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Invasive Plant Management

Challenges & strategies in construction and ROW management



How plants spread

- ‘Propagules’
- Seed
  - Large, heavy (ex. berries)
  - Small, light (ex. dandelion fluff)
- Vegetative structures
  - Creeping roots
  - Rhizomes
  - Bulbs/tubers
  - etc.

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Plant Life Stages

- Germination
- Vegetative
- Reproductive (flowering)
- Maturity (seed-set)

Chris Evans_Univ. IL_Bugwood.org

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Pathways of spread and establishment

- Disturbance of soil and existing vegetation
  - Opens space for weed seeds
- Movement of ‘propagules’
  - Wind, water, animals
  - Human activities
- High-risk activities:
  - Construction/earth-moving
  - ROW maintenance



Ben Jackson, University of Georgia, Bugwood.org

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Soil Disturbance + Movement

- Excavation, fill, foreign-borrow, and waste
- Propagules in soil being moved
  - All soil will have some
- Propagules introduced during construction
  - Vehicles and equipment
  - Materials



Peter Bedker, Bugwood.org

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Roadside Mowing

- Disturbs existing vegetation
  - Openings for existing weed seed to germinate
- Spreads weed propagules on equipment
  - Openings for new seed to contact soil/germinate



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Reducing Propagule Spread

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Soil Disturbance

- Minimize disturbance
  - Only when needed
  - Only in specific place(s) necessary



Dave Jackson

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Soil Disturbance

- Revegetate quickly
  - Seed-in groundcover immediately
  - Temporarily seed areas as they are completed (if in stages)
    - Fast-growing annual (ex. **common oat** (*Avena sativa*), or **cereal rye** (*Secale cereale*))
- Native grasses + forbs ideal (HB 797, 2024)
  - PennDOT native seed mixes (7)
    - Conservation Mix (Formula N)
  - Exotic **non-invasive** species acceptable
    - Residential Mix and Clear Zone mix (grasses)



Soil Movement

- Consider the source!
  - Inspect site for weed species
  - Use “weed-free” if possible
- Monitor for several seasons





Kris Johnson, Great Smoky Mountains National Park, Bugwood.org

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Mowing

- **Clean equipment!**
- Implement reduced-mowing (or no-mowing) program
- Targeted mowing
- Strategic timings to prevent weed seeding
  - Species-dependent
  - Most plants set seed by late-summer/fall

Equipment Cleaning

- **<u>Main</u> way to reduce spread**
- Knock dirt and plant material off vehicle
  - Leaf blowers, brooms, brushes, vacuums
- Vehicles should be washed for about 6 min
  - Longer for large/complex equipment
  - 60-min standard for tracked equipment
- Washing methods (90+ psi)
  - Portable Vehicle Washing Units (VWU)
  - Pressure washers
  - Elevated ramps to access undercarriage



(James H. Miller, USDA Forest Service, Bugwood.org)

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Equipment Cleaning continued

- Inspect vehicles/equipment:
  - wheel wells, inside of wheels, behind bumpers, on radiators, on tracks, above drivetrain skid plates, etc.



Andrew Koeser, International Society of Arboriculture, Bugwood.org

Equipment cleaning

- Enforce ‘equipment cleaning’ stipulations in contracts



- Control weeds in storage areas

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Plant Life Cycles

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Annuals

- Complete life cycle in one growing season
  - Summer annual – spring to fall
  - Winter annual – fall to spring
- Prevent flowering/seed set



Mile-a-minute



Chickweed



Japanese stiltgrass



Yellow rocket

Photos: Dave Jackson; Emily Rojik

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Biennials

- Life cycle – spring to spring
  - First year + winter: rosette
  - Second year (spring/early summer): bolting, flowering, seed set
- Prevent flowering/seed set





Poison hemlock





Teasel

Photos: Emily Rojik, Jon Johnson, and Barry Rice_sarracenia.com_Bugwood

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Herbaceous Perennials

- Above-ground growth dies each fall
- Regrows from persistent roots each spring
- ‘Clumping’ vs ‘Spreading’

