Controlling Invasive Plants in Small Woodlots

American Tree Farm System
Webinar
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Standard 5: Fish, Wildlife, and Biodiversity

Performance Measure 5.3

- Forest owner should make practical efforts to prevent, eradicate, or otherwise control invasive species.

Indicator 5.3.1

- Forest owner should make practical efforts to prevent, eradicate, or otherwise control invasive species using a range of integrated pest management methods.

What We'll Cover

- Invasive plant characteristics
- Integrated control
- Herbicide application methods
- Products
- Detailed invasive plant summaries

Garlic Mustard

Definitions

- **Invasive** a plant which grows rapidly, spreads aggressively, and displaces other plants
  - Trees, shrubs, vines, grasses, and herbs
- **Non-native** - did not originally occur in the area where it is now established
- **Noxious** - a legal designation used for plants determined to be major pests of agricultural ecosystems
  - Determination made by PA Dept. of Agriculture

Noxious Weed Control Law

- PA Department of Agriculture
- "Noxious Weed" A plant that is determined to be injurious, to public health, crops, livestock, agricultural land or other property.
- Unlawful to sell, transport, plant, or otherwise propagate
- Control orders can be issued

Multiflora rose	**Purple Loosestrife**
Mile-a-minute vine	**Canadian thistle**

Invasive Plant Characteristics

- **Reproduce prolifically**
  - Mature quickly
  - Produce large number of seeds
  - Sprout easily

Oriental bittersweet

- **Spread aggressively over large areas**
  - By seeds, roots, and shoots
  - Seed disperses from parent plant
- **Difficult to control**
  - Introduced either accidentally or on purpose far from native habitat and natural controls

Invasive Plant Impacts

- Degrade native environments
- Cause a decline in native plant species diversity
  - Reduced Biodiversity
- Impact forest regeneration success
- Loss of habitat for native wildlife
- Threaten rare species

1522 invasive terrestrial plants documented across U.S. (Center for Invasive Species and Ecosystem Health, Invasive.org, 2012)

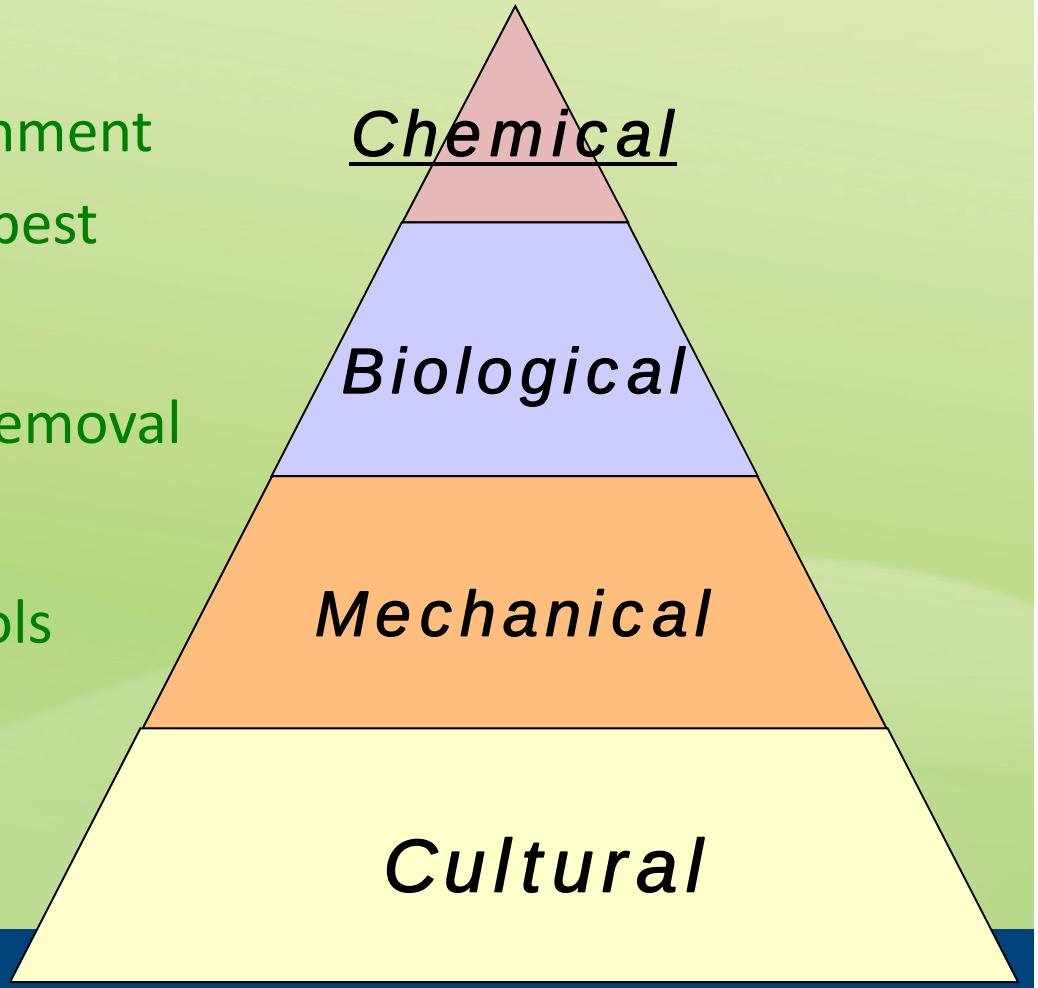
72 invasive terrestrial plants in Pennsylvania (DCNR 2012)

