Environmental Education Council of Ohio

Issue Focus:

Invasive Issues

Fall 2017

What is Environmental DNA?
Asian Carp Response in the Great Lakes

by Asian Carp Regional Coordinating Committee

Most of us have seen television shows where crime labs compare a person's DNA sample to DNA found at the crime scene. This gives investigators a clue as to whether or not a particular person may have been at that location at some point. While that type of DNA testing can track a genetic sample to a particular person, there are limitations on what a DNA sample can tell investigators. For example, they may not be able to tell how long a sample has been at a location or how it got there. DNA is found in certain genetic material like hair, skin and bodily fluids.

Silver Carp jumping in the Fox River, Illinois. Photo credit: USFWS - Carterville FWCO

In much the same way, the Army Corps of Engineers and others have been using environmental DNA, commonly referred to as eDNA, as a surveillance tool to try to find out if DNA from bighead or silver carp is present in certain waterways. eDNA is one of the many surveillance tools used by Asian Carp Regional Coordinating Committee (ACRCC) to monitor and track Asian carp in certain waterways. However, much like the DNA comparisons used to solve crimes, there are also limitations on what eDNA can tell researchers about Asian carp.

eDNA has been used as an early detection surveillance tool since 2009. It provides information about whether Asian carp DNA is present in water samples. What it doesn't tell researchers is if the genetic material came from a live or dead fish, one fish or several, or if the eDNA may have been transported from other sources (e.g., navigation vessels or fish-eating birds). Due to the two-week sample processing time, eDNA cannot yet provide precise, real-time, information about where Asian carp might be.

So if eDNA can't answer all these questions, why use it? Asian carp are notoriously difficult to find in waterways if the population is very low. The eDNA technique is much more sensitive than other standard fishery sampling gear, and is useful for early Asian carp DNA detection and to identify distribution patterns of DNA when the fish are low in abundance. A positive eDNA result tells researchers if Asian carp genetic material is present in an area, then that area may be a good place to use other sampling tools, such as netting, to look for signs of live Asian carp. It is important to note though, that despite over two years of eDNA sampling, hundreds of hours of monitoring efforts and tons of fish harvested, only one Asian carp has been captured in the Chicago Area Waterways above the electric barriers in the Chicago Sanitary and Ship Canal.

Continued Over Page

Save the Date

Find out more at
www.eeco-online.org

OEEF Grant
Letter of Intent due early January
Grant Due mid-January, by 5 pm
http://epa.ohio.gov/oee/EnvironmentalEducation.aspx

Grant Workshops
October 19, from 8:30 am until 2:30 pm at the Summit County ESC, Tallmadge, Ohio.

101 Conference
October 7 at Camp Kern, Oregonia, Ohio. See inside for details.

Inquiry-Based Learning Conference
November 2-3, at Burr Oak State Park/ See inside for details.

The Ohio Community Wildlife Cooperative Conference
November 8, 2017, Columbus. See http://go.osu.edu/OCWC17

Winter Snow - STEM Conference
February 2 & 3, 2018 at Camp Nuhop, Butler, Ohio. Details inside.

EECO 51st Annual Conference
April 12-15, 2018 at Maumee Bay State Park Lodge.

Life on a Sandy Delta
June 3-9, 2018, at Camp Oty'Okwa, Hocking Hills

eDNA: Asian Carp *Continued*

At present, eDNA evidence cannot verify whether live Asian carp are present. Released fall of 2011, the Environmental DNA (eDNA) Independent External Peer Review (IEPR), conducted by objective panelists with technical expertise in genetics and population ecology, confirmed eDNA sampling and testing methodology is sound for detecting silver and bighead carp DNA but cannot indicate the source of Asian carp DNA (information on the size, gender, number and age of individuals present and cannot distinguish between pure silver or bighead carp and their hybrids). To view the current USACE sampling results, please visit:

eDNA Water Filtering Photo Credit: USFWS

www.lrc.usace.army.mil/Missions/Civil-Works-Projects/ANS-Portal/eDNA/

Find out more about the response to Asian Carp in the Great Lakes and the Ohio River watersheds, along with videos and other resources at www.asiancarp.us/index.htm.

Find watershed specific results at www.fws.gov/midwest/fisheries/eDNA.html

Resources for Students and Teachers can be found at www.asiancarp.us/index.htm

Not in My Stream: Asian Carp Invasion lesson plan: from Michigan State University
http://kbsgk12project.kbs.msu.edu/blog/2014/12/22/not-in-my-stream-the-asian-carp-invaders/

Milkweed Seed Pod Collection

Sept 1 - Oct 31

The Ohio Pollinator Habitat Initiative is calling on Ohioans for a second year of Milkweed pod collections! This project started in 2015 as a 7 county pilot and last year hundreds of Ohioans worked together last fall to collect approximately 200 lbs of common milkweed seeds, totaling over 19 million seeds! Milkweed is the only host plant for the Monarch butterfly for egg laying and caterpillar rearing. It also serves as a food source for Monarchs as well as many other pollinator species. The disappearance of milkweed across the U.S. has contributed to the 80% decline of the eastern monarch butterfly population over the last 20 years. We are working hard to change this and you can help! Lets make our collection efforts in 2017 even better by following these simple tips!

