

Effectiveness of herbicide treatment on mile-a-minute (*Persicaria perfoliata*), an invasive plant: implications for survival of restored buffers

Jill Dunscomb^{1,2}, Joe Receveur², Dave Wise², Tara Muenz²
¹ Bayard Rustin High School, ² Stroud Water Research Center



Riparian Buffer Restoration Methods

After detection of Mile-A-Minute at site in late June

- Area around trees mowed
- Each tree shelter hand weeded as necessary
- 3' radius herbicide applied to all trees on site
- Pre-emergent Herbicide treatment applied
 - 50 trees each treatment
 - One shake Preen® treatment inside each shelter (50 trees)
 - One shake Snapshot® treatment inside each shelter (50 trees)
 - No pre-emergent herbicide treatment as control (50 trees)

Seedling trees planted March/April

- Red Maple
- Silver Maple
- Black Gum
- Sycamore
- Swamp White Oak
- River Birch
- Pin Oak

Abstract

Riparian buffers are valuable to the overall health of stream ecosystems providing reduced nutrient inputs to streams, habitat for wildlife, and detrital contributions which provide food for aquatic macroinvertebrates. Additional benefits include regulation of stream temperatures and algal production through shading, and protection from bank erosion. Mile-a-minute (*Persicaria perfoliata*), is an herbaceous, annual, invasive vine from eastern Asia which grows up to six inches a day and can quickly smother plantings. In this study, we compare the use of two pre-emergent herbicides, Preen® and Snapshot®, with regard to reducing weed competition with the newly planted trees.



Restoration Work

Restored riparian buffers are valuable to the overall health of the stream. Maintaining and restoring streamside buffers can reduce nutrient inputs to streams, provide habitat for terrestrial animals, contributed detritus to the stream which provides food for the macroinvertebrates. The reforested buffer also regulates stream temperature and algae productions through shading. It can also physically protect the channel from bank erosion. It is difficult to quantify the nutrient and sediment load reductions to be expected due to reforestation. Forested streams are wider and have a lower water velocity and a higher bed roughness than meadow streams. It is assumed that forested streams are the natural state and natural is better with regard to streambank vegetation.