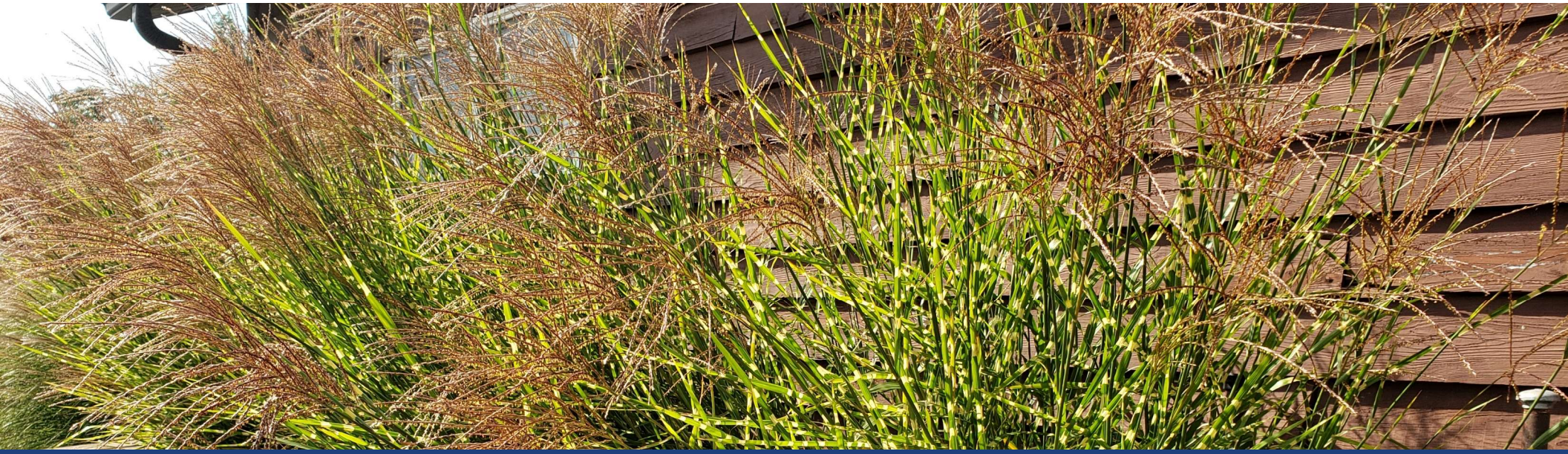
- **Clumping** (non-spreading roots)
  - Spreads only by seed
  - Prevent flowering/seed set

Ravenna grass





Purple loosestrife



Silvergrass/Ravenna grass

ID and Control Methods

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Silvergrass and Ravenna Grass



Silvergrass



Ravenna grass

Silvergrass (*Miscanthus*)

- Increasing populations on roadsides, meadows, utility ROW, etc.
- Highly flammable







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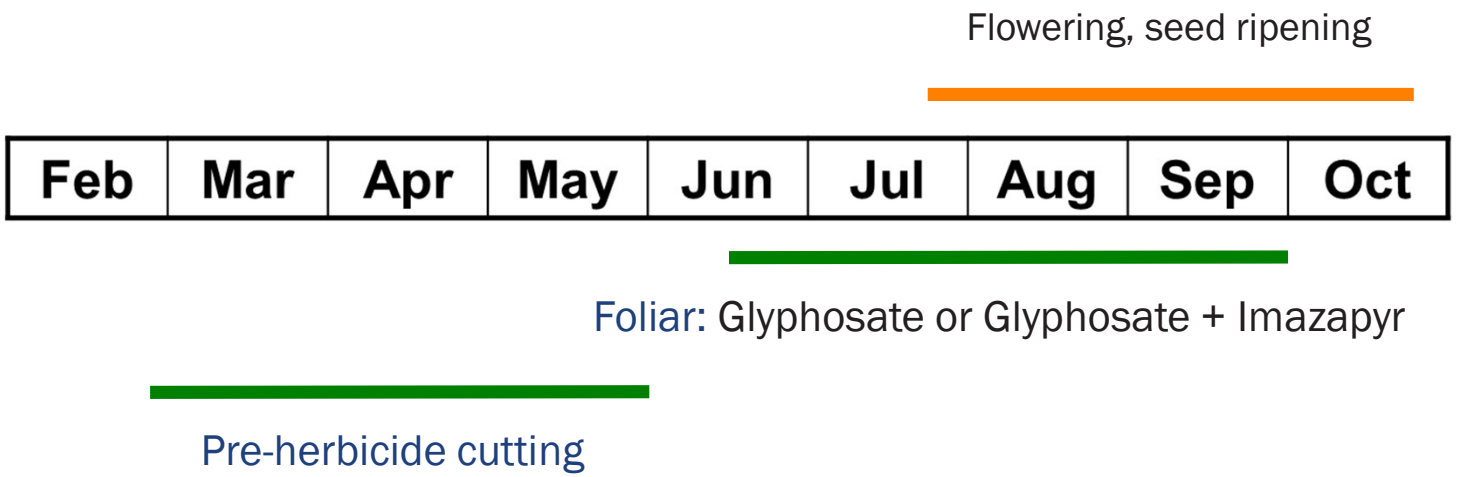
Silvergrass (*Miscanthus*) & Ravenna grass