• Make sure that before you collect seed, you become familiar with the common milkweed to avoid harvesting pods from similar plants such as hemp dogbane and swamp milkweed

• It is best to collect the pods when they are dry, grey, or brown. IT IS IMPORTANT TO CHECK THIS

• If the center seam pops with gentle pressure, they can be harvested.

• Store the pods in paper bags; plastic bags collect unwanted moisture.

• Put the date and county collected on the bag when you turn them in.

• Keep the pods in a cool, dry area until you can deliver them to the nearest collection site.

• You can find the nearest collection site at http://www.agri.ohio.gov/divs/SWC/searchlocalSWCD.aspx

Collections start September 1st and goes until October 30th (we will accept pods until November 1st)

If you have questions regarding milkweed collection, please contact Marci Lininger at marci_lininger@fws.gov or Lori Stevenson at Lori_Stevenson@fws.gov.

For more information on Milkweeds refer to this video! http://u.osu.edu/beelab/milkweed-seed/

Find out more about this Ohio Pollinator Intiative at http://www.ophi.info/

Great pollinator resources are available at http://www.pollinator.org/education.htm

Thousand Cankers Disease

By Cindy Meyer, OSU Extension of Butler County

Thousand cankers disease (TCD) is an emerging disease causing widespread mortality of walnut trees in the western United States. TCD was first detected as a general decline of walnuts in Colorado in the early 2000s. Initially the symptoms were attributed to drought, but it is now widely accepted that a fungus, Geosmithia morbida, is the cause of the observed walnut mortality. The fungus is carried by an insect, the walnut twig beetle (WTB; Pityophthorus juglandis), which greatly enhances the infectious potential of G. morbida.

Photo by Joe Boggs, OSU Extension

Walnut Twig Beetle (WTB) was originally confirmed in Butler County, Ohio in late 2012 and Thousand Cankers Disease (TCD) was isolated from the walnut branch samples taken in Butler County in 2013. This marked the first time TCD had been confirmed in Ohio.

What is TCD? TDC is caused by a fungus, Geosmithia morbida, which is carried by WTB. WTB's infect black walnuts with the fungus by boring into the branches and trunk tissue to complete their life cycle. The fungus kills areas in the phloem just underneath the bark. Commonly, these dead areas or cankers, overlap and cause disruption of the nutrient flow within the tree. The tree suffers repeated infections caused by the fungus and eventually dies. There is no known cure for TCD.

Ohio Department of Agriculture (ODA) has conducted TCD surveys since 2013. WTB's were collected in traps in 2013 and in 2016, Geosmithia morbida was also isolated in both of those years from samples collected from symptomatic trees. Results from 2017 are still being tabulated and tested. ODA plans to continue trapping in 2018 in and around Butler County.


Walnut Beetle Trap: Photo by Joe Boggs, OSU Extension

ODA has not documented widespread mortality although they are seeing symptomatic trees. Symptoms include:

- Sparse foliage or thinning of the canopy
- Leaf yellowing or wilting or branch dieback
- Excessive staining of the bark surface
- Presence of beetle holes in bark or galleries in branches or the trunk
- Presence of brown to black tissue surrounding beetle galleries inside the bark

Verifying these symptoms with a local tree expert or forester is important. Many diseases also have similar symptoms and therefore cannot be used only to identify TCD. Testing is also essential to confirm the fungus.

Butler County is quarantined. The quarantine prohibits anyone from removing regulated materials from Butler County. Regulated materials include walnut nursery stock, unprocessed walnut lumber, or any other walnut material, such as logs, stumps, roots, branches, mulch, wood chips, and any firewood. The quarantine does not apply to nuts, nut meats, hulls, processed lumber (bark-free and kiln-dried) and finished wood products without bark, such as walnut furniture, instruments and gun stocks.

Landowners and homeowners are encouraged to watch for signs of TCD on their walnut trees. For more questions, contact your local Ohio State University Extension office (extension.osu.edu) or a local forester. For additional information go to: thousandcanker.com or check out the following OSU factsheet: http://ohioline.osu.edu/factsheet/plpath-tree-07-0 .

Upcoming EECO News Themes

- Winter - Agriculture and EE - deadline Nov 1

If you think there is a project, lesson, recipe, etc that we should highlight in any of these upcoming issues, please contact Lynn White at whitelr@butlercountyohio.org

What themes would you like to see in 2018?

If there is a topic that you think would be of interest by other EECO member, please let us know.

The Hemlock Woolly Adelgid: Threatening Hemlock Trees in Ohio and Beyond

by Tom Macy, ODNR Division of Forestry, Forest Health Program Administrator

Eastern hemlock forest in the Hocking Hills

The Resource at Risk

Eastern hemlocks are special trees in Ohio – people love to hike, camp, hunt, and fish in hemlock forests. Places like the Hocking Hills and Mohican draw in millions of visitors every year due in large part to their scenic hemlock forests. These native evergreen trees are also ecologically valuable. The understories of hemlock forests are cooler and more shaded than the understories of forests dominated by hardwood (deciduous) tree species, and therefore they harbor a unique community of plant and animal species. Eastern hemlocks are commonly planted in landscapes throughout Ohio, but native hemlock forests are scattered across mainly eastern Ohio.

