Michigan Invasive Plant Council
Newsletter

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Biological Control of Spotted Knapweed

By Bob Rich

Spotted Knapweed, *Centaurea maculosa,* is an invasive plant found across much of Michigan. It infests over eight million acres nationally and is found in nearly every state. In the battle against invasive species, it is easy to become discouraged. However in the case of Spotted Knapweed, thanks to some very effective biological control agents and the work of the researchers who are responsible for introducing them to the United States, we are able to chock one up in the win column.

Knapweed, like many invasive plants, came to North America accidentally from Europe and Asia. When this occurred, it left the insects that fed on it behind on the other side of the Atlantic Ocean. Biological control re-introduces the historic predators of the plant to their prey in a new land. Biocontrols must be proven to be host specific to the target plant before they are approved for release in the United States. Since 1973, 13 different species of biological controls have been released for the control of spotted knapweed, 11 of these species are currently established in the United States. All eleven of these species feed only on Spotted Knapweed or closely related species of knapweed that are also exotic invasive plants. There is no record of any of these insects feeding on native plants. Successful biocontrol agents must also be capable of reproducing and spreading from a single release. As the population of the target weed decreases, the insect population also decreases and eventually comes into a dynamic equilibrium with the plant.

Two species of seed head flies *Urophora affinis,* the banded gall fly, and *Urophora quadrifasciata,* the UV knapweed seed head fly, are already common in many knapweed sites. *Urophora affinis* was the first insect released to control Spotted Knapweed in 1973. Both species are strong fliers and disperse well. Larval feeding of these flies can reduce knapweed seed production by 50 %.

Spotted Knapweed, *Centaurea maculosa,* is effectively controlled with biological agents, such as the knapweed flower weevil pictued below.

Matthew Rich–Weedbusters Biocontrol

Two species of weevils, *Larinus minutus,* the lesser knapweed flower weevil, and *Larinus obtusus,* the blunt knapweed flower weevil, also feed on knapweed seed as larva. Recent research by Jim Story at Montana State University's Western Agriculture Research Center in Corvallis, Montana, has shown that *Larinus,* when combined with the two *Urophora* species, reduces knapweed seed production by 95%. Although *Larinus* is also a strong flier, it is a more recent introduction to North America and is not as widespread as the *Urophora* species.

While the *Larinus* and *Urophora* species can dramatically reduce seed production, they are not capable of killing existing spotted knapweed plants. However, *Cyphocleonus achates,* the knapweed root boring weevil has proven to be a very effective agent in reducing knapweed biomass and density by killing existing plants. First released in Montana in 1988, this insect means business when it comes to killing

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Inside...

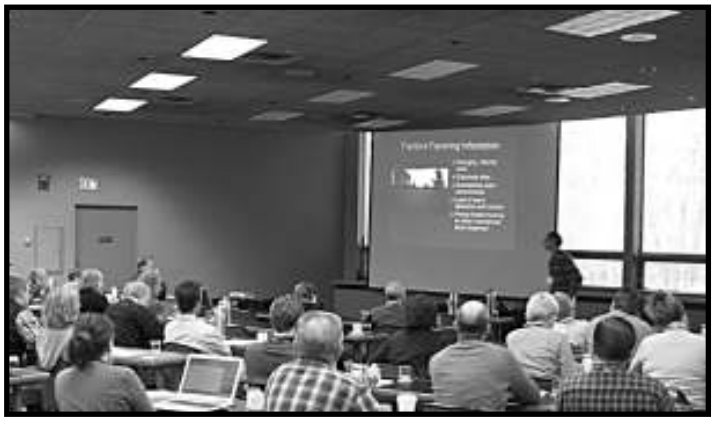
2008 Symposium a Success

The Michigan Invasive Plant Council 2008 Symposium was a great success. Nearly 50 people made their way through a winter snow storm to attend a wonderful line up of speakers at the Kellogg Center. After opening remarks given by Brian Majka of JFNew, Neil MacDonald of Grand Valley State University gave an excellent informative talk on using herbicide and fire to control spotted knapweed in warm season grasses. Melanie Good from the Land Conservancy of West Michigan livened up her discussion on woody invasive species identification and control with first-hand information. After a break, Dupont representative Mark Rice spoke about IPM approaches for invasive brush and broadleaf plants. Mary Hilovsky, president of Enviroscience, rounded up the morning agenda with biological controls for Eurasian watermilfoil.