Estimated Cost: $34.7 billion annually in control efforts and agricultural losses (Brown University, 2000)

"Control"

Integrated Vegetation Management (IVM)

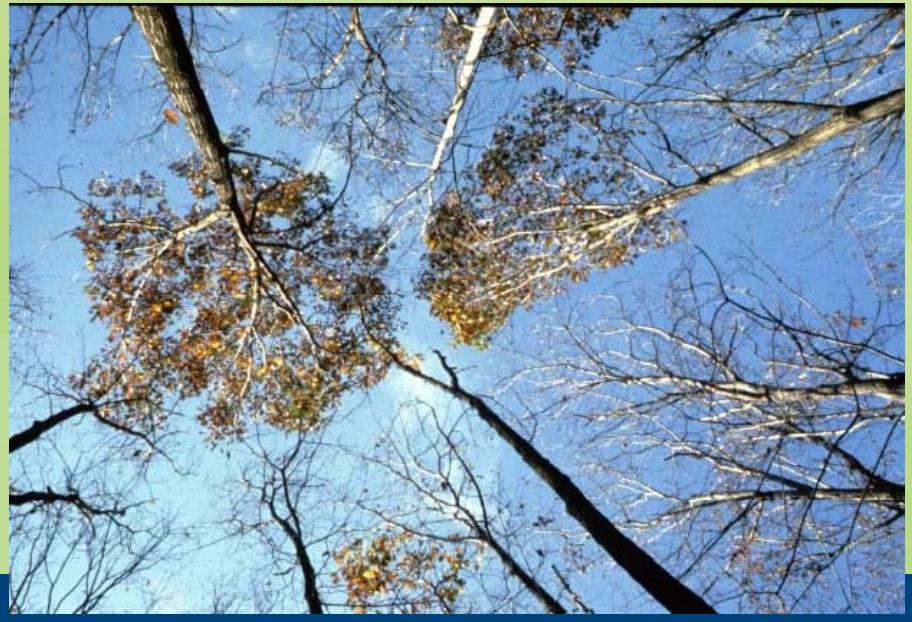
- **Cultural**
  - Making the environment unsuitable for the pest
- **Mechanical**
  - Hand or machine removal
- **Biological**
  - Natural pest controls
- **Chemical**
  - Pesticides



Cultural Control

"Indirect" Weed Management

- Enhance the growth of desirable plants
  - Utilize proper forest management practices
  - Reduce deer impact
- Prevent the spread of undesirable plants
  - Eliminate seed sources
  - Plant natives
  - Reduce seed spread
    - Clean equipment
    - Stop soil movement
  - Minimize disturbance