The Pest

The hemlock woolly adelgid (pronounced "uh-DEL-jid" – HWA for short), is a tiny insect, related to aphids, which attaches to the undersides of hemlock needles, where it feeds on the tree's sap. They are easiest to spot from October through June when they are covered in a protective ball of white cottony material, about 1/8 inch in diameter. HWA was accidentally introduced to eastern North America on imported Asian hemlock trees sometime before 1951, when it was documented near Richmond, Virginia. Since then it has been infesting and killing millions of eastern hemlocks and Carolina hemlocks throughout Appalachia. While HWA can be moved short distances by the wind, they are transported much farther on the feet and feathers of birds. This mainly occurs in the spring, when HWA is in its "crawler" stage, after egg-hatch and before permanently settling at the base of a needle. Humans also inadvertently move HWA on infested landscape trees. Population growth of HWA can be prolific, with two generations per year and asexual reproduction. Tree death typically occurs after 5-10 years of foliage discoloration, thinning, and branch dieback.

Eastern hemlock branch heavily infested with HWA

What Can be Done? What is being Done?

The first discovery of HWA infesting native hemlock forests in Ohio was in 2012 in southeastern Ohio. It is now confirmed to be present in ten counties in the southeastern and northeastern parts of the state, including the Hocking Hills. Luckily for Ohio's hemlocks, research done in other states over the last few decades has provided some key tools for protecting hemlock trees. Several insecticides are available that control HWA on hemlocks. Some systemic insecticides can provide up to seven years of control against HWA with a single application. While neonicotinoid insecticides have been implicated in the decline of some pollinating insects, when they are properly applied to hemlock trees for the control of HWA, there is very little impact to pollinators, since hemlocks (and all conifers) are wind-pollinated, and do not produce flowers attractive to pollinating insects. These systemic insecticides are indeed a critical management tool for keeping hemlocks alive and providing their important ecosystem services. The Ohio Department of Natural Resources (ODNR) has developed a hemlock conservation plan to identify the best hemlock forests in the state and is actively surveying for HWA in these areas and treating infested hemlock trees when they are found. Additionally, several insect predators of HWA have been identified as potential biological controls of HWA. While insecticide treatments are a critical rapid-response measure to keep hemlocks alive, two beetle species have been released in Ohio in hopes to establish future sustainable populations of biological controls for the suppression of HWA.

You can help! If you have hemlock trees on your property, inspect the undersides of the needles from October to June. There is no need to treat your trees with insecticides prior to identifying a HWA infestation. HWA is relatively easy to control in landscapes. Please report any suspected HWA infestations to the Ohio Division of Forestry at 1-877-247-8733 or http://ohiodnr.gov/hwa

2018 EECO Conference Call for Proposals is now Open

2018 EECO Conference

April 12-18

at Maumee Bay State Park

Session proposals are being accepted for the 2018 EECO Conference at Maumee Bay State Park on April 12-18. This year's conference theme is "On Board with Environmental Education" and strands will focus on Lake Erie and Water Education, STEM and Careers, Sustainability, Strategic Growth for Organizations, and Outdoor Education and Natural History.

You can request an electronic proposal packet by emailing Jeffrey.montavon@epa.ohio.gov. You may also request a hard copy by calling Jeff Montavon at (614) 644-3671. Deadline to submit proposals is October 27. You will be notified of acceptance by December. Presenters will receive a registration discount on the full conference registration fee.

Invasive Species Lesson Plans

From Project Learning Tree- Invasive Species

Throughout history, poeple have intentionally and unintentionally moved plant and animal species to new environments. SOme of thes species have proved beneficial, but others invade natureal habitats causing environmental, and sometimes economic harm. Students will research invasive species to determine how these species got to their new locations and what characteristics make them so challenging.

PLT has provided a sampler of activities, including this one on their website http://forestry.ohiodnr.gov/plt-ohioforests

From Ohio State Extention - Youth Scientists: The Emerald Ash Borer

This unit focuses on the Emerald Ash Borer (EAB) and the issues surrounding this invasive insect. Students become scientists as they learn about the EAB and walk through the process of science in a fun, hands-on way!

The learning unit along with other learning untis, extra resources, and information on how to request a kit are all available at http://u.osu.edu/youthscientist/

Project WILD - Least Wanted: Invasive Plants and Animals

Understanding the biological difference between native, non-native, introduced and invasive species; and a simulation activity illustrating the importance of early warning and detection of invasive plant or animal species as they attempt to establish themselves in an ecosystem. A demonstration of a professional biologist's management of an invasive species before and after its establishment, and how human decisions and movement can increase the speed and distance an invasive travels. Please visit projectwild.org/resources/documents/LeastWanted-InvasiveSpecies.doc

U.S. Fish and Wildlife Service - Wild Things: Investigating Invasive Species

thorugh this program, students learn: What is an invasive species? Why are invasive species harmful? What is the Fish and Wildlife Service doing to control invasive species? and What can YOU do to help control invasive species?

https://www.fws.gov/invasives/pdfs/wildThingsManual-1v4.pdf

Other Great Resources

Ohio Tree ID & Shrub (including invasive plants) pamphlet. PLT and the Division of Forestry is happy upon request to provide individuals with a copy. Contact Sue Wintering for details Sue.Wintering@dnr.state.oh.us

Ohio's Trees. A pdf from the Ohio Division of Forestry
http://forestry.ohiodnr.gov/portals/forestry/pdfs/ohiotreesbooklet.pdf

Ohio Environmental Education Fund

The Ohio Environmental Education Fund (OEEF) invites applications for mini grants ($500 - $5000) and general grants ($5,000 – $50,000) for education projects targeting pre-school through university students and teachers, the general public and the regulated community. The Request for Proposals for the July 2017 grant cycle is now open. Application guidelines are posted at www.epa.ohio.gov/oee. Please review the application guidelines, and the OEEF Grant Preferred Characteristics for projects targeting the three different audiences, before completing an application.

