered invasive in Pennsylvania. Plants on this list should not be used around your home or community because they can escape cultivation and aggressively move into surrounding ecosystems. Avoid invasives by choosing plants that are native to your area. Natives often are adapted to a specific environmental niche, and have natural controls that keep them in balance.

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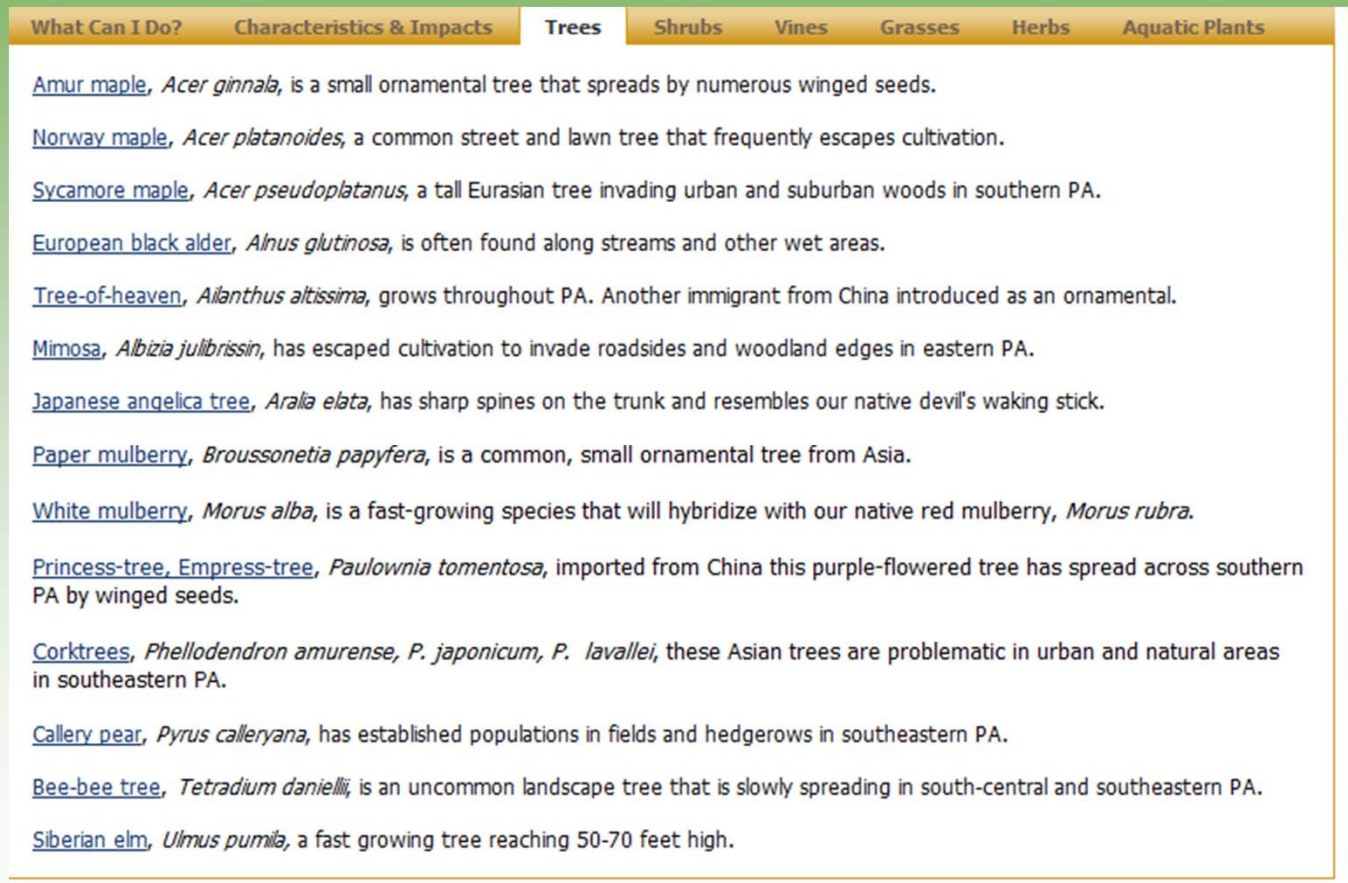

What Can I Do? | Characteristics & Impacts | **Trees** | Shrubs | Vines | Grasses | Herbs | Aquatic Plants

Amur maple, *Acer ginnala*, is a small ornamental tree that spreads by numerous winged seeds.

Norway maple, *Acer platanoides*, a common street and lawn tree that frequently escapes cultivation.

Sycamore maple, *Acer pseudoplatanus*, a tall Eurasian tree invading urban and suburban woods in southern PA.

European black alder, *Alnus glutinosa*, is often found along streams and other wet areas.

Tree-of-heaven, *Ailanthus altissima*, grows throughout PA. Another immigrant from China introduced as an ornamental.

Mimosa, *Albizia julibrissin*, has escaped cultivation to invade roadsides and woodland edges in eastern PA.

Japanese angelica tree, *Aralia elata*, has sharp spines on the trunk and resembles our native devil's waking stick.

Paper mulberry, *Broussonetia papyfera*, is a common, small ornamental tree from Asia.

White mulberry, *Morus alba*, is a fast-growing species that will hybridize with our native red mulberry, *Morus rubra*.

Princess-tree, Empress-tree, *Paulownia tomentosa*, imported from China this purple-flowered tree has spread across southern PA by winged seeds.

Corktrees, *Phellodendron amurense, P. japonicum, P. lavallei*, these Asian trees are problematic in urban and natural areas in southeastern PA.

Callery pear, *Pyrus calleryana*, has established populations in fields and hedgerows in southeastern PA.

Bee-bee tree, *Tetradium daniellii*, is an uncommon landscape tree that is slowly spreading in south-central and southeastern PA.

Siberian elm, *Ulmus pumila*, a fast growing tree reaching 50-70 feet high.

