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VIRGINIA FOREST LANDOWNER UPDATE

Events, News, and Information Promoting the Stewardship of Virginia's Forest Resources

INSIDE

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An Introduction to IPM

by Daniel Frank, Virginia Tech

Control of pests is best accomplished using a process called Integrated Pest Management (IPM). IPM focuses on long-term prevention of pests or their damage through a combination of appropriate control tactics. These tactics can be preventative, curative, or both and are often combined to provide the best possible results. An IPM program proactively seeks to determine and correct the cause of a pest problem while also minimizing risks to human health and the environment. In short, IPM can be thought of as best practices for managing pests. IPM plans can be developed for virtually any setting where pests occur such as gardens, farms, natural areas, or homes.

Although IPM plans can vary with each situation, they all follow a similar process:

- Identify the pest(s) to be managed.
- Use prevention strategies to deter the pest(s).
- Monitor pest populations and assess their damage.
- Determine a guideline (threshold) for when control action is needed.
- Use a combination of appropriate control methods to reduce pest populations.
- Evaluate the results of control efforts.

Together, these actions enable informed and intelligent decision-making regarding pest control.

Pest Identification

Correct identification of the pest or problem is the foundation of any IPM plan and can be considered the most important step. It starts with asking yourself if what you are seeing is actually a pest. Proper identification will also provide you with important information about the pest. This can include its preferred habitat, life cycle, and the factors that influence its spread and development. The more information that can be gathered about a pest, the greater the opportunity for cost-effective and successful pest control. Although identifying a pest can sometimes be difficult, there are several Virginia Cooperative Extension resources that can help.

Virginia Tech Diagnostic Labs:
- Insect ID Lab, ento.vt.edu/idlab.html
- Weed ID Clinic, agweedsci.spes.vt.edu/extension/weedid.html
- Plant Disease Clinic, spes.vt.edu/affiliated/plant-disease-clinic.html

Virginia Cooperative Extension Publications:
- Pest Management Guide: Horticulture and Forest Crops, https://www.pubs.ext.vt.edu/456/456-017/456-017.html
- General Information, pubs.ext.vt.edu/

Your Local Extension Agent:
ext.vt.edu/offices.html

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Some plant pests, like garlic mustard, can be effectively removed mechanically (hand-pulling). Image by: Chris Evans, University of Illinois

Events Calendar

For the most complete listing of natural resource education events, visit the online events calendar at https://forestupdate.frec.vt.edu

SCHEDULED EVENTS 2023

DATE	LOCATION / DETAILS	EVENT DESCRIPTION	CONTACT
April 26	Williamsburg 8:00 - 12:30 $25/person includes lunch	**Trophy Hunting For Trees** Join Big Tree Hunter Byron Carmean and Colonial Williamsburg Arborist Charles Gardener to learn about the big, remarkable, and historic trees in the Williamsburg area. Byron will demonstrate how to measure big trees using the historic Compton oak.	Jennifer Gagnon jgagnon@vt.edu 540-231-6391
April 26 - 28	Williamsburg Times and price vary	**Virginia Forestry Summit** Join landowners and natural resource professionals from across Virginia for this educational and networking event.	Virginia Forestry Association vfa@vaforestry.org 807-278-8733
May 11 **May 18** **June 9**	Red Oak Halifax Bedford 10:00 - 3:00 $10/person includes lunch	**Spring Venture Outdoors** Are you a woodland owner interested in topics such as: tree identification, invasive plant and insect management, hardwood management, and water quality? If so, consider attending one of these one-day short courses on management options for your Southside woodlands.	Jason Fisher jasonf@vt.edu 434-476-2147
May 19-20	Galax • 5/19 7:15 - 6:00 • 5/20 7:15 - 1:00 • $65*/person • $110*/couple	**Southwest Virginia Beginning Woodland Owner Retreat** The Beginning Woodland Owner Retreats were developed for those new to active woodland management. A combination of classroom, field trip, and hands-on activities will be used to teach concepts of sustainable woodland management. On-site lodging is available for an additional $40/person.	Bill Worrell bworrell@vt.edu 276-889-8056
June 5 - **Aug. 11**	Online $45/family	**Online Woodland Options for Landowners** This 10-week self-paced online course teaches the fundamentals of forest management. Upon completion of the class, you will have a draft forest management plan.	Jennifer Gagnon jgagnon@vt.edu 540-231-6391
Summer TBA **Sept. 16** **Nov. 2**	Chatham Charlottesville Richmond area	**Generation NEXT Legacy Planning Workshops** Learn how to pass your land and your legacy on to the next generation while keeping it intact, in forest, and in family ownership.	Karen Snape ksnape@vt.edu 540-231-6494
Sept. 8 - 9	Providence Forge Registration opens in June	**Southeast Virginia Beyond the Basics: Advanced Woodland Owner Retreat** This Retreat is for woodland owners with experience actively managing their land. Classroom, field trip, and hands-on activities will be used to teach advanced concepts of sustainable woodland management.	Jennifer Gagnon jgagnon@vt.edu 540-231-6391