Prospective applicants can start the process by opening an account in Ohio EPA's eBusiness Center. This can be found at https://ebiz.epa.ohio.gov/. Electronic letters of intent to apply must be submitted in the OEEF online grant service no later than 5:00 p.m. on Jan 10, 2018. Completed proposals must be submitted in the OEEF online grant service no later than 5:00 p.m. on Jan 17, 2018.

Ohio EPA encourages OEEF applicants to discuss their proposal ideas with OEEF staff members before completing their applications. OEEF staff members will be happy to provide a pre-review of draft applications as they are under development in the online grant service.

Grant Writing Workshops

The Ohio EPA Office of Environmental Education offers grant writing workshops around the state throughout the year. If your organization would be interested in hosting a local workshop, please contact oeef@epa.ohio.gov.

- **Grant Writing 101: Finding the Right Funder** (format: half-day interactive workshop) Prospecting tips to help you identify foundations, corporations, and government grant programs, and how to approach different kinds of grantmakers.
- **Grant Writing 102: Writing a Winning Proposal** (format: half-day interactive workshop) How to avoid common mistakes applicants make, and develop realistic objectives, activities and budgets. OEEF will be referred to during this session.

Upcoming Workshops

OEEF Grant Writing 101 & 102
October 18
Dr. Samuel L. Bossard Memorial Library, 7 Spruce Street, Gallipolis, OH 45631.
Please contact Dennis Clement for more information and to register. dennis.clement@epa.ohio.gov

OEEF Grant Writing 101 & 102
October 19, 8:30 AM – 3:30 PM
Summit Educational Service Center, 420 Washington Ave., Cuyahoga Falls, OH 44221
Registration is required by e-mail to MissiZ@cybersummit.org by October 13, 2017. A workshop fee of $25 is being charged to cover continental breakfast, lunch and snacks.

Environmental Education Certification Program

December 4-8, 2017
Old Woman Creek Reserve in Huron, OH

EECO's EE Certification Program is back.

The week-long workshop will highlight:

- Foundations of Environmental Education
- Environmental Literacy
- Planning and Implementing EE
- Professional Responsibilities for the field of EE
- Assessing EE
- Networking with professionals from all over the state.

You can earn two graduate credits from Kent State University by completing the Environmental Education Certification Program. Credits are from the College of Education, School of Teaching and Learning.

For more info and registration, please see the website, www.eeco-online.org, or email eecertification@eeco-online.org

Other Grant Resources

Kohl's Associates in Action

Through the Kohl's Volunteer Program, Kohl's Associates donate their personal time to make a difference in their local communities by volunteering with eligible nonprofit organizations. With every qualifying event, volunteer efforts are rewarded with a $500 grant from Kohl's to the benefitting organization.
For additional information and eligibility requirements, visit https://corporate.kohls.com/corporate-responsibility/associates-in-action.

Target Field Trip Grants

Throughout the year, Target stores provide education grants to local K-12 schools to support educational field trips. Each grant is valued up to $700. Target accepts grant applications between noon CST Aug. 1 and 11:59 p.m. CT Oct. 1.
For additional information, visit https://corporate.target.com/corporate-responsibility/grants.

Ohio Humanities Grants

Ohio Humanities has recently announced a three-year initiative focusing on the environment. As part of this initiative, they seek to strategically invest in public conversations that address environmental issues from a humanities perspective.
For additional information, visit http://www.ohiohumanities.org/toward-a-beautiful-ohio/.
Ohio Humanities also supports cultural programs that share the human story through documentation, interpretation, reflection, and representation. Humanities scholars, community history specialists, and cultural heritage professionals play a key role in Ohio Humanities funded projects. Funded projects take many forms: documentaries, exhibitions, public talks, book festivals, and digital media.
For additional information, visit www.ohiohumanities.org/grants/

AEP Teacher Vision Grants

Teachers of pre-K through Grade 12 who live or teach in the AEP service area or in communities with major AEP facilities may apply.
Priority may be given to educators who:

- Have attended AEP Workshops for Educators
- Have participated in the National Energy Education Development (NEED) Project
- Are affiliated with an AEP school-business partnership

For additional information, visit www.aep.com/community/TeachersAndStudents/TeacherVisionGrants.aspx.

Martha Holden Jennings Foundation

Grants to Educators
The Grants to Educators program encourages individual educators to try innovative, smaller-scale activities within their classroom, school, or district. The maximum grant is $3,000.
Open Grants
Open Grant requests must be for one year only. The Foundation does not make grants for multiple-year projects. An organization may resubmit a proposal for continued funding based on the final evaluation report responses. The average Open Grant is $12,000.
For additional information, visit www.mhjf.org/.

US EPA Education Grants

Every year, EPA awards over $4 billion in funding for grants and other assistance agreements. From small non-profit organizations to large state governments, EPA works to help many visionary organizations achieve their environmental goals.
For additional information and grant resources, visit https://www.epa.gov/grants.