After a delicious lunch provided by the Kellogg Center, the symposium attendees returned to listen to Ernie Kafcas of MDNR give some control techniques for common reed. Next up was Dave Nicholson of JFNew giving us the scoop on understanding aquatic herbicides and what effect they have on aquatic plants. Last on the agenda was a panel question and answer discussion led by Brian Majka, Dave Nicholson, Marty Hilovsky, and Robert Schutzki of MSU. Since the symposium was geared towards professionals in the field many attendees took advantage of the opportunity to earn recertification credits towards MDA's pesticide license.

The 2008 symposium was a full day of very useful information for the many people attending, all of whom came from a wide spectrum of organizations and businesses. A wonderful example of MIPC fulfilling its mission!

Brian Majka gave opening remarks to the symposium and also served as moderator.



Nearly 50 people attended MIPC's symposium

Discussion of topics continued during breaks

Spotted Knapweed *continued...*

knapweed. The larvae of this insect mine out the roots weakening and killing the plant. Other research by Story in Montana showed a 77% and 99% reduction of knapweed density on two different sites over an eleven year period, when *Cyphocleonus* was introduced into a knapweed stand that already contained *Urophora* and *Larinus.* After introduction of *Cyphocleonus* four or more years is often required, before a reduction of knapweed density is apparent. *Cyphocleonus* is flightless and therefore spreads more slowly than other species that fly but is considered to be the most effective biocontrol available for Spotted Knapweed today. *Cyphocleonus* and *Larinus* were first introduced into Michigan in the summer of 2007 at Orion Oaks County Park in Oakland County.

In addition to the species already mentioned, there are six other insects: a root moth, a seedhead moth, a root beetle, another seedhead weevil and two other seedhead flies that attack knapweed and are impacting it with varying success.

The knapweed bio-controls available today have caused some stunning and permanent declines in knapweed stands in several states. Biocontrols of course, will never eradicate this invasive species; however they can reduce knapweed to a low level in the ecosystem and maintain the plant at that level permanently.

Bob Rich is the owner of Weedbusters Biocontrol, a supplier of noxious weed biological control agents based in Missoula, Montana. He may be reached at (406) 251-4261 or by e-mail at robertkandace5@msn.com for further information on knapweed biological control.

Prescribed Burning in Michigan

by David Borneman

(published in May 2001 Michigan Out-of-Doors)

The scene was beautiful beyond description. The timber consisted of large oak trees standing several rods apart and the intermediate space between them was covered with bright green grass and beautiful flowers. The whole country had been burnt over every fall or spring, I presume, for centuries, and everything had been destroyed except these giants of the forest. It did appear as if one-half of the vegetation was flowers. Most of them were about eighteen inches high and when moved by the wind the effect was wonderful. I have never seen in any of our large cities a park that was its equal.

• J.W. Wing in Washtenaw County, Michigan, June 1839

If you smell smoke next time you're out for a walk through your favorite natural area, it may not be from a campfire or from a wildfire. It may be from an intentionally set, prescribed ecological burn.

For at least the past five thousand years, fire has been a part of the Michigan landscape. Some of these fires may have been started by lightning, especially in our very fire-prone jack pine forests, but Native Americans probably set the majority of them. Fire was an important part of their lives, and thus an important historic force on our early landscape. These fires actually created and maintained Michigan's pre-European landscape. Many of our native ecosystems—prairies, oak woodlands, dunes, even wetlands—are not only fire-adapted, but fire-dependent in the sense that they must be maintained by regular fire, and would be lost without it.