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Invasive Plants in Pennsylvania

Tree of Heaven

Ailanthus altissima

Photo: Jessica Sprajcar, DCNR

Background:

Also known as Chinese sumac, stinking sumac and tree of hell, this tree is native to China. It was brought to Philadelphia in 1784 by an amateur gardener. By 1840 it was commonly available from nurseries. Ailanthus is the subject of the well known book, "A Tree Grows in Brooklyn," by Betty Smith.

Range:

Tree of heaven is very common in the northeast and Midwest, through parts of the southeast, southwest and west coast.

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Description:

This rapidly growing tree can reach a height of 80 feet, with up to a six-foot diameter trunk. Leaves are pinnately compound with 10 to 41 leaflets with smooth leaf margins. When crushed, the leaves and other plant parts have a rancid smell like cat urine or burnt peanut butter.

Photo: Chuck Bargeron, U. Of Georgia, www.invasive.org

Flowering occurs in early summer, when large clusters of yellowish flowers develop above the leaves. Fruit produced on the female trees are tan to reddish, single winged, papery seeds, called samaras. They may remain on the tree throughout late fall.

Habitat:

Ailanthus is extremely tolerant of poor soils and will even grow through cracks in pavement. Trees are not shade tolerant. They will quickly colonize forest edges, fields and roadsides.

Biology and Spread:

Tree of heaven spreads by hundreds of thousands of seeds per tree and through vegetative sprouting. A cut or injured ailanthus tree may send up dozens of root suckers and resprouts, creating large clonal colonies.

Ecological Threat:

This tree produces chemicals in its roots that prevent the establishment of other plant species nearby. Its fast growth limits habitat for other species. Its root system may be extensive and has been known to cause damage to sewer lines and building foundations.

Photo: Leslie Mehrhoff, U. of Connecticut, www.invasive.org

Look-A-Likes:

The native trees most likely to be confused with ailanthus are the sumacs (*Rhus* spp.). One way to tell them apart is the small glands on the underside of ailanthus leaves (*see photo below*). Staghorn sumac leaves do not have this gland, but have toothed leaf margins, while ailanthus' leaf edges are smooth. Sumac fruits are fuzzy and red.

Photo: James Miller, USDA Forest Service, www.invasive.org

Young ailanthus may also be confused with black walnut (*Juglans nigra*) because of the compound leaves and shield-shaped leaf scars. However, the flowers, seeds and smell of ailanthus should give it away.

Photo: John Cardina, The Ohio State University, www.forestryimages.org

How to Control this Species:

Elimination of this species is difficult and time consuming, due to its abundant seed, high germination rate, and frequent root sprouts.

Manual and Mechanical

While young seedlings could be pulled or dug up, the chance of getting all root fragments is difficult and can lead to re-sprouts. Seedlings can be confused with root suckers, which would be nearly impossible to remove effectively by hand.

Cutting is not recommended, as the trees will send up large numbers of root sprouts and suckers, creating a bigger problem than before.

Chemical

The most effective way to treat ailanthus is with herbicides. Foliar application of triclopyr or glyphosate, mixed with water and a non-ionic surfactant, is effective on smaller trees when applied between June and late August.

For larger trees, application of triclopyr or glyphosate with the basal bark, hack and squirt, injection or cut stump method should work effectively. Application rates may vary—see the references below for more specific information.

Follow-up monitoring and treatment are very important. Regardless of the control method used, treated areas should be checked one or more times a year.

References:

Plant Conservation Alliance's Least Wanted List:
http://www.nps.gov/plants/alien/fact/aial1.htm

Center for Invasive Species and Ecosystem Health:
http://www.invasive.org/browse/subinfo.cfm?sub=3003

Virginia Cooperative Extension:
http://pubs.ext.vt.edu/420/420-322/420-322_pdf.pdf

For More Information:

Penn State University Vegetation Management Publications:
http://horticulture.psu.edu/research/labs/vegetative-management/publications

http://horticulture.psu.edu/research/labs/vegetative-management/publications

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Invasive Plant Management Tutorial

Invasive plants are those that are not native to an area and can cause harm to the environment, to the economy or to human health. While not all non-native plant species are invasive, some can really do damage to our public and private lands. Invasive plants are highly adaptable to different habitats, grow quickly or produce abundant seeds, are difficult to eradicate and can negatively impact our native species. This tutorial provides a "one-stop shop" for anyone who is interested in preventing, managing and controlling invasive plants.

What is an Invasive Species?

Here you will find a basic definition of an invasive and the characteristics that make it so.

Impacts of Invasive Plants

Invasive plants are a considerable threat to biodiversity and the economy.

Prevention and Early Detection

The most effective and economical approach to managing invasive plants is to prevent their invasion in the first place. A sound early detection program can help you prevent serious infestations.

Laws and Regulations

Some invasive plants are regulated species. Be sure you know what you are dealing with and what laws pertain to the species before any management takes place.

Management Tools

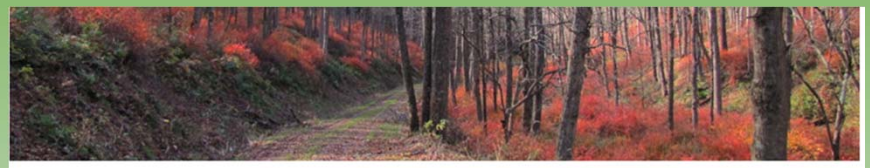
There are a variety of ways to control invasive plants and the tools will depend on the species. Learn about your options here.

Management Planning

Management plans help you determine a time schedule for control work, choose the most effective tools, and make better use of your time.

Restoration

Ecological restoration is an intentional activity that initiates or accelerates the recovery of an ecosystem with respect to its health and integrity.