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Herbaceous Perennials

- **Spreading**
  - Spreads by seed and vegetatively, forms colonies
  - Control vegetative structures (roots, rhizomes, stolons, tubers)

Canada thistle





Mugwort

Japanese knotweed



Knotweed

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Knotweeds

- Spreading herbaceous perennial
- Seed
  - Matures mid-Sep. to mid-Oct.
  - Low establishment rate
- Vegetative
  - Rhizomes
  - Rhizome + stem fragments
  - Flooding, human soil movement





Image – Art Gover, PSU (retired)

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Herbicide – foliar spray

- Most efficient and fastest suppression
  - 1 – 2 seasons of ‘intensive’ knockdown
  - Low-input maintenance following years
- Least site disturbance
- Recommended herbicide – glyphosate
  - Most cost-effective and sustainable method overall



Image – Kerri Griffin-Rowles, PSU

Foliar spray – best approach

- Cut knotweed, spray regrowth once
  - Cut late-May, early June
  - Wait at least 8 weeks
  - Spray regrowth late-July to Sep.

Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct

Pre-herbicide cutting

Post – cutting foliar herbicide: glyphosate
(e.g. Rodeo, 3 qts/ac)



Image – Kerri Griffin-Rowles, PSU



Image – Kerri Griffin-Rowles, PSU

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Post-suppression

- Suppress at least 2 years
- Planting natives likely necessary
  - Covering exposed soil
  - Competitive suppression of regrowth
  - Prevent est. of other invasives







Images – Art Gover, PSU (retired)

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Canada thistle

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Canada thistle

- Spreads through seed + roots
  - Seed viable for 20 years
- Flowers/seed mid-summer
- Best herbicide uptake late-summer
  - Two-step approach





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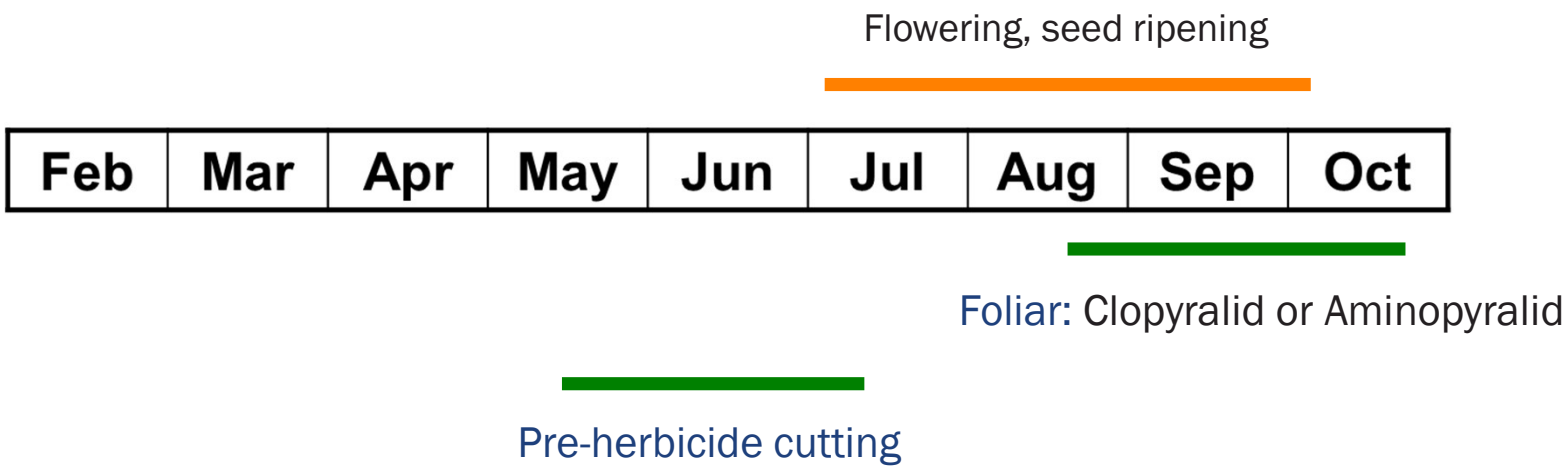
Canada thistle



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Summary

- Disturbance activities = high risk of plant spread
- Propagules are almost everywhere
- Get materials from non-invaded or “weed-free” sources
- Cover bare soil ASAP
- *Clean vehicles/equipment!*
- Monitor for invasives
- Strategically manage at correct life stages

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Thank you!



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