Why did Native Americans burn? Probably for some of the same reasons that modern day land managers, foresters, wildlife biologists, and farmers burn. Let's consider some of these.

When using fire for ecological management, we are attempting to tip the competitive advantage toward the native, fire-adapted species, thus discouraging the non-native (or "alien"), invasive plants, which are often very sensitive to fire. The use of fire is often prescribed to control alien shrubs such as buckthorn and honeysuckle, as well as herbaceous plants like garlic mustard and spotted knapweed. These are species that did not evolve with fire, as did our natives. Many prairie plants are very deep-rooted, with much more biomass underground than the "tip-of-the-iceberg" vegetation you see above ground. This is in contrast to many alien plants that are shallow-rooted and thus able to get a quick start because they put their resources into the leaves and stem rather than the roots. So when a fire runs through the prairie, the aliens are much more stressed than the natives, which can vigorously resprout from their extensive root systems. In fact, fire returns nutrients to the soil, giving an extra boost to the natives, which are better adapted to exploit these periodic post-burn nutrient pulses. That's why we see such a spurt in the growth of many native grasses following a burn.

A controlled burn at Fernood's Prairie *Wendy Miller*

Although the benefits of fire to prairies are widely known, there's less public appreciation for the importance of fire to some types of forests in Michigan, especially oak woodlands. To germinate, acorns need direct contact with mineral soil. Burning removes the leaf litter and allows that contact. Then to grow, oak seedlings need plenty of sunlight—something you won't find under a dense layer of woodland shrubs. Walk through any oak woodland and admire the large oak trees, then look around at your feet and see how many oak seedlings you find. If it is a woodland that has not seen a fire for many years, you'll probably see lots of shrubs or saplings from ash, cherry, or maple - but you won't see many oaks. That former oak woodland is being converted to either a shrub thicket or a different type of forest than was there previously. If you don't want to allow that conversion, fire can help. It will discourage the shrubs and the other tree species, and benefit the oak community by stimulating acorns to germinate and saplings to resprout vigorously. Jack pine forests are even more fire-dependent. Jack pine cones actually need to go through a fire before they'll open and disperse their seeds.

Native Americans used fire to manage for desired species too. Acorns were an important source of food for them and for the game animals they hunted. Though they may not have called it habitat management, Native Americans burned the woodlands to create better habitat for deer, elk,

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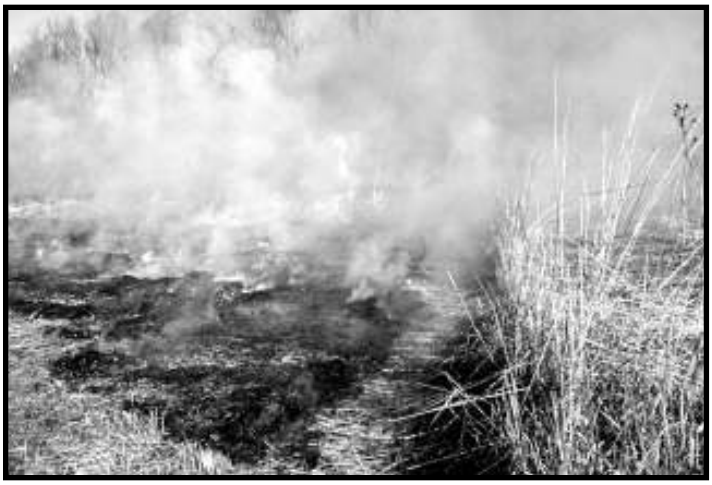

Fernwood Botanical Garden's controlled prairie burn is done each year in late-March. *R.Willey*

Prescribed Burning, continued

bison, grouse, and turkey. Today, fire improves habitat for pheasants, and for non-game species such as bobolinks, grasshopper sparrows, and short-eared owls. Native Americans also used fire when hunting, to drive game toward marksmen with spears or bows and arrows. Burning is also an effective way to reduce populations of insect pests and ticks.