Mechanical Control

- Hand removal
  - Pulling
  - Cutting
- Mowing

Fecon Bull Hog

Weed Wrench

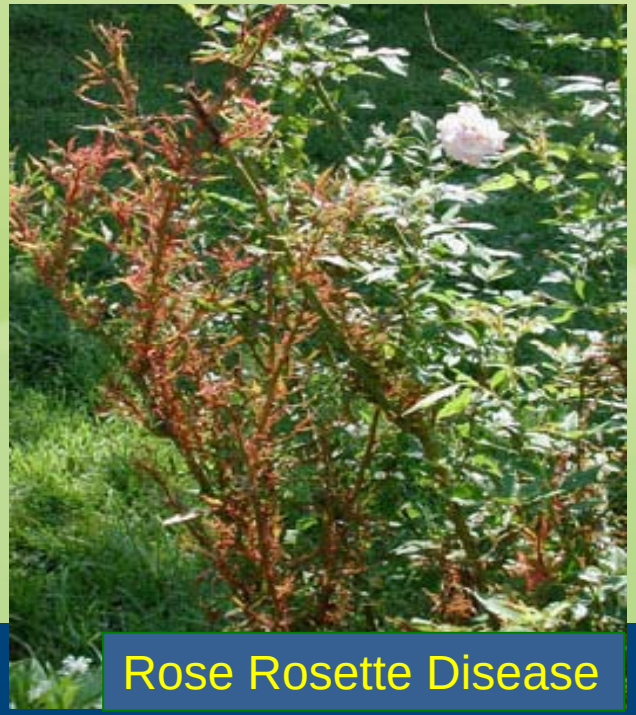
Biological Control

Natural Pest Controls

- Insects and Diseases
- Grazing by livestock

Ailanthus Wilt

"Goats in the Woods Project"



Rose Rosette Disease

Chemical Control

Herbicides

- Productive
- Economical
- Low Risk
- Effective
- Selective
- *Necessary???*

Control Principles for Invasives

- Requires Constant Surveillance
  - Right-of-ways, stream banks, roads, and trails
- Control invasives when they first appear
  - Minimizes effort and costs
  - They will spread!
- Use integrated management treatments
  - Herbicide applications often most effective
- Reestablish native plants
  - Naturally or by planting

How are forestry herbicides applied?

Application Methods

- Foliar Spot and Broadcast

- Basal Bark

- Axe Frill (Hack and Squirt)

- Stem Injection

- Stump Treatment

Application Methods

Foliar Spot & Broadcast Applications

Backpack Sprayer

Backpack Mist Blower

Even coverage, spray to wet,
do not spray to the point of runoff

ATV, truck, and tractor mounted sprayers

Basal Bark Treatments

Treating thin barked trees generally less than 6” in diameter.

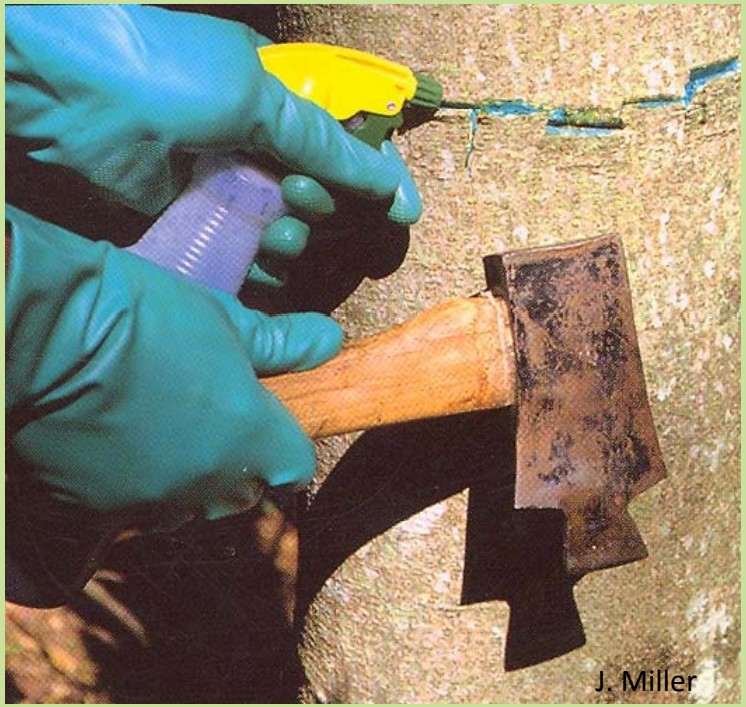
Wet lower 12”-18” of trunk completely around tree.