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Management Tools

After you assess which invasive plant species to target for management, the next step is to evaluate options for control. There are a number of tools available. They include everything from manually or mechanically removing plants to using biocontrol methods or chemicals. Understanding the biology of the targeted plant, as well as its population size, degree of threat and tools that have proven successful by other practitioners should all play in to your decision of what tools to use. In most cases, more than one tool will be necessary to control your target.

Mowing | Pulling | Prescribed Fire | Soil Covers | Chemical | **Biocontrol** | Grazing | Aquatic Plants

Biocontrol

Biological control is the use of animals, fungi or other microbes to feed upon, parasitize or otherwise interfere with a targeted invasive species. Successful biocontrol programs usually significantly reduce the abundance of the invasive, but in some cases, they simply prevent the damage caused by the species without reducing overall abundance. Biocontrol is often viewed as a progressive and environmentally friendly way to control pest organisms because it leaves behind no chemical residues that might have harmful impacts on humans or other organisms, and when successful, it can provide essentially permanent, widespread control with a very favorable cost-benefit ratio.

Successful biocontrol projects reduce the abundance or impacts of the targeted species to acceptable levels across large areas. Use of biocontrol agents should be approached with caution, however, due to concerns that biocontrol agents may attack and damage populations of non-target native species. If a biocontrol agent does in fact attack any native non-target species, its persistence and ability to spread to areas far from release sites become serious liabilities. While biocontrol offers great promise, it will provide long-term benefits to natural areas and biodiversity preservation only if it is practiced carefully and its potential risks are fully recognized and addressed.

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Characteristics of Invasive Species

- Competitive advantage
  - No predators, high reproduction rates, leaf out early, mature/grow fast
- Tolerant of disturbed landscapes and wide variety of environments
- Spread easily by humans, wildlife, or other means

Impacts from Invasive Species

- Ecological
  - Loss of native vegetation, wildlife habitat, soil/water quality

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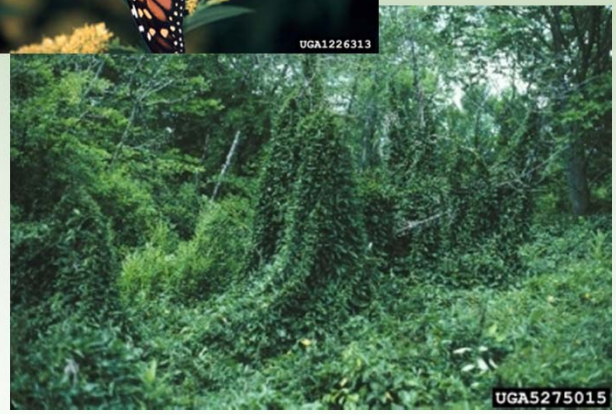
Impacts from Invasive Species

- Ecological
  - Loss of native vegetation, wildlife habitat, soil/water quality



Swallow-worts are toxic to wildlife and Monarch butterflies.

Invasive honeysuckles do not provide migrating birds with proper protein.

Garlic mustard interrupts with the life cycle of the rare West Virginia White butterfly.

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Impacts from Invasive Species

- Economic
  - Loss in agricultural productivity, fish and game habitat, natural resources, property value, recreation

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Impacts from Invasive Species

- Public Safety
  - Poisonous plants, encroach on infrastructure, increase fire risk

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PREVENTION IN PLANTING!

- Know your invasive species and avoid using in the landscape.
- Know where they occur and eradicate.
- Avoid unnecessary disturbance.
- Don’t bring in or spread.
- Plant and encourage desired species.

Invasive Plants: Meet the Culprits

- The first step to prevention or management is knowing how to identify invasive species and where they occur on your property.

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Japanese Stiltgrass

- Extremely prevalent along forest roads and other disturbed areas.
- Spreads through active management.
- Distinguished by silver stripe down middle of leaf.

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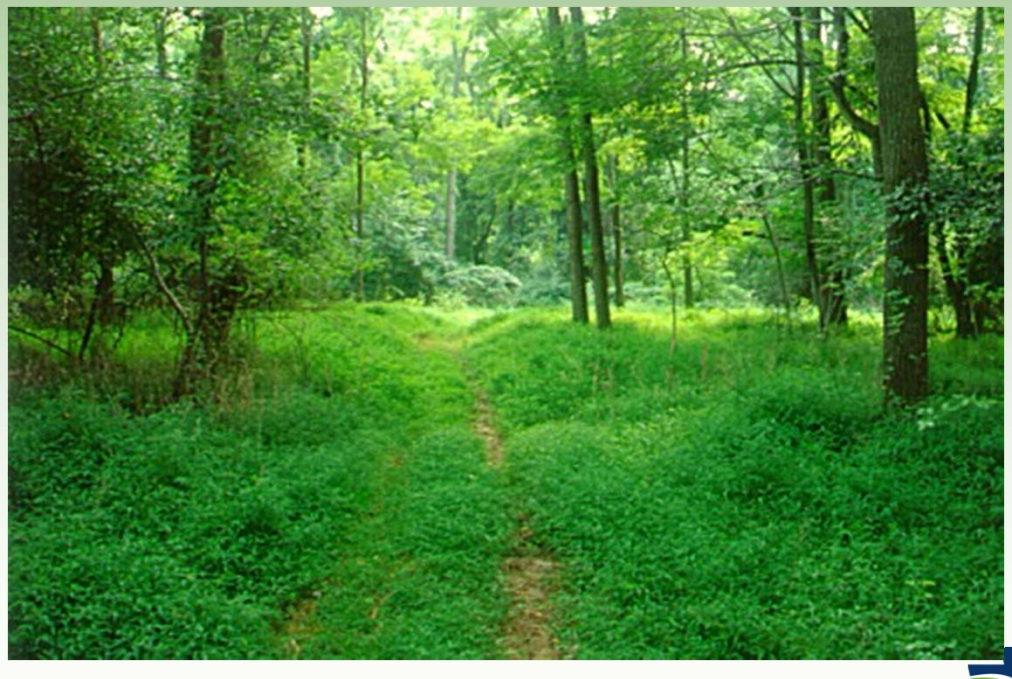
Japanese Stiltgrass

- May change soil chemistry!
- May alter fire regimes!
- May arrest regeneration or succession!