Additionally, Native Americans could use fire as a weapon in war, to drive away their enemies. Conversely, if they were worried about an attack, they might intentionally burn the surrounding prairies and woodlands in a controlled fashion rather than giving their enemies the opportunity to burn it for them. Once burned and free of fuel, the blackened area became a safe zone where they could set up camp without worrying about being burned out. This also eliminated many hiding places for an approaching war party and improved visibility so they could better watch for danger. In this sense, Native Americans were practicing what we might today call "fuel load reduction."

As a modern-day practice, fuel load reduction is more common in the western U.S. where there may be a heavy buildup of pine slash in the forests. It is common here, however, to use fire to clear land and to "open up" the landscape, thus providing a more natural alternative to brush-hogging or herbiciding. In fact, the Natural Resources Conservation Service now accepts fire as a tool on land enrolled in the Conservation Reserve Program (CRP) to keep that land open. Additionally, fire is used in the management of grassland pastures and forage production areas. Native American farmers also used fire to clear fields and increase crop production. This is recorded by early surveyors and mapmakers who noted many instances of "Indian cornfields" in the southern Michigan countryside. It is also well documented that Native Americans burned bogs and pine barrens to enhance blueberry production, which increases greatly one to three years after a fire.

Of course, despite the long history of fire in our landscape and its numerous benefits, fire can still be quite deadly and should never be used in a cavalier fashion. One escaped fire may be all that it takes to shut down everyone's prescribed burn program. Consider all the bad publicity following the National Park Service's ill-fated burn last year at Bandolier National Monument near Los Alamos, New Mexico. Anyone responsible for setting a fire for whatever purpose accepts a tremendous amount of responsibility and potential liability. If you're considering using fire on your land, you need to first spend some time thinking about how that burn can be conducted safely. Where are the fire breaks? Where will the smoke go? What are your contingency plans? The planned burn should be carefully coordinated with the local Fire Department, who may require that you submit a written plan for review before they will issue a permit. So, if you're not sure that you can handle the burn safely, consider hiring a professional contractor to do the job for you.

For more information about using fire safely, contact the Southern Michigan Prescribed Fire Council: Mark Sargent, Chair, Private Lands Coordinator, MDNR Wildlife Division, P.O. Box 30444, Lansing, MI 48909-7944.

David Borneman is the Manager of the Natural Area Preservation Division for the City of Ann Arbor, Department of Parks and Recreation. He serves on the Steering Committee of the Southern Michigan Prescribed Fire Council and has conducted hundreds of prescribed burns on urban and rural lands in the past thirteen years.

Invasive Plant Species Control and Management

Garlic Mustard *(Alliaria petiolata)*

Background

Garlic mustard, *Alliaria petiolata,* is a biennial herbaceous plant introduced as a food source from Europe. While typically occupying woodland edges, garlic mustard can spread into open sunny areas when given the chance. Because garlic mustard has no known enemies in North America, it can be extremely difficult to eradicate once established.

Garlic mustard can be recognized by its basal rosettes during the winter months and throughout the growing season of its first year of growth. During its second growing season, the flowering stalk will grow to an average height of 1-3'. Flowers are white and have four petals, typically 1/8"-1/4" in diameter. Leaves will be dark green and kidney-shaped, with scalloped edges.

Management options are typically categorized into Biological, Mechanical, and Chemical methods. The ideal treatment strategy often utilizes more than one of these techniques in an IVM, or Integrated Vegetation Management approach.

Biological Control

While no biocontrols have been officially released, research is currently being conducted on a series of weevils that have been shown to use garlic mustard as a food source. It is anticipated that biocontrols will become available in the next several years.

Mechanical Control

Hand-pulling after the plant has bolted (during the flowering stage) is typically the most effective method of garlic mustard control. Because it inhabits loose forest soils, plants will generally come out of the ground with ease. It is very important, however, to remove all pulled plants from the site by burning or placing in plastic bags and discarding in a landfill. Proper disposal is necessary due to the plant's ability to develop viable seed even after pulled from the ground.