FirstEnergy STEM Classroom Grants

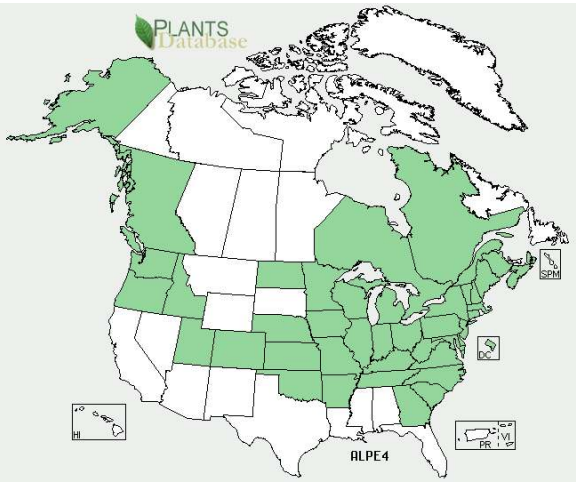
FirstEnergy proudly supports classroom projects and teacher professional-development initiatives focusing on science, technology, engineering and mathematics (STEM). Education grants of up to $1,000 are available for educators at schools and youth groups in communities served by FirstEnergy electric operating companies, other areas where FirstEnergy facilities are located, and where they do business.
For additional information and resources, visit www.firstenergycorp.com/community/education.html#gsc.tab=0.

Classroom Binocular Grants

Celestron Optics are offering high-quality binoculars for classrooms participating in citizen science. Binoculars will be given on a rolling basis through December 2017 until all 120 pairs have been distributed. Grant recipients are selected at the end of each month, with 1-2 programs receiving the grant each month. Teachers at any school (both public and private) in the United States are welcome to apply. Get details and apply at www.birdsleuth.org/mini-grants/

Garlic Mustard

from Ohio State University Extension



Source: USDA Natural Resources Conservation Service

Garlic mustard (Aliaria petiolata) is a cool-season biennial herbaceous plant. It was brought to North America from Europe, most likely as a medicinal herb or green vegetable. It was first described in the U.S. on Long Island, New York in 1868. Since then, populations of garlic mustard have been reported in 30 states, mostly in the Northeast and Midwest.

Garlic mustard is distributed throughout Ohio in moist woods and swampy areas and along forest edges and stream banks. It also invades disturbed areas such as roadsides and railways and is becoming a troublesome weed in reduced tillage. It is extremely tolerant of shaded conditions and is capable of establishing extensive, dense colonies in woodlands. In such situations, it out-competes and displaces native plants (wildflowers, trees, and shrubs) and the wildlife species that depend on them. Although usually found in shaded conditions, it is becoming more and more common in full sun. It prefers to grow in moist, rich soil, but can tolerate drier sites.

First year basal rosettes

Garlic mustard is a biennial that forms a rosette the first spring and an upright stem with small white flowers the second spring. It is characterized by triangular, coarsely toothed leaves and a slender taproot with a distinct S-curve just below the root crown. Young leaves give off a strong garlic odor when crushed, but the odor fades with leaf age and is nearly gone by fall. Garlic mustard reproduces only by seeds.

When trying to control garlic mustard, there are only a few options available to the landowner. The size of the infestation plays a critical role in what method a landowner may choose. If the infestation is small and not well established, hand pulling plants can be the simplest method to implement. Once garlic mustard has established itself, the goal is to limit or completely prevent the plants from contributing further seed to the seed bank.

Garlic Mustard Resources

Background Information
www.nps.gov/plants/alien/fact/alpe1.htm

Good video from Wisconsin
http://hiramtom.blogspot.com/2009/02/garlic-mustard.html

Scientific article about garlic mustard control
http://harvardforest.fas.harvard.edu/publications/pdfs/Stinson_PlosBiology_2006.pdf

Control info from Michigan State
www.ipm.msu.edu/invasive_species/garlic_mustard

FAQ from Michigan State
www.ipm.msu.edu/invasive_species/garlic_mustard/frequently_asked_questions_faq

Ohio State Extension Factsheet
https://ohioline.osu.edu/factsheet/F-66

Cooking With Garlic Mustard

Cooking tips for Garlic Mustard

*Use garlic mustard in any recipe calling for mustard greens.

*Young plants have a mild mustard flavor with hints of garlic and can be used raw.

*Older, larger leaves and plants have a more bitter, stronger flavor.

*The round leaves are less bitter than the triangular ones on the flower stalk.

*If the plant is in full flower or has produced seeds, it will be much more bitter.

*DO NOT USE plants that may have been treated with weed killer.

*Pull up the entire plant gently. The roots will keep it fresh until you are ready to use it. Then cut off the leaves, discard the flower stalk, wash and use.

*DO NOT PLANT IT!!! That is like planting dandelions-absolutely not necessary!

*Have fun being creative; experiment with this weed while helping to control it!

Wonderful book with great recipes: *Garlic Mustard Cookbook – From Pest to Pesto* from Kalamazoo Nature Center www.naturecenter.org

Recipes are adapted from the Pest to Pesto cookbook:

Garlic Mustard Lentil Soup

Served 6-8

- 3 cups shredded garlic mustard leaves
- 2 cups lentils
- 2 chopped carrots
- 3 potatoes
- 3 Tbsp dried oregano
- 4 Tbsp dried basil
- 3 Tbsp minced garlic
- 1/2 cup low sodium soy sauce

Soak lentils overnight. Boil 7 cups of water, add potatoes, carrots, and lentils and let cook 25-30 mins. Add the remaining ingredients and cook for an additional 25-30 minutes.