Basal Bark Applications
Applied any time of year, including winter months

Axe Frill (Hack & Squirt) and Stem Injection

Penetrate through bark into cambium layer

Hatchet & Spray Bottle



Control individual trees generally over 5 inches in diameter

Forestry Suppliers

Lance Type Injector

Hypo Hatchet

Stump Treatment

Used for sprout control on cut hardwood stumps.

Herbicide must be applied to freshly cut surface immediately

Monsanto

Triclopyr

2,4-D

Glyphosate

Imazapyr

Metsulfuron methyl

What Do I Use?

Sulfometuron methyl

Fosamine

Hexazinone

Picloram

Dicamba

Clopyralid

2,4-D

Triclopyr

Glyphosate

Imazapyr

Metsulfuron methyl

What Do I Use?

Sulfometuron methyl

- Labeled for use in your state
- Labeled for use in the forest or site
- Non-restricted use products

Dicamba

Clopyralid

Use Classification

Every pesticide is classified by the EPA as either **general** or **restricted** use.

- **General Use:**
  - Does not require certification when applied to property owned or rented by applicator or employer
- **Restricted Use:**
  - Requires certification
  - Contains the following statement on label:

RESTRICTED USE PESTICIDE
For retail sale to and use only by certified applicators or persons under their direct supervision and only for those uses covered by certified applicator's certification.

What to Use

- **Foliage Applications**
  - **Glyphosate**: (ex. Rodeo) – controls annual and perennial weeds, grasses, and woody plants
  - **Triclopyr**: (ex. Garlon 3A) – Controls woody plants and broadleaf weeds
  - **Sulfometuron methyl**: (ex. Oust XP) – Ferns & grasses

Trade names are used in this presentation only to give specific information. Penn State Cooperative Extension does not endorse or guarantee any product and does not recommend one product instead of another that might be similar.

What to Use

- **Cut Surface Applications**
  - **Glyphosate (ex. Rodeo)** – controls numerous woody species
  - Frill girdle
  - Hack & squirt
  - Stem injection
  - Stump treatment

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What to Use

- **Basal Bark Applications**
  - **Triclopyr (ex. Garlon 4)** – Used on thin barked trees up to 6 inches in diameter

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Herbicide Summary

http://extension.psu.edu/fvm

Rodeo

Dow AgroSciences

Common Name: Glyphosate-53.8%; Acid Equivalent: 4 lbs./gal.
Formulation: Water-soluble liquid (amine salt)
Signal Word: Caution
Toxicity: Practically nontoxic; oral LD (50): >5,000 mg/kg
Use Classification: General use
Minimum Required Personal Protective Equipment: Long-sleeved shirt, long pants, shoes, and socks
Carriers: Water
Activity: Absorbed through foliage or cut surface
Mode of Action: Inhibits production of enzyme necessary for producing essential amino acids; also inhibits synthesis of chlorophyll, causing leaves to lose color
Selectivity: Nonselective, broad-spectrum control
Precautions: Avoid herbicide contact with foliage, green stems, and exposed non-woody roots of desirable plants and trees
Application Methods: Foliar spray(aerial or ground), cut stump, stem injection, frill girdle
Uses: Controls annual and perennial weeds, grasses, vines, and woody plants; ground broadcast and spot treatments for hardwood brush and fern control; directed spray and broadcast treatments for conifer release; for use in site preparation prior to planting any tree species; may be used in and around water and wetlands found in forestry sites

