

Poster Presentation Research Abstracts

Are Alternative Prey Resources More Prevalent in Hemlock Woolly Adelgid-Infested Hemlocks Than in Uninfested Hemlocks?

Rachel Mallis - University of Kentucky

*Comparative Susceptibility of Plants Native to the Appalachian Range of the United States to Inoculation with *Phytophthora ramorum**
Linderman, R. G.¹, de Sá, P. B.², and Davis, E. A.¹ ¹USDA-ARS Horticultural Crops Research Laboratory; ²University of Kentucky

Examining the Impact of Hemlock Woolly Adelgid Invasions on Headwater Streams

Joshua K. Adkins and Lynne K. Rieske-Kinney - University of Kentucky

Invasive Shrubs in Kentucky

Richard L. Boyce - Northern Kentucky University

Research and Demonstration of Control Methods for Amur (Bush) Honeysuckle in the Bluegrass

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Variation in Highway Woody Plant Communities and Soils Along Urban-Rural Gradients in Louisville, KY

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Rachel Mallis - University of Kentucky

Hemlock woolly adelgid (*Adelges tsugae*) (HWA) is an exotic invasive insect that is rapidly devastating Eastern Hemlock (*Tsuga canadensis*) throughout its range. Little or no natural enemies of HWA have been found in the eastern US. Adelgids are sedentary insects with a mobile crawler stage, and provide a readily available, easily obtained food source. One predominant predator group associated with hemlocks that have not been fully investigated as adelgid population regulators are spiders. Spiders are generalist predators and likely make use of this food source. We are examining the spider community on eastern hemlocks and their relationship with HWA. Here we focus on what prey items, alternative to HWA, are available to spiders. Sticky traps designed to mimic vertical and horizontal orb and sheet webs were used to capture potential prey items. One vertical and one horizontal trap were placed in the four cardinal directions in eastern hemlock trees in adelgid-infested and adelgid-free hemlock forests. Traps remained in the field for 3 d, after which they were removed. Captured arthropods were counted and identified to ordinal and sometimes family level. There were two sites, one with HWA and the other without, with 2 plots at each site and 3 trees sampled per plot. Trapping occurred from July through September 2008, when HWA was aestivating, with 144 trap days at each site. Our results will generate a more thorough understanding of the ecological relationships developing as the hemlock woolly adelgid establishes itself in Kentucky's hemlock forests. This study contributes to characterizing the hemlock arthropod community and its relationship with HWA.

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Comparative Susceptibility of Plants Native to the Appalachian Range of the United States to Inoculation with *Phytophthora ramorum* Linderman, R. G.¹, de Sá, P. B.², and Davis, E. A.¹ ¹USDA-ARS Horticultural Crops Research Laboratory; ²University of Kentucky

Phytophthora ramorum causes ramorum blight on many plant species and sudden oak death on *Lithocarpus densiflorus* and on several species of *Quercus*. Sudden oak death was first detected in 1995 in Marin and Santa Cruz Counties in California and since then has spread to an area extending from south of Big Sur to Humboldt County in California, and to Curry County in Oregon. Risk models for establishment of *P. ramorum* and development of sudden oak death indicate that the Appalachian range of the eastern United States is a high risk area. The climate conditions and native flora of forests in Appalachia in Kentucky appear to be favorable for establishment of *P. ramorum*. Because little information about the susceptibility of plants native to this region was available, foliage of several species of native plants were collected and sent to the USDA-ARS Horticultural Crops Research Laboratory in Oregon, for evaluation of relative susceptibility to inoculation with this pathogen. Leaves were wounded and inoculated with sporangia or mycelium agar plugs of an isolate of the North American mating type (A2) or the European mating type (A1) of *P. ramorum*. The leaves were incubated for 14 days incubation at 20°C under high humidity. Lesions formed on the leaves were compared using digital photos and the ASSESS software. Susceptibility of inoculated plants to infection varied from no susceptibility to high susceptibility with lesions covering large areas of the leaves.

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Examining the Impact of Hemlock Woolly Adelgid Invasions on Headwater Streams