Garlic Mustard Pesto

- 4 cups fresh garlic mustard leaves
- 1 clove garlic
- 11/4 cup pine nuts or walnuts
- 3/4 cup grated Parmasean cheese
- 3/4 cup olive oil
- Salt to taste

Use a food processor to chop garlic mustard, garlic and nuts. Slowly mix in cheese and oil. Can be eaten on bread or crackers or pasta. If eating on bread or crackers, use 1/2 cup olive oil (will be too oily.)

Recipes are from Patapsco State Park for a Garlic Mustard Challenge:

Garlic Mustard Mexicali Cornbread

Submitted by Sally Voris

- Measure out 1/4 batch Golden Cornbread. Mix.
- Add 2 cups buttermilk
- ½ cup chopped garlic mustard leaves
- ½ cup frozen Mexican vegetables.

Bake at 450 in greased bread pan 20-30 minutes until bread springs back. Time required: 30 minutes.

Garlic Mustard Ricotta Dip

Submitted by Lucy McKean

- cup chopped garlic mustard
- cup non-fat ricotta cheese
- cup non-fat mayonnaise
- McCormick's Steak Seasoning
- White Wine Worchestershire Sauce

Mix all ingredients together. Adjust seasonings to taste, adding salt and pepper.

Mrs. Zs Garlic Mustard Mashed Potatoes

Submitted by Steve Wecker

- 4 large baking potatoes
- cup sour cream
- pound butter
- 2 slices salt pork, chopped
- cup garlic mustard leaves, chopped
- Pepper to taste

Boil 4 large russet potatoes til soft. Peel and mash. Saute Garlic mustard with salt pork. Drain. Add to potatoes with butter and garlic mustard. Add sour cream and pepper. Bake for 25 minutes at 350 degrees.

Garlic Mustard Pasta

Submitted by Alex Streat, age 12

- 1 pound linguine
- 2 TBSP. Butter
- cup garlic mustard, washed, crisped and chopped

cook linguine according to directions on box. Saute garlic mustard in butter. Blend with cooked linguine. Garnish with garlic mustard stems. Serve hot or chilled.

Garlic Mustard Scallion Cakes

Submitted by Jay Voris

- 2 eggs
- 1 bunch scallions, chopped
- 1 pkg flour tortilla
- 1 cup garlic mustard, chopped
- 2 tsp sesame oil
- oil for frying

Mix scallions and garlic mustard. Beat together eggs and sesame oil. Brush on side of a tortilla with egg mixture. Sprinkle on scallion/garlic mustard mixture. Brush egg mix on another tortilla, then put on top of 1st tortilla with egg side down (repeat until all tortillas are used). Cover with plate and weigh down with cans to seal tortilla (about 15 minutes). (Separate cakes with wax paper.) Heat oil in heavy pan. Brown cakes on both sides (~2 minutes total). Drain on paper towel. Cut into wedges and serve.

Earthworms: Blessing or Curse?

By Casey Brooks, Guernsey County Soil & Water Conservation District

Earthworms are often thought of as being highly beneficial to soil and the plants therein. This is certainly true in agricultural settings. Worms condition the soil for various crops, rapidly decompose organic matter and quickly return nutrients to the soil. In addition, their physical presence aerates the soil, allowing oxygen and water to filter into the plant roots, and create channels, called macropores, for roots to grow. Without these worm related activities, farmers and gardeners would have to expend more physical, chemical and hydrologic energy to produce a high yield. Earthworms create a relatively homogenous, consistent soil and can eat as much as half their body weight in a day, making a substantial amount of nutrient rich excrement over their lifetimes. Despite these benefits to agriculture, those very same worms are villains in our forests.

Most northern temperate forests in the U.S. have had no native earthworm populations since the Wisconsinian glacier more than 10,000 years ago. Over the last 200 years, these forests have been invaded by numerous earthworm species native to Europe and Asia. The earthworms north of the glacial moraine probably arrived with soils and plants brought from Europe. Ships traveling to North America used rocks and soil as ballast which they dumped on shore as they adjusted the ballast weight of the ship. During the late 1800's and early 1900's many European settlers imported European plants that likely had earthworms or earthworm cocoons (egg cases) in their soils. More recently, the widespread use of earthworms as fishing bait has spread them to more remote areas of the state. All common bait worms are non-native species. When non-native earthworm species are introduced into forest habitats, their impacts can be severe. Earthworms' impacts on ecosystems are very complex and although some aspects of their invasion are in need of further research, there is a general consensus that invasion of forests by earthworms can have significant negative impacts. As the earthworm populations expand, they can substantially affect forest soils by altering nutrient storage and availability, especially carbon, nitrogen and phosphorous. High earthworm populations effectively mix the O and A horizon into one homogenous soil layer, making nitrogen and phosphorous more available to the plants' roots at a very rapid rate. While this is beneficial in gardens and agricultural fields, it is detrimental to forest ecosystems that have evolved with slow release of nutrients to the soil. Their feeding habits disrupt the natural function of fungi in forest leaf litter by consuming much of the organic material. Forests with high, invasive earthworm populations tend to have a very thin organic layer and by the end of summer are often devoid of leaf litter. Since many spring ephemeral plants and trees depend on fungal relationships, as the leaf litter disappears, so do those plants. Loss of leaf litter also alters the micro-arthropod and insect community causing a windfall of changes in the forest floor as a whole. Earthworm presence tends to change communities dominated by fungal relationships to those dominated by bacterial relationships. Invasive earthworms are also capable of altering the pH of forests by secreting calcium carbonate, making normally acidic communities more alkaline.