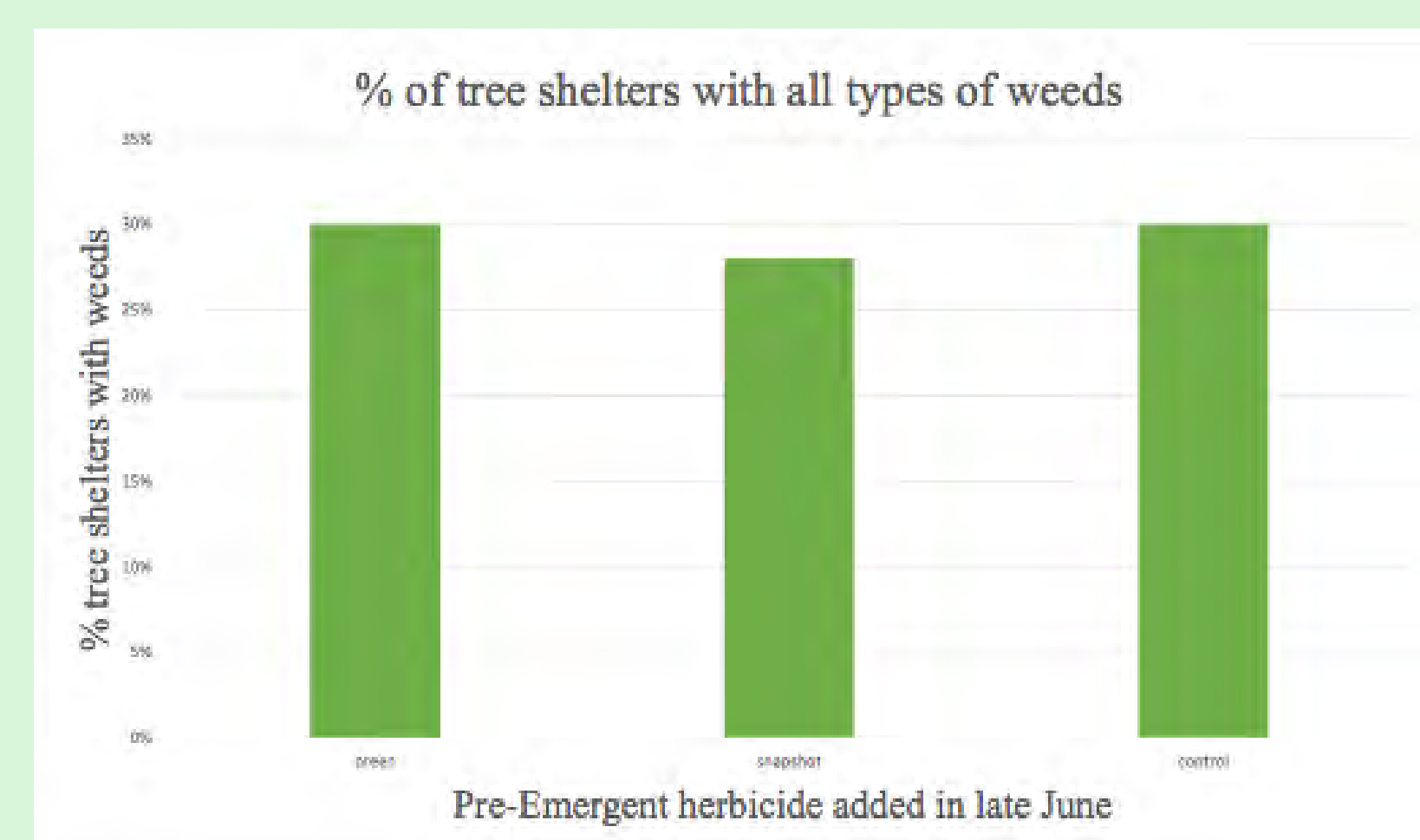
Results



Before: Overrun with Mile-A-Minute Early June 2016



After: Mowed, hand weeded, herbicide applies Late June 2016



All tree shelters were checked for weeds 3 weeks after application. In the Snapshot® section, 14 weeds including 1 mile-a-minute plant were discovered and removed from the shelters. In the Preen® section, 15 weeds including 1 mile-a-minute plant were removed from the shelters. In the control section, 15 weeds including 1 mile-a-minute plant were discovered and removed.

Discussion and Conclusion

In this test plot, 150 native trees were planted in the spring and protected with tree shelters, mowing and 3' radius herbicide treatment. Three sets of 50 tree seedlings were treated with Preen®, Snapshot® or left untreated in addition to the above treatment. Preen® (trifluralin) promotes cellular damage due to its direct action on microtubules, thus inhibiting cell division and root growth. Snapshot® contains trifluralin as well as isoxaben, which is a selective cellulose biosynthesis inhibitor. Both are pre-emergent herbicides. At the end of 3 weeks, Mile-A-Minute was found to be growing inside 1 of 50 tree shelters in all plots. In addition other weeds were growing inside 14 -15 of 50 tree shelters. Since seeds germinate in March or April and no effect was seen it is likely that seeds were already emerged and thus the pre-emergent treatment was ineffective. Seeds are dispersed by many different animals including deer and birds and seeds have been shown to be viable for up to 6 years, but it was unknown if the seeds germinate throughout the growing season. Mile-a-Minute sets seeds in late June to August and produces a blue berry. Future treatment will require removal of the weed by mowing, by hand and with non-specific herbicide treatment (glyphosate). It is suggested that another trial of the pre-emergent herbicides be run in March before the seeds germinate.

Curriculum: PA State Standards

3.3.12.A7. MODELS Interpret and analyze a combination of ground-based observations, satellite data, and computer models to demonstrate Earth systems and their interconnections. CONSTANCY/CHANGE Infer how human activities may impact the natural course of Earth's cycles. PATTERNS Summarize the use of data in understanding seismic events, meteorology, and geologic time.

Pests Destroy Tree seedlings

Voles are small brown rodents also called field mice

- Found in weedy/grassy areas
- Eat bark in fall and winter
- Feel vulnerable in well cleared area

Competing Vegetation

- Invasive plants such as multiflora rose
- Invasive grasses

Deer and other animals

- Browse on seedlings
- Rub young trees with antlers

Use of tree shelters protects trees until established

- Provides greedhouse
- Protect from herbicide treatments
- Protect from mowing
- Protect from deer browse
- Offer wind shelter to prevent drying

Control of Mile-A-Minute: Herbicide and biological control

P. perfoliata

-is vulnerable to the non-specific herbicide glyphosate and possibly a specific herbicide Lontrel®.

- vulnerable to the stem-boring weevil, *Rhynoncomimus latipes*.

Mile-a-Minute is native to China where the weevils naturally feed on it. It was brought to the Eastern US as part of an initiative with the USDA Forest Service. The weevils delay seed production, stunt plants as well as kill plants especially when there is competition from other plants. The weevils were released near the test property in 2005 and have been established in the test property as seen by the holes in the leaves.

--It can be mowed or removed by hand.