Japanese Stiltgrass

- Annual species; sprouts from seed every year. Seeds don’t mature until late summer/early fall.
- Spreads easily through disturbance and movement by humans. MAP AND PLAN!!!

Japanese and Giant Knotweed

- Hollow, bamboo-like stems. Dies back every winter.
- Very persistent sprouter and seeder.

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Japanese and Giant Knotweed

- Once used in bank stabilization, but actually causes bank degradation.
- Thickets limit the ability of other species to grow (except garlic mustard).

Japanese and Giant Knotweed

- This one takes time, patience and vigilance to manage.
- Very difficult to kill in one treatment.
- Cut June 1, treat with herbicide 8 weeks later, repeat.

Garlic Mustard

- Shade-tolerant in forests.
- First year produces evergreen rosettes. Second year bolts to with flowering stalk.
- Clusters of white, cross-shaped flowers.
- Garlic odor when crushed

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Garlic Mustard

- Not favored forage by wildlife.
- Changes soil chemistry. May alter regeneration development and understory floral communities.
- Alters life cycle of rare WV white butterfly.

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Garlic Mustard

- Once confident with identification, treatment with herbicides on first year rosette during winter months to avoid injuring non-target plants.
- Pulling effective *before* going to seed and with proper disposal.

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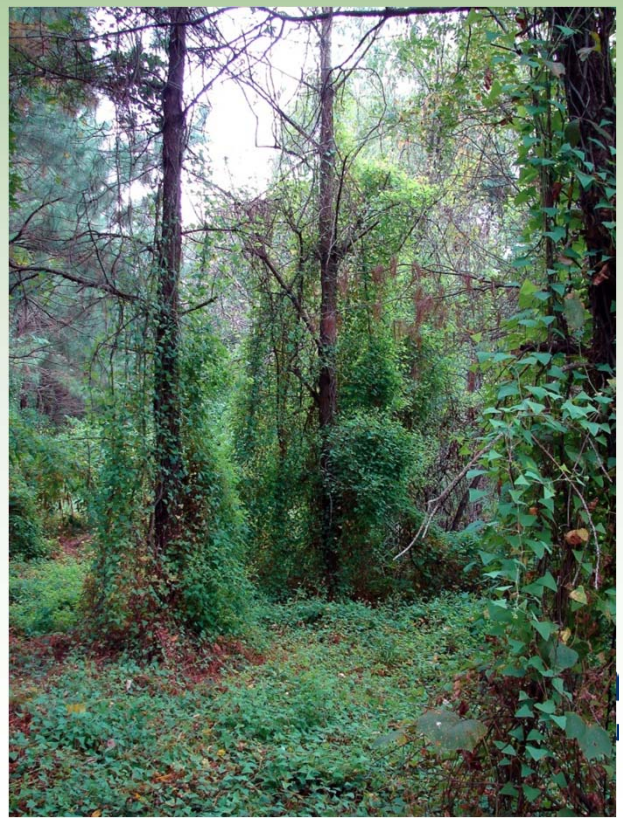
Mile-a-minute

- Prevalent in the south and moving north.
- Annual vine with distinct equal-sided triangular leaves.
- ‘Prickles’ on stem – difficult to pull and work in.
- Develop clusters of blue berries that the birds love.

Mile-a-minute

- Can be detrimental on native flora and regeneration.
- Often stimulated by timber harvests or other disturbances

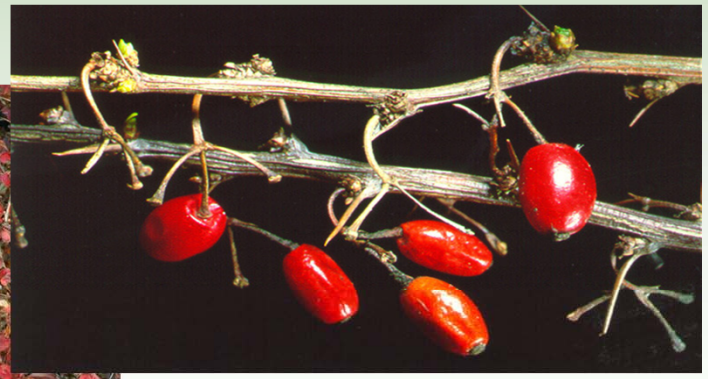


Mile-a-minute

- Need to kill before it goes to seed!
- Pre-emergent in March or post emergent before July 1. Follow up for several years.
- Pulling effective, but wear gloves!
- Weevils…

Japanese Barberry

- Shade-tolerant, thorny shrub that can dominate forest understories.
- Dark purple foliage in fall with bright red berries persisting through winter (birds!).
- Seeds can persist in soil for 80 years!



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Japanese Barberry

- Changes forest structure and may increase predation of game bird poults.
- Increases tick density and Lyme disease occurrence in ticks.
- Changes soil chemistry and decomposition rates

Japanese Barberry

- Relatively easy to kill with herbicide.
- Watch for sprouting seedlings.
- Pulls out of ground easily, also.
- May take years to restore sites…

Ailanthus, Tree-of-Heaven

- Readily sprouts from cutting or disturbance. Heavy seeder as well.
- Stinky peanut butter odor.