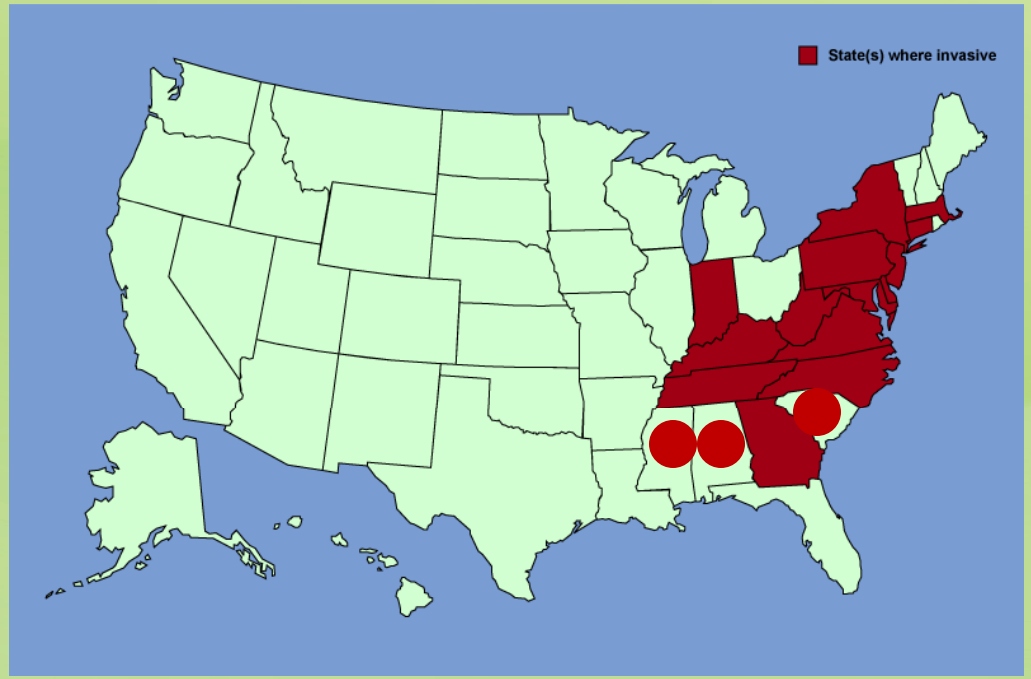
- **Japanese Stilt Grass**
  (*Microstegium vimineum)*
  - *Annual Grass*
- **Japanese Knotweed**
  (*Polygonum cuspidatum)*
  - *Perennial Forb*
- **Japanese Barberry**
  (Berberis thunbergii)
  - *Shrub*
- **Tree-of-heaven**
  (Ailanthus altissima)
  - *Tree*

Japanese Stilt Grass - Description

- Annual summer grass
- Sprawling growth habit
  - Grows 1-3 feet tall
  - Forms thick thatch
- Lance shaped pale green blade
  - 1-3 inches long
  - Mid-vein offset from center
  - Silvery hairs

Japanese Stilt Grass - Origin and Distribution

- Native to tropical Asia
- First reported in Tennessee in 1919
- Known as "*Chinese Packing Grass*"



Invasive in 18 eastern states

Japanese Stilt Grass – Site and Dispersal

- Wide variety of sites:
  - Open to shady
  - Moist to dry
- Shade tolerant
- Annual fall seeder
  - 3 year viability
- Seed moved by water and vehicle traffic
- Disturbance adapted
  - Bare ground

Japanese Stilt Grass - Control

- Mechanical
  - Hand pulling
  - Mowing to prevent seed set
  - Timing important

Japanese Stilt Grass - Control

- Chemical
  - Glyphosate (Rodeo) – non-selective
  - Pre-emergent; Sulfometuron Methyl (Oust XP) – reduce seed germination

Japanese Stilt Grass - annual grass

germination

flowering, seed ripening

Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct

Pre-emergence – Sulfometuron methyl (Oust XP)