To determine what species of earthworms are found in your area, mark off a section of a woodland garden or forest about three feet square. Then wait for a heavy rain (this test will not work in dry soil). If the soil is moist, apply a hot mustard solution, made by mixing two cups mustard with 10 ½ quarts of water. Sink five coffee cans, tops and bottoms removed, about an inch into the ground of the marked area; then pour the mustard solution into the cans. As the mustard infiltrates the soil layers, the various ecological groups will come to the surface in relation to their depth of feeding. Surface dwelling species (epigeic) first, followed by deeper dwelling (endogeic and anecic) worm species. If more than five worms surface, the area is infested. In rural areas researchers have found only about two worms per three square feet; in urban areas, numbers can be as high as 89.

Since their arrival, invasive earthworms have spread rapidly throughout North America and although there are approximately 100 native species of earthworm in the United States, none of those were found in glaciated regions of the country until European colonization. Invasive worms continue to be introduced into areas throughout the U.S., primarily through intentional and unintentional activities of humans. Earthworm populations are much higher near human settlements, popular fishing lakes and other areas of human disturbance. Naturally, earthworms move at very slow rates, so their rapid population expansion has been greatly accelerated by human activity. In areas where invasive earthworms are already established, there is no feasible way to eliminate them but their populations can be contained to those areas by minimizing soil disturbance and preventing spread to uninfested areas. In locations not yet infested by invasive earthworm species, prevention is the key. Fishermen/women should be careful not to release unused bait worms on shores of lakes or any other area where worms can survive. The worms should be disposed of by freezing, putting them in alcohol or simply throwing them in the trash. Care should also be taken anytime soil is disturbed in known earthworm infested areas, as egg cases, cocoons and individual worms can be in plant root balls, on tire treads or even shoe treads. By preventing future expansion of invasive earthworms into forests throughout the U.S. and Canada, detrimental effects on native forests can be averted, thus maintaining the diversity and ecological wealth of these spectacular habitats.

For more information visit the Great Lakes Worm Watch website; http://greatlakeswormwatch.org/

101 Alternatives to Chalkboard Conference

At YMCA Camp Kern, Oregonia, Ohio
Saturday, October 7, 2017

The 101 conference is an outdoor education workshop experience designed to inspire with creative and fun ways to provide exciting learning experiences.

Cost: $30. Includes all sessions, programs, meaks, and overnight accomodation (option of staying Friday and/or Saturday night).

Scholarships and discounts available. No charge for interns and students.

Contact Dave Moran for more details dmoran@daytonymca.org or 513-932-3756 x 1527

This event made possible by YMCA Camp Kern, the Environmental Education Council of Ohio, and the Ohio Environmental Education Fund

The Ohio Community Wildlife Cooperative Conference

November 8, 2017
Nationwide & Ohio Farm Bureau 4-H Center, Columbus

Is your community dealing with deer conflict? What about feral cats and other wildlife?

Join Ohio community leaders and planners for a one-day conference focused on helping cities and communities managing human-wildlife conflict. Get the information and resources you need while learning how other Ohio communities resolve conflicts with wildlife.

Topics for this year's conference include:

- Feral Cats (special guest Peter Marra, author of Cat Wars: The Devastating Consequences of a Cuddly Killer)
- Panel Discussion: Feral Cats in Ohio
- The State of Deer in Ohio
- Survey Techniques for Deer
- Bat and White-Nose Syndrome
- The 6 Steps to Bat Exclusion
- Maximizing the Benefits of Social Media
- Bobcat Behavior

Registration ($35) includes a light breakfast, lunch, and conference materials. $5 cancellation fee if cancelled before 10/30. Register at: http://go.osu.edu/OCWC17 before October 30th.

Inquiry-Based Learning Conference

November 2-3, 2017
Burr Oak State Park

Hosted by Rural Action and Camp Oty'Okwa, the goals of this conference are to:
1) Model the integration of inquiry-based learning and environmental education into preK-12 classes;
2) Provide field-based experiences for teachers and non-formal educators to better inform inquiry-based learning and environmental education across the region;
3) Better connect Appalachian Ohio schools with environmental education providers careers related to sciences and the environment

Cost: $35 per day

Contact Joe Brehm for more info, registration questions, or for scholarship info: joe@ruralaction.org or 740-767-2225.

(There is a $5 cancellation fee if cancelled before 10/30)

Find out more at : http://ruralaction.org/eeconference/

Upcoming Training Opportunties

Project Learning Tree Facilitators Workshop

October 25-26, 2017
Oak Openings Preserve, Oak Openings Lodge
Registration Deadline: October 20
Fee: $ 75.00
This two day workshop is intended for those who wish to facilitate training for outdoor educators, teachers, volunteers and other adult learners in the Project Learning Tree environmental education curriculum. $75.00 registration fee includes refreshments, meals and all PLT curriculum materials and supplies. Note that day two will start at 9 am and end at 3:30 pm. Attendance both days is required. 1 hour of college credit may be available. For more information contact Kim High, 419-467-8291, or Sue Wintering, 614-265-6657.