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Ailanthus, Tree-of-Heaven

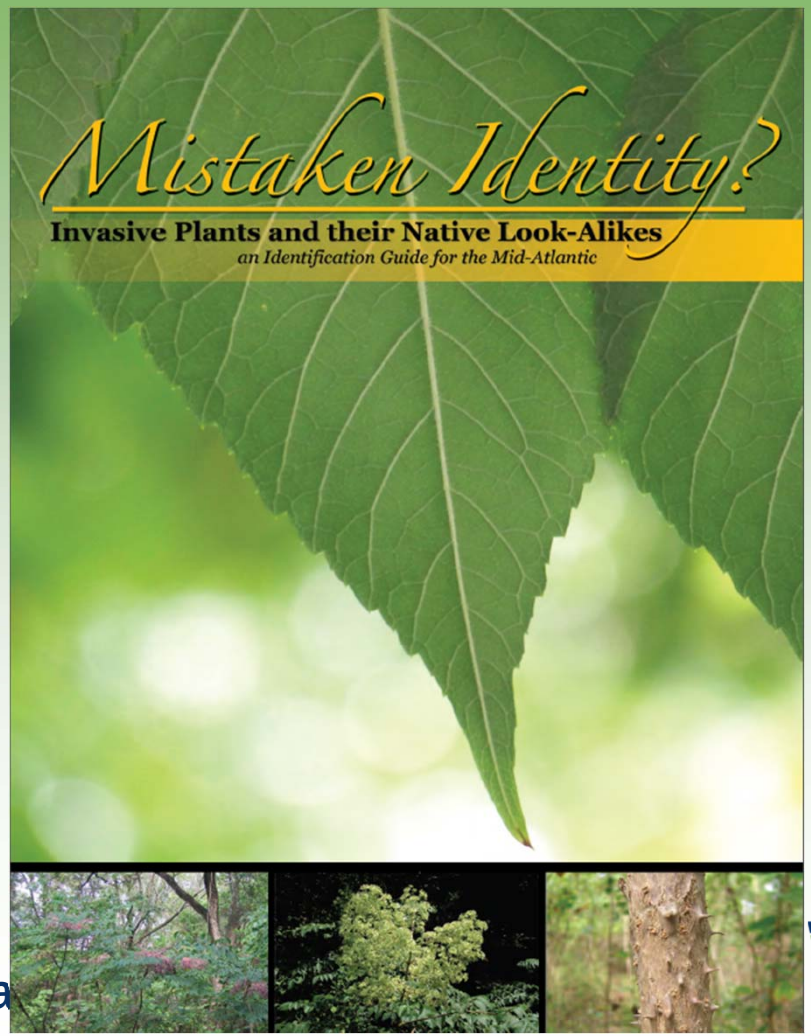
- Can form dense monocultures.
- May change soil chemistry.
- Limited to no wildlife benefit.
- ‘A Tree Grows in Brooklyn’

Ailanthus, Tree-of-Heaven

- Cutting/pulling will just make this mad!
- Need to kill the roots. Stem (hack and squirt) treatments work best.
- Verticilium wilt also killing naturally!

Invasive Plant Look Alikes

www.nybg.org/files/scientists/rnaczi/Mistaken_Identity_Final.pdf



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Invasive Plant Look Alikes

www.nybg.org/files/scientists/rnaczi/Mistaken_Identity_Final.pdf

Invasive

TREE-OF-HEAVEN

Ailanthus altissima
Quassia Family (Simaroubaceae)

Broadleaf Deciduous Tree

Flowers: Jun–Aug
Fruits: Jul–winter
Native Range: China
Introduction: to Philadelphia in 1748 by a gardener.

Mid-Atlantic Range & Habitats: Disturbed forests, forest edges, old fields, roadsides, urban areas, widespread, in a wide range of soils.

Ecological Impacts:

Tree-of-heaven releases chemicals into the soil that inhibit the growth of other plants. At the same time, the rapidly growing tree quickly reduces light availability to plants growing beneath it. *Ailanthus* has also been shown to change nutrient cycling and availability in invaded forests. Female trees produce huge numbers of windborne seeds.

Quick ID:

1. Leaves	Leaflets entire except for one to several broad, rounded teeth at base; underside of leaflet with a round, thickened spot (a gland) near the base of each tooth
2. Fruit	Large cluster of winged samaras
3. Odor	Leaves and stems of plant with a strong, unpleasant odor when crushed or bruised

More ID Tips:

Ailanthus has clear sap, whereas the *Rhus* species have milky, sticky sap. The young stems and petioles of *Ailanthus* are hairless. Smooth Sumac has hairless but glaucous stems and petioles and those of Staghorn Sumac are covered in dense hairs. The undersides of the leaflets of both species of sumac are whitish, compared to the green or light green of *Ailanthus*. The thin gray bark of Tree-of-heaven is distinctive, with diamond-shaped markings on younger trees, and pale vertical lines on older trees. The bark of the sumacs is very smooth with narrow horizontal markings. Sumacs do not grow more than 10 m tall, whereas Tree-of-heaven grows to a height of 25 m.

Native

STAGHORN SUMAC and SMOOTH SUMAC

Rhus typhina, R. glabra
Cashew Family (Anacardiaceae)

Broadleaf Deciduous Trees

Flowers: Jun–Jul
Fruits: Jul–winter

Mid-Atlantic Range & Habitats: Dry soils of forest edges, hedgerows, roadsides, old fields. Both species are widespread in the region, but generally less common on the Coastal Plain where the distinctive Winged Sumac (*Rhus copallinum*) is the more common species.

Ecological Value:

Sumacs are important winter food for grouse, turkey and other game birds, as well as many species of songbirds, especially robins and bluebirds. Rabbits and deer browse the foliage, while the fruits are readily consumed by squirrels. Sumacs are also important species for bees and other insects, providing pollen and nectar in the flowers and nesting sites in the stems.

Quick ID:

1. Leaves	Leaflets with small, sharp teeth along their edges; no gland on underside of leaflet
2. Fruit	Cluster of red, hairy fruits
3. Odor	No strong unpleasant odor

Other Similar Species:

Tree-of-heaven resembles Ashes (*Fraxinus spp.*), Black Walnut (*Juglans nigra*), and Buttemut (*Juglans cinerea*). The simplest character that distinguishes Tree-of-heaven from these species is its distinctive strong odor. In addition, the *Juglans* species have toothed leaflets and the fruit is a hard nut. The *Fraxinus* species have compound leaves that are opposite, rather than alternate, on the stem.