Post- Glyphosate (Rodeo)

Targeted Pulling and Cutting

Gover

Japanese Knotweed - Description

- Herbaceous, rhizomatous, perennial
- Grows 6 to 10-plus feet
- Dense stands

Japanese Knotweed - Origin and Distribution

- Native to East Asia, imported as an ornamental in the late-1800's.
- Widespread: Newfoundland to North Carolina, Midwest and coastal areas of Pacific Northwest
- Grows almost anywhere:
  - Acidic spoil in full sun
  - Fertile, shaded alluvial soils along rivers and streams

Japanese Knotweed

Keys to Control

- Control the rhizomes, not the shoots
- Two-step control phase
- Persistence

Japanese knotweed - Control

- **Mechanical**
  - Useful in combination with herbicides
  - Not useful as ‘stand-alone’ approach
- **Cultural**
  - Ditch/roadside maintenance source of rhizome movement
- **Biological**
  - Organism screening phase

Japanese knotweed - Control

Chemical

- Pre-emergence herbicide applications
  - **NOT** an option

Japanese knotweed - Control

Chemical

- Foliar applications
  - Cut to ground June 1
  - Treat with glyphosate between July 15 and Sept. 1
  - OR, treat July 15 *and* Sept. 15
  - Retreat about July 1 of following year
  - Retreat annually as needed


12 months later
It's not over – not even close
JUL 24 2006

Japanese Knotweed - perennial forb

vegetative growth

seed ripening

Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct

Pre-herbicide cutting

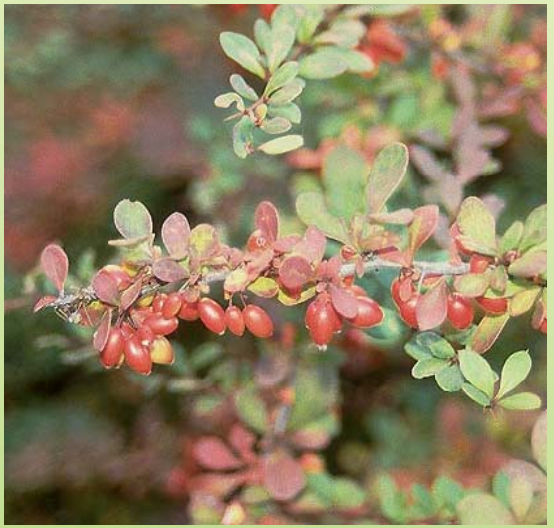
Post – cutting foliar herbicide: glyphosate

Foliar herbicide uncut plants

Gover

Japanese Barberry - Description

- Compact, spiny, deciduous shrub
- Arching branches, dense foliage
- Small rounded leaves
- Yellow flowers
- Red, oblong berries



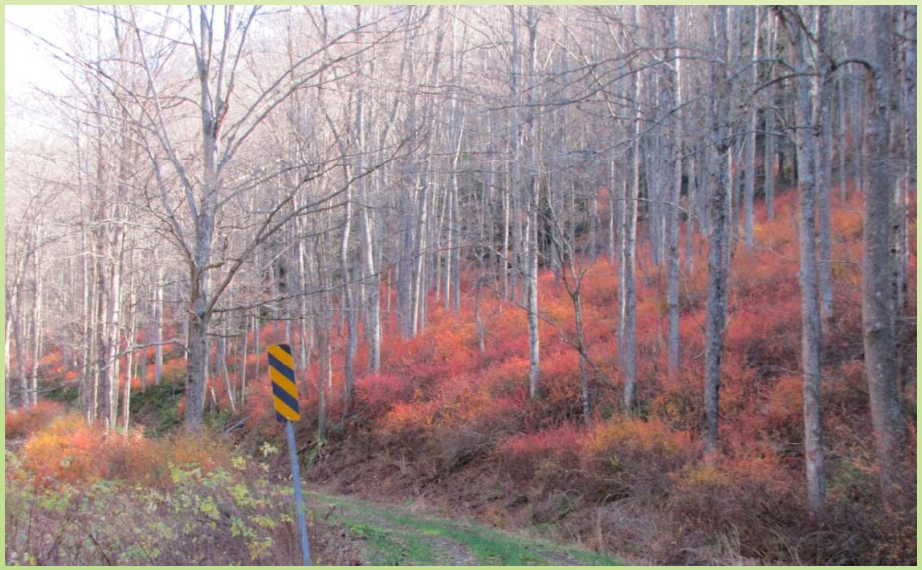
Japanese Barberry - Origin and Distribution