Project WET

November 1, 4 PM – 7 PM and November 8 4 PM – 7 PM
Lake Erie Nature and Science Center, 28728 Wolf Rd, Bay Village, OH 44140
Fee: $25 includes instruction, materials and Project WET 2.0 K-12 Curriculum Guide.
Early Bird Special – First 15 registrations will be $15.
Register online at www.cuyahogaswcd.org. Contact Jacki Zevenbergen at at jzevenbergen@cuyahogaswcd.org or (216) 524-6580 ext. 1006 for more information.

Project WILD

November 4, 9 am - 3:30 pm
Fernald Preserve, 7400 Wiley Rd, Hamilton, Oh, 45013
Contact Lynn White for more details and registration at whitelr@butlercountyohio.org

Project WET

November 7, 9 AM – 4 PM
Beachwood Community Center, 25325 Fairmount Boulevard, Beachwood, OH 44122
Fee: $25 includes instruction, materials and Project WET 2.0 K-12 Curriculum Guide.
Early Bird Special – First 15 registrations will be $15.
Register online at www.cuyahogaswcd.org. Contact Jacki Zevenbergen at jzevenbergen@cuyahogaswcd.org or (216) 524-6580 ext. 1006 for more information.

Online Environmental Education Courses

Northern Kentucky University is offering online courses in Environmental Education Fall 17.
Environmental Issues (EDU 594-001), Oct. 18-Dec. 15 – Students will investigate, evaluate and reflect on global and regional environmental issues, as well as develop action-based appropriate solutions.
Email Kimberly Yates yatesk2@nku.edu for more information.

Growing Up WILD Workshop

Thursday November 2, 2017 12:00pm to 3:00pm
Xavier University Cohen Center, 1658 Herald Ave, Cincinnati, Ohio
Workshop is free, but pre-registration is required. Contact Gwen Roth at gwen.roth@hamilton-co.org or Sara Fehring at sara.fehring@hamilton-co.org to register or for more information. Registration deadline is October 19th.

STEM Conference 2017

September 26-27, 2017

University of Cincinnati and Northern Kentucky University

The theme is "Partnerships, Networks, Pedagogy, Resources, Models – Stepping Up to the Challenges of STEM Educators," and the conference will focus on shaping the STEM educators of tomorrow.

Find out more and register at http://inside.nku.edu/artsci/centers/cinsam/p12teachers/stem-conference.html

Meet an EECO Board Member

Dave Moran has been overstaying his welcome at YMCA Kern since the early 90's. Drifting from seasonal into fulltime work he has been a lifeguard, naturalist, river monitoring coordinator, sailing instructor, he is now the Outdoor Education Director. Claiming degrees in English and education from Bowling Green University, he has yet to produce a diploma. Sometime in the early 2000's Dave was asked to join the EECO board. This imprudent invitation has entangled Dave with the organization ever since. He coordinates the EECO sponsored "101 Educators Conference" held every October at Camp Kern. Dave and his beautiful bride live in nearby Lebanon along with their two teenage sons (in spite of persistent promptings to move out and get a job). To avoid both work and family responsibilities Dave often hides on the Little Miami River where he enjoys fishing, paddling, cigars and copious amounts of canned beer.

Place-Based Education Conference

Nov 9 - 11, 2017
Eastern Michigan University

Place-based education is a powerful tool in education, environmental protection, and community development. The Great Lakes Stewardship Initiative and the SEMIS Coalition at Eastern Michigan University invite you to Ypsilanti, Michigan, for the 6th annual Place-based Education Conference, a one-of-a-kind gathering that will inform and inspire you.

This conference takes place Thursday, November 9, 2017 at 8:00 AM EST to Saturday, November 11, 2017 at 2:00 PM EST at Eastern Michigan University Student Center in Ypsilanti. You can find additional information here: http://placebased-edconference.org.

2017 Wetlands Science Summit!

H2-OH! Ohio Wetlands Work for Water Quality

Saturday, October 14, 2017
Everal Barn & Homestead, 60 N Cleveland Ave, Westerville, Ohio

The day's events include morning programs, a vegetarian lunch, and a field trip to a wetland.

Keynote by Dr. Wm. Mitsch presenting: "Wetlands: The Kidneys of Our Planet"

For full details on the Wetlands Science Summit visit: http://www.ohwetlands.org/wetlands-science-summit.html
Online registration is available using PayPal or your credit card or you can download a form and pay by check.

About Ohio Invasive Plant Council

The Ohio Invasive Plants Council is a coalition of agencies, organizations, and individuals throughout Ohio concerned about the introduction, spread, and control of invasive, non-native plants in Ohio's natural habitats. OIPC promotes public awareness of invasive species issues and encourages land management and research to detect invasive species and prevent new invasions into natural ecosystems. OIPC was formed as a 501(c)(3)not-for-profit organization in 2005 as a result of efforts in the late 1990's to improve awareness of the threats of invasive plants.

Invasive Plant Assessment Program

OIPC is developing a new list of invasive, non-native plants that threaten the health and diversity of natural ecosystems in Ohio using an objective, science-based process. find out more about this assessment and more from OIPC at www.oipc.info/

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