PREVENTION IN PLANTING!

- Know your invasive species and avoid using in the landscape.
- Know where they occur and eradicate.
- Avoid unnecessary disturbance.
- Don’t bring in or spread.
- Plant and encourage desired species.

Know where they occur

- Make a map of your property that highlights areas where invasive plants are known to occur
- Check surrounding properties for invasive plant presence when possible
- Utilize free online tools (eddmaps.org)

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EDDMapS (eddmaps.org)

- ***Free*** online service to document invasive species.

EDDMapS (eddmaps.org)

- Easy to enter invasive species information
  - Species
  - Infested and gross area
  - Habitat
  - Canopy closure
  - Density
  - Plant state (maturity)
  - Location (County, lat/long, description, ownership, etc.)
  - Images
  - Additional info

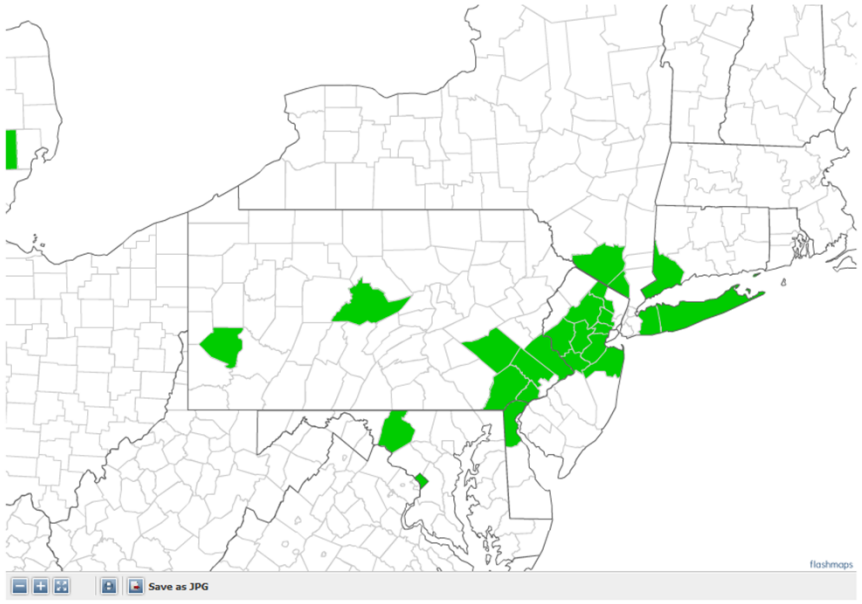
EDDMapS (eddmaps.org)