Joshua K. Adkins and Lynne K. Rieske-Kinney - University of Kentucky

The hemlock woolly adelgid (*Adelges tsugae*: HWA) is an exotic invasive insect native to Asia that feeds on all species of hemlock (*Tsuga* spp.). Eastern hemlock (*T. canadensis* L.) is particularly susceptible and has suffered extensive mortality throughout much of its native range. Eastern hemlock is a critical component of eastern North American forests, providing food and essential habitat for wildlife and regulating key ecosystem processes. In Kentucky, eastern hemlock is primarily limited to moist coves and headwater riparian zones, where it plays a vital role in regulating air and stream temperatures, reducing stream turbidity, and stabilizing base flows. Consequently, streams with eastern hemlock riparian zones support unique benthic macroinvertebrate communities. HWA is spreading throughout southeastern Kentucky where stream quality is already at risk from large-scale surface mining operations. Loss of eastern hemlock due to invading HWA populations may exacerbate the deterioration of stream quality in this area and have far reaching consequences downstream. The objectives of our study are to evaluate the effects of HWA on headwater stream quality. We are currently investigating differences between eastern hemlock dominated and deciduous dominated headwater streams to determine the extent to which HWA invasion will affect (1) stream and riparian macroinvertebrate community dynamics, (2) stream chemistry, and (3) other stream characteristics, including temperature, conductivity and turbidity. Our study will provide insight into the direct and indirect consequences of riparian eastern hemlock loss, and contribute to the knowledge base necessary for preservation of this imperiled ecosystem.

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Invasive Shrubs in Kentucky

Richard L. Boyce - Northern Kentucky University

Invasive plants are recognized as major problem in ecosystems across the US, including Kentucky. I surveyed the distribution of invasive shrubs across Kentucky, along with physiological characteristics, habitat preferences, effects, control measures, and nativity. Invasive shrub diversity increases with county population. Invasive shrubs species presence appears to be underreported across most of Kentucky. Of the 53 invasive shrubs I describe, species in the families Rosaceae, Caprifoliaceae and, Oleaceae were most common. The most widespread species are *Lespedeza cuneata*, *Sida spinosa* and *Rosa multiflora*. Most introduced shrubs are originally from east Asia and were introduced in the 19th century. Almost all are still commercially available. Almost all have heavy fruit crops that are dispersed by birds and mammals. Most can reproduce vegetatively, are at least partially shade-tolerant, and tolerate a wide range of soils. Many have extended-deciduous leaf habits and tolerate drought. A number of adverse ecosystem effects are reported for many species that have been studied. Mechanical and chemical control methods appear to be best for controlling Kentucky invasive shrubs, but the effects of fire and biological control on these species have been studied for only a few.

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Research and Demonstration of Control Methods for Amur (Bush) Honeysuckle in the Bluegrass

William Thomas, Jeffrey Stringer, John Cox - University of Kentucky

This poster outlines the progress and findings of a recent project involving research and demonstration of eradication techniques for bush honeysuckle in the inner bluegrass. The project developed demonstration areas and associated materials at three parks and natural areas showcasing methods to effectively eradicate bush honeysuckle from woodlands and wooded remnants in urban areas. Research, involving a replicated study of mechanical and chemical control methods, has also been conducted at these sites. The research has involved the testing of methodologies and determination of costs associated with treatments. This poster provides background on the demonstration activities and the efficacy and cost effectiveness of control options for bush honeysuckle.

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Variation in Highway Woody Plant Communities and Soils Along Urban-Rural Gradients in Louisville, KY

Tara Trammell, Brad Schneid, and Margaret Carreiro - University of Louisville

Linear vegetation patches are important landscape elements, promoting connectivity between urban and rural areas, providing barriers and filters for air and water pollutant movement, and serving as corridors for species movements. Species composition of the plant communities in these linear elements is an important determinant of their landscape functionality. Woody plant communities and soils were studied along three interstate highway corridors in Louisville, Kentucky. Woody plant communities along these interstates exhibited plant composition and soil differences that correlated with the abundance of the exotic shrub, Amur honeysuckle (*Lonicera maackii*). Communities dominated by honeysuckle had lower mean tree seedling and sapling density (27 ± 0.8 100m⁻² with 33% exotic tree species) compared to plots dominated by native tree species (seedling/sapling density 271 ± 72 100m⁻² with 0.31% exotic tree species). Woody plant species richness also differed, with native plant communities having nearly twice the diversity (18 species) of the honeysuckle communities (10 species). Soil characteristics also differed between communities dominated by honeysuckle versus native tree species. Honeysuckle plots had higher bulk density (1.104 vs 1.091 g cm⁻³), soil pH (6.6 vs 5.7), and clay content (25.1% vs 19.5%) than low honeysuckle plots. These initial correlative studies suggest that shrub honeysuckle may be negatively affecting seedling regeneration of native woody tree communities in these highway forests and soil processes. In addition, the surprising existence of communities with valued native tree and shrub species provides optimism that native highway verge plant communities can be maintained even when edge-to-interior ratios and pollutant inputs are high.

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Various Invasive Species During Backyard Restoration in Sedalia, KY

Dianna Johnson and Iin Handayani - Murray State University

The purpose of this presentation is to provide information regarding to the common invasive species that have occurred before and after two years of backyard restoration experiment. The backyard restoration project was initiated in 2006 using various designs of permaculture or forest garden. Invasive species richness, abundance and identification will be presented in the poster.

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