Mowing or cutting is not typically an effective means of garlic mustard control.

Chemical Control

Herbicide treatments for garlic mustard have proven effective, but must be applied after the plant has bolted and before inflorescence. A 2-4% solution of glyphosate (RoundUp) or triclopyr (Garlon 3A or 4), along with the necessary adjuvants, should be applied to the leaves.

Herbicide applications to the basal rosettes may be effective during the fall or early spring if air temperature is above 50 degrees. However, it is likely that multiple treatments will be needed if only the rosettes are treated.

Whenever using pesticides, be sure to follow label directions and obtain all necessary state or local approvals and permits prior to treatment.

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Michigan Invasive Plant Council Mission

To protect Michigan from the threat of invasive plants.

Objectives

- Develop, maintain, and publish a council-reviewed invasive plant species list
- Raise public awareness about the spread and impact of invasive plants
- Facilitate the exchange of information concerning management, control, inventory, and monitoring of invasive plants.
- Provide a forum for all interested parties to discuss issues relating to invasive plants.
- Serve as an educational, advisory, and technical support council for all aspects of invasive plants and related issues.
- Prevent future introductions of new invasive plants.
- Adopt guiding principles set forth in the management plan by the National Invasive Species Council Executive Order 13112 February 3, 1999.

Look for MIPC's website:
www.invasiveplantsmi.org

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MIPC Membership Form

The Michigan Invasive Plant Council welcomes those people interested in working on invasive plant concerns in the state of Michigan. Please make your check payable to "Michigan Invasive Plant Council" and send it along with this form to:

MIPC - Membership
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Useful Web Sites of Interest

Biological Control: A Guide to Natural Enemies in North America
www.nysaes.cornell.edu/ent/biontrol.html

Ecological Society of America
www.esa.org

Garlic Mustard Research at Michigan State University
www.ipm.msu.edu/garlicRes.htm

Garlic Mustard Web Site
www.ipm.msu.edu/garlicmustard.htm

Global Invasive Species Database
www.issg.org/database/welcome/

INVADERS database system - Noxious weed listings for all states and southern Canada
www.invader.dbs.umt.edu/Noxious_Weeds/

Invasive and Noxious Weeds/USDA Plants
www.plants.usda.gov/java/noxiousDriver

Invasive Plant Association of Wisconsin
www.ipaw.org/

Invasive Plants of Ohio
www.dnr.state.oh.us/tabid/2005/default.aspx

Invasive Plants of the Eastern United States
www.invasive.org/eastern/

Invasive Plant Species Assessment Work Group (Indiana)
www.invasivespecies.IN.gov

Michigan Botanical Club
www.michbotclub.org/

Michigan Lake and Stream Associations
www.mlswa.org

Michigan Natural Areas Council
www.cyberspace.org~mnac/

Michigan Nursery and Landscape Association
www.mnla.org/

Midwest Invasive Plant Network
www.mipn.org

National Conference on Ecosystem Restoration
www.conference.ifas.ufl.edu/NCER2007

National Invasive Species Information Center
www.invasivespeciesinfo.gov/

Natural Resource Conservation Service Plants Database
www.nrcs.usda.gov/

North American Weed Management Association
www.nawma.org/

Plants Database/USDA Plants
www.plants.usda.gov/

The Nature Conservancy
www.nature.org/

The Nature Conservancy Weed Control Handbook
www.tncweeds.ucdavis.edu/handbook.html

The Nature Conservancy Global Invasive Species Initiative Page
www.tncweeds.ucdavis.edu/

USDA APHIS PPQ Federal Noxious Weed Program
www.aphis.usda.gov/ppq/weeds/

Weed Feeders (biological control agents)
www.nysaes.cornell.edu/ent/biocontrol/weed-feeders/wdfdrtoc.html

Weed Science Society of America
www.wssa.net

Wildflower Association of Michigan
www.wildflowersmich.org/