Japanese angelica tree

***Aralia elata* (Miq.) Seem**

USDA PLANTS Symbol: AREL8
Invasive Plant Atlas

Distribution Maps: Points on Google Maps

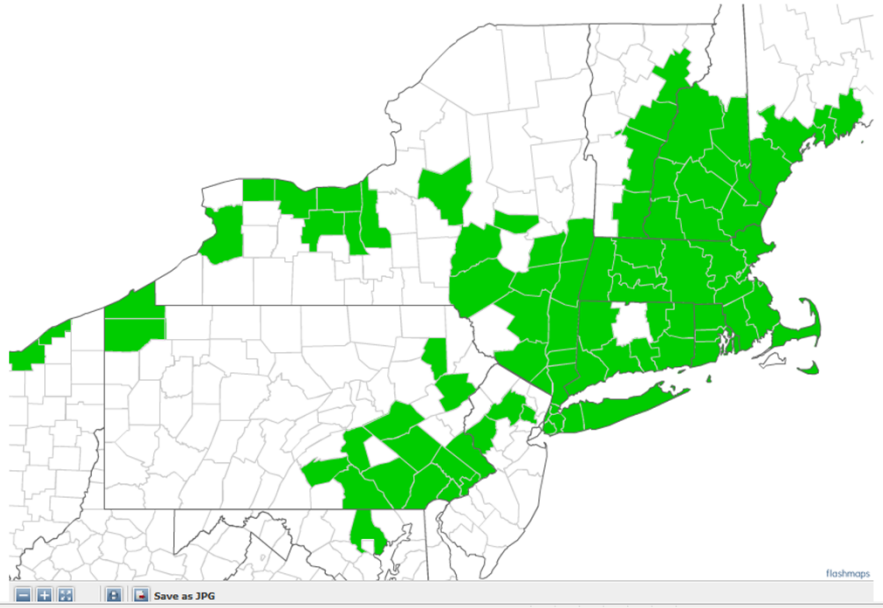


Black dog-strangling vine, black swallowwort

***Cynanchum louiseae* Kartesz & Gandhi**

USDA PLANTS Symbol: CYLO11
Invasive Plant Atlas

Distribution Maps: Points on Google Maps



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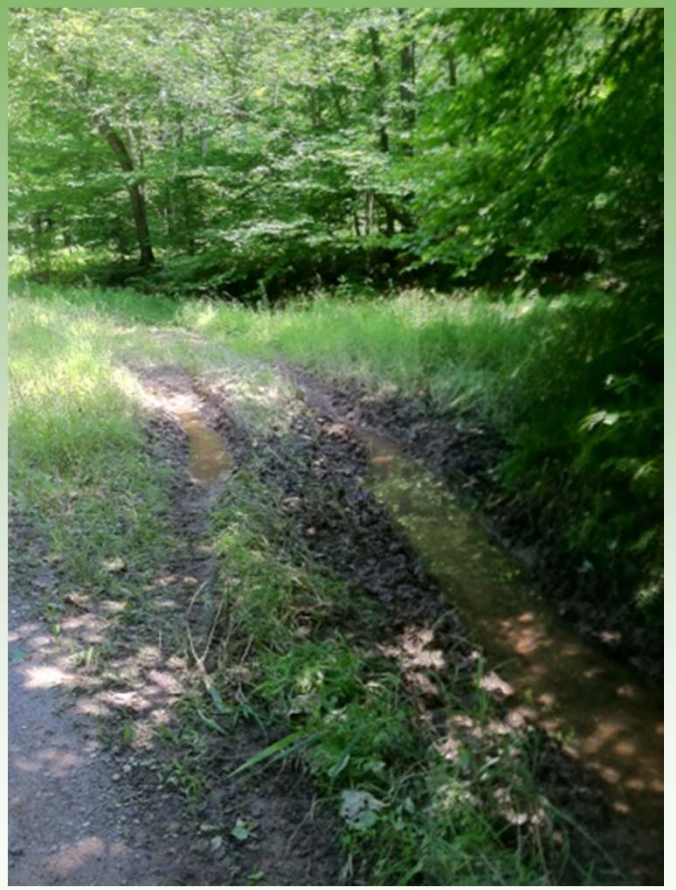
Avoid unnecessary disturbance

- Limit ground disturbances whenever possible
- Provide protection to native species when possible
- Seed disturbed areas with appropriate species



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Don’t Bring In or Spread

- Don’t intentionally introduce!
- Check sources of materials for invasive plant presence - soil, mulch, seed, etc.
- Clean equipment that was in heavily infested areas
- Pre-treat heavily infested areas with herbicide.

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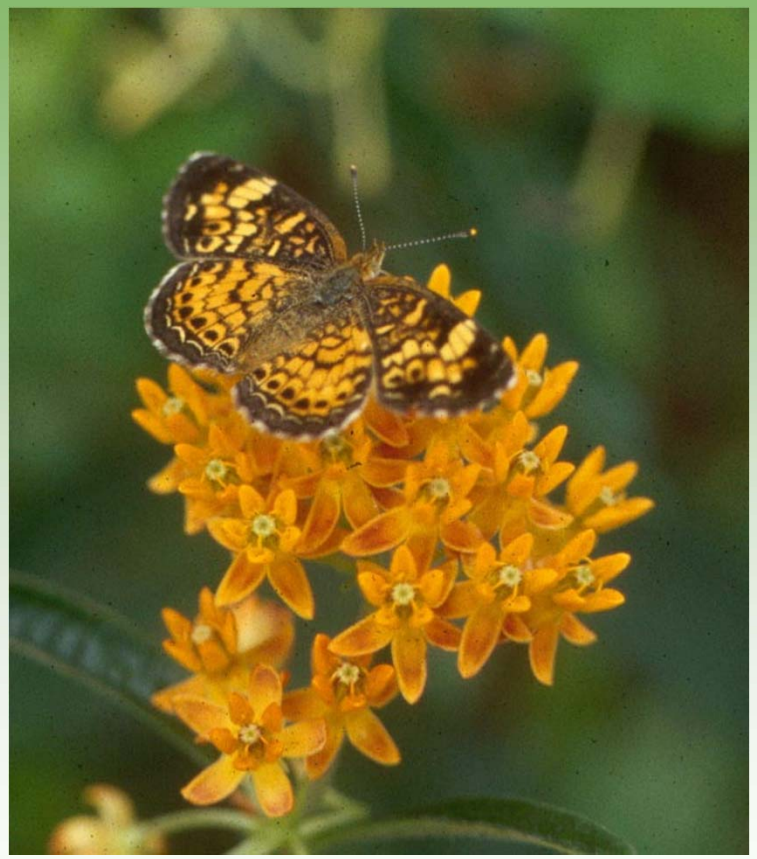
Plant and Encourage Desired Species

- Better adapted to particular habitats.
- Serve as host plants or food for native butterflies and other beneficial insects.
- Rich food source for birds and wildlife.
- Fertilizers and soil amendment needs may be minimal.
- General increase in native diversity.



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Choosing Native Species

www.dcnr.state.pa.us/forestry/plants/nativeplants/index.htm

DCNR Home : Forestry : Wild Plants : Native Plants

Landscaping with Native Plants

A native plant is one which occurred within this region before settlement by Europeans. Native plants include ferns and clubmosses; grasses, sedges and rushes; perennial and annual wildflowers; and the woody trees, shrubs, and vines which covered "Penn's Woods" when the first settlers arrived. There are over 2,100 native plant species known in Pennsylvania.

An introduced or non-native plant is one that has been brought into the state and escaped cultivation to become established in the wild. At the turn of the 21st century, about 1,300 species of nonnative plants existed in Pennsylvania outside of gardens, parks and agricultural lands. That is 37 percent of Pennsylvania's total wild plant flora. More introduced plants are identified every year.

Six Basics of Plant Conservation

1. Protect native plant communities and minimize habitat destruction

The most important guideline is to conserve already existing areas of native vegetation as a whole, functioning unit. The easiest, least expensive, and best way to conserve Pennsylvania's plant heritage is to protect existing native plant communities from further disturbance. If disturbance is necessary, strive for minimum habitat destruction. In some cases ecological restoration may be necessary, which can include planting native species, removing invasive introduced species, controlling erosion and loosening soil compaction.