- Introduced from Japan around 1875
- Nova Scotia to North Carolina, west to Montana

- Ornamental shrub for hedges
- Used for wildlife plantings

Japanese Barberry - Site and Dispersal

- Most soil types
  - ridgetops to wetlands
- Full sun to full shade



- Seed is distributed by birds
- Arching branches can root

Japanese Barberry - Control

Mechanical:

- Small infestations
- Pulling or digging early in season before seed set
- Remove entire root system

Chemical:

- Foliar – Glyphosate and Triclopyr (Garlon 3A)
- Basal Stem – Triclopyr (Garlon 4)

Japanese Barberry – exotic shrub

Leaf out

flowering, seed ripening

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Foliar herbicide applications – Glyphosate and Triclopyr (Rodeo and Garlon3A)

Basal stem treatments - Triclopyr (Garlon 4)

Gover

Tree-of-Heaven (Ailanthus) - Description

- Large tree
  - 80 feet in height
- Smooth pale gray bark
- Stout blunt brownish twigs
- Pinnately compound leaves
  - 1-4 feet in length w/ 11-25 leaflets
- Papery seeds (samaras)
  - May remain on tree all winter
- All parts give off a strong offensive odor

Tree-of-Heaven - Origin & Distribution

- Native of China
- Imported in 1784 to Philadelphia
- Was valued as a street and shade tree
- Planting in Baltimore and Washington continued into the 20th century

Tree-of-Heaven - Site

- Common on disturbed sites
  – Pioneer species
- Fairly intolerant of shade
  – Cannot compete under closed canopy
- Wide variety of soils
  – Poor and rich soils
  – rocky drought prone areas

Tree-of-Heaven - Dispersal

- Can produce 300,000 seeds annually
- Sprout from parent tree
  - up to 50 feet away
- Allelopathic
  - Produces toxin which inhibits growth of other plants

Tree-of-Heaven - Control

Mechanical:

- Cutting causes tree to sprout
- Target female: seed producing trees
- Can pull new seedlings

Biological:

- Fungal pathogen
  - (*Verticillium albo-atrum)*

Tree-of-Heaven - Control

- **Chemical**
  - Stump Treatment
    - When removal is necessary
    - Prevents stump sprouts, ***not*** *root suckers*
    - Foliar follow-up essential
    - **BETTER TO TREAT FIRST, THEN CUT**
  - Hack-and-squirt
    - Late summer/early fall
    - Glyphosate (Rodeo), Triclopyr (Garlon 3A)
  - Basal Stem
    - Late summer/early fall
    - Triclopyr (Garlon 4)

Tree-of-Heaven - suckering tree

seed set

flower

leaf-out

fall color

vegetative growth

Apr	May	Jun	Jul	Aug	Sep	Oct

Foliar: Glyphosate or Triclopyr (Rodeo, Garlon 3A)

Basal bark: Triclopyr (Garlon 4)

Hack & Squirt: Glyphosate or Triclopyr (Rodeo, Garlon 3A)

Gover

In Summary: Follow-up on ALL Invasive Treatments

- Mandatory in Year 2
  - Annually or bi-annually
- Learn to identify invasive plants
- Scout property
- Implement control measures immediately
  - Herbicides often most productive approach

Tree-of-Heaven

Questions?

Forest Vegetation Management
http://extension.psu.edu/fvm
Plant Science - Publications
http://plantscience.psu.edu/research/projects/vegetative-management

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