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Landscape Crop Advisory Team Alert

Update on garlic mustard biological control

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Garlic mustard flowering.

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Garlic mustard is a biennial invasive weed native to Europe that is now widely distributed across North America from Georgia to Alaska. In a recent *Landscape Alert* (Vol. 22, No.2, April 13, 2007), Rebecca Finneran described garlic mustard's two year life cycle and recommended control strategies for homeowners and land managers.

Ongoing research has shown that garlic mustard seeds can remain viable in the soil for at least ten years. Thus, long term management by hand is impossible for all but the smallest infestations. A search for suitable biological control agents for garlic mustard was initiated in 1998 by MSU collaborators at Cornell University, the University of Minnesota, and CABI Bioscience in Switzerland. Efforts are now focused on four beetles (weevils) in the genus *Ceutorhynchus*, whose larvae target multiple stages in garlic mustard's life cycle.

Larvae of these species mine inside the root crowns of overwintering rosettes (*Ceutorhynchus scrobicollis*), mine in garlic mustard stems and leaf petioles (*C. alliariae*, and *C. roberti*), or feed on developing garlic mustard seeds (*C. constrictus*). Adults of all four species feed on garlic mustard foliage, which further reduces seed production. Population modeling studies by MSU researchers Adam Davis (now with USDA

ARS in Illinois), Doug Landis and Doug Schemske suggest that releasing the root crown miner either alone or in combination with one of the stem-mining species is likely to be the most effective strategy for the greatest number of invaded sites. Current work in our lab is focusing on refining these models with new data we are collecting from Michigan and Illinois populations of garlic mustard.

Before weed biological control agents can be released, researchers must evaluate the breadth of their feeding preferences to demonstrate that they won't harm non-target plant species. This host specificity testing has been completed for the root crown miner, and a proposal to conduct test releases is currently being prepared for the federal Technical Advisory Group, which oversees weed biocontrol. Testing is continuing on the other three candidate agents in Switzerland, and in a quarantine facility at the University of Minnesota. This means that biocontrol agents will not be available in Michigan for at least another one to two years, if they are approved. Until then, keep pulling garlic mustard to stop it from spreading.

For more information on garlic mustard invasions and control in Michigan, please visit <http://ipm.msu.edu/garlicmustard.htm> and check back for updates throughout the year.



Garlic mustard rosette.

More thoughts on managing garlic mustard

The goal of management is to prevent garlic mustard from producing new seeds. Most first year seedlings and rosettes will die naturally, so management efforts should be focused on second year plants. Second year plants are easy to distinguish from first year rosettes in late spring once their stems elongate in May and they begin producing white flowers. First year rosettes will not have long stems or flowers and lay close to the

ground. In summary, small infestations can be managed with vigilant pulling of second year plants every year prior to seed production or with careful application of glyphosate (e.g. Roundup) during the late fall or winter when most native species are dormant.

We now know that viable seeds can develop on any garlic mustard plants that have already flowered, even after the plants have been pulled. For this reason, we no longer recommend burying pulled plants. Plants should be bagged in plastic, tied up, and removed. **IPM**

Cone season begins

Bert Cregg
Horticulture and Forestry

We are beginning to receive reports of cones developing in Fraser fir Christmas tree plantations. So far, the indications are the crop is variable, with relatively few cones in some areas and fairly heavy cones in others. Firs are known to exhibit a biennial pattern of cone production. That is, heavy cone crops alternate with light cone crops. The physiological explanation is based on source-sink relations. In heavy cone years, trees allocate their resources to the current year's cone production, and therefore have less remaining energy to put into new shoot growth and buds for the following year.

Based on this, some alert readers may be asking, "Since we had exceptionally heavy coning last year, shouldn't there be few cones

this year?" Part of the answer is that growers usually "short-circuit" the alternate-bearing cycle by picking cones when they are small, and before they become a major drain on the tree's resources. We will likely see evidence of this if we look at conifers in the landscape, which had heavy cones last year, but were not picked. The other part of the answer is that environmental signals can still override the internal signals within the tree. High temperatures, drought stress and high levels of nutrition promote cone formation the following year. In 2005, June in Michigan was warm, which contributed to heavy coning in 2006. Last year was cooler, but also drier in some areas, which may contribute to this year's crop. **IPM**

Should I boycott cypress mulch?

Bert Cregg
Horticulture and Forestry

It's hard to think of mulch as a controversial topic, but as with most things these days, we find people on both sides of an issue. As with most things these days, some of the opinions are based on substance, others are not. In the southern United States, some environmental groups are advocating a boycott of cypress mulch. Cypress mulch is derived from baldcypress and pond cypress, which grow in ecologically sensitive wetlands in the Southeast. Cypress wood is highly valued for its natural decay resistance. Florida and Louisiana are the leading states for cypress harvesting for timber and other products. In Louisiana, it is unclear if cypress is logged solely for mulch, but cypress harvesting for mulch does occur in Florida. According to Dr. Jim Chambers, professor of Forestry at Louisiana State University and chair of a governor's science panel on forested wetlands in Louisiana, cypress mulch production is a sensitive issue.

"Many of our cypress-tupelo forests are in a severe state of decline. As you can imagine, these forests are very important to south Louisiana for many reasons. Areas permanently flooded, areas that are flooded for substantial parts of the growing season

and areas subjected to salt water input, cannot regenerate. The amount of forested areas with these conditions continues to increase as subsidence increases, coastal wetlands are eroded by storms, and human impacts on hydrology continue to degrade many sites."

The inability to regenerate new stands of cypress is an important concern and calls into question the sustainability of cypress harvesting on these sites. Chambers is working with environmental groups and others to develop a process to certify that mulch is produced from sustainable forest harvest operations.

Another issue related to cypress mulch, is a claim that is circulating in parts of Michigan (and perhaps elsewhere) that cypress mulch is linked to cancer. I conducted a search of the National Library of Medicine and National Institutes of Health literature database (www.pubmed.gov) on cypress and cancer. The only hits I found were related to studies looking at falsecypress (*Chamaecyparis*) extracts for anti-cancer properties, similar to taxol. The claims of cypress mulch and cancer may be an amalgam of the environmental concerns over cypress harvesting discussed above, and concerns over use of mulch