Native Plants for Your Garden

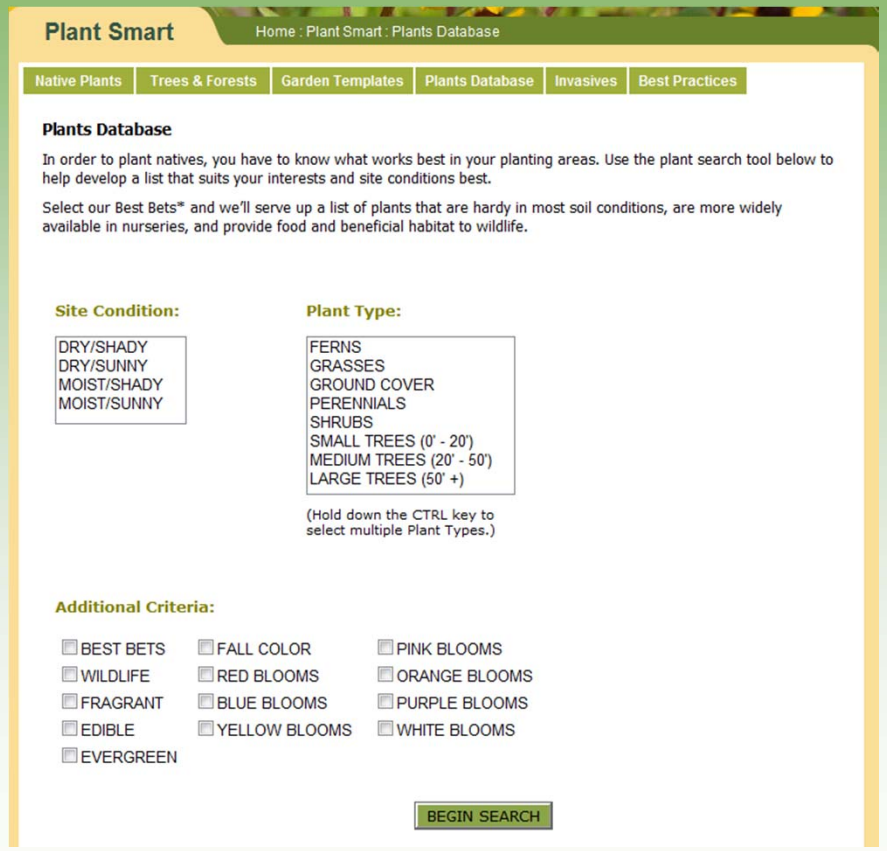
Choose the best native plants for your garden conditions using DCNR's interactive plant selection resources.

Native Plant Publications

Access lists of wildflowers and trees for different conditions: shady-dry; shady-moist; sunny-dry; sunny-moist. Download the Landscaping with Native Plants brochure.

Buy Native Plants

Find nurseries throughout the state that specialize in native species.



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A Few ‘Good’ Native Plants

- Northern red oak (*Quercus rubra*)
  - Good for providing wildlife habitat and food
  - Well-adapted to conditions across PA

A Few ‘Good’ Native Plants

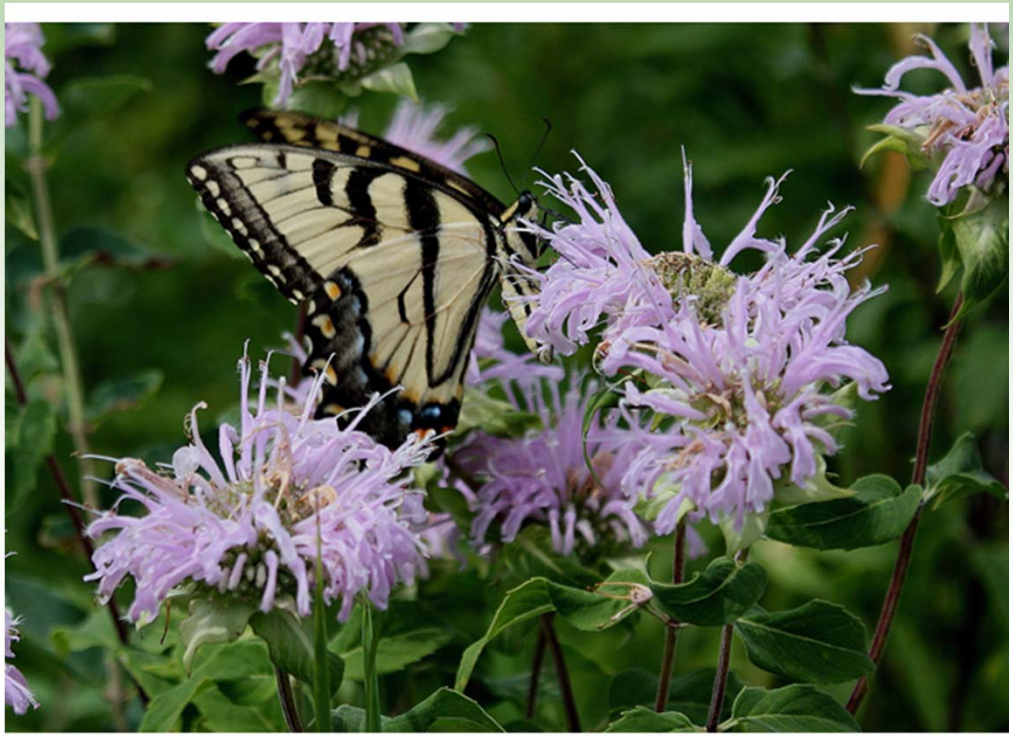
- Serviceberries (*Amelanchier* spp.)
  - Great food source for birds
  - Beautiful spring flowers and fall color

A Few ‘Good’ Native Plants

- New Jersey tea (*Ceanothus americanus*)
  - Striking white flowers in spring
  - Important host plant for butterflies

A Few ‘Good’ Native Plants

- Bee-balm (*Monarda fistulosa*)
  - Fragrant foliage, nectar-producing flowers
  - Tolerant of different soil conditions



A Few ‘Good’ Native Plants

- Little bluestem (*Schizachyrium scoparium*)
  - Tolerates poor soils
  - Nice winter accent foliage

Thank You!!!

Questions?

Feel free to contact me for more information or help with native plantings.

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DCNR Invasive Plant Page:

www.dcnr.state.pa.us/forestry/plants/invasiveplants/index.htm

Mistaken Identity:

www.nybg.org/files/scientists/rnaczi/Mistaken_Identity_Final.pdf

DCNR Native Plants:

www.dcnr.state.pa.us/forestry/plants/nativeplants/index.htm

Mapping:

www.eddmaps.org