ONGOING EDUCATIONAL PROGRAMS

Virginia Master Naturalist Volunteer Basic Training
Available statewide. Dates, times and fees vary.
People who are curious about nature, enjoy the outdoors, and want to be a part of natural resource management and conservation in Virginia are perfect candidates to become Virginia Master Naturalists. Visit www.virginiamasternaturalist.org to find a chapter near you and learn more about training schedules.
Michelle Prysby, Statewide Coordinator, 434-872-4580

Fifteen Minutes in the Forest
Online video series. Every other Friday at 12:15pm.
Join Virginia Cooperative Extension's Forestry Team (and special guests) for videos about a natural-resource related topic. Connect or find past videos:

- **YouTube:** https://www.youtube.com/c/VirginiaForestLandownerEducationProgram
- **Facebook live:** www.facebook.com/VFLEP

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Prevention Strategies

Prevention strategies can help limit the factors that contribute to pest issues. Preventative measures taken before a pest appears can result in fewer rescue treatments, and should be used first if practical and available. It may be easier and more effective to remove the reason why the pest is present in the first place, as opposed to controlling the pest after the fact. Prevention strategies are used to create a healthy growing environment that limits the introduction of pests and their ability to reproduce, develop, and/or spread.

Preventative tactics can include:

- Selecting plants that are best suited to the existing site conditions (e.g., hardiness zone, sun exposure, soil type, drainage);
- Choosing disease- or pest-resistant plant cultivars/ varieties;
- Using pest-free seeds or transplants;
- Cleaning and disinfecting tools, equipment, and potting materials;
- Ensuring that appropriate growing practices are implemented (e.g., providing adequate moisture and fertilization, proper maintenance).

Monitoring and Assessment

Another key component to a successful IPM plan is regular monitoring of pest populations or their damage. Monitoring can answer several important questions:

- Is the pest present?
- Where is the pest located?
- How abundant is the pest?
- What is the severity of damage?
- When is the best time to implement a pest control tactic?
- How effective were pest control efforts?

To aid monitoring efforts, it is important to learn about the preferences and common problems relevant to the system being managed. Pest management guides can be a good source to familiarize yourself with some of these issues.

Regular monitoring will allow for early detection of pests, which can help prevent or minimize a pest outbreak. Specifics on how often monitoring should be conducted depends on the system being managed and the pest. Regardless, it is often easier to control a pest problem in the early stages before populations have increased in size and spread.

Pest populations can vary from one location to another and from year to year. For this reason, it is important to consider keeping records of your monitoring activities. Records can help you manage pests during the current growing season, evaluate current control methods, and predict problems in the future.

Determining Thresholds

If preventative measures fail to control a pest population, you will need to assess their damage and set a threshold for when to initiate a control measure or rescue treatment. The objective of IPM in most forest settings is not to eliminate the pest population, but to suppress pest numbers or damage to a tolerable level. In many cases, a certain level of pest presence can be tolerated because the complete eradication of a pest species may be prohibitively expensive or technically impossible. When establishing thresholds, a number of factors can be considered such as the potential damage (economic, aesthetics, health, etc.) from the pest, and the cost and/ or time involved in its control. Determining a threshold for each pest you are assessing will help you move forward with implementing control tactics efficiently and effectively.

For some pests and commodities, thresholds have been developed based on economic or other considerations and are often based on monitoring data (e.g., percent defoliation, leaf wetness duration, population numbers per unit area). However, in some situations thresholds cannot be developed or have limited value. This is particularly true for many plant diseases, disease vectors (e.g., mosquitoes, ticks, fleas), or newly invasive species, which essentially have a threshold of zero. Controls for these pests are often initiated preventively or immediately upon detection.

Control Methods

When pest populations and/or their damage exceed established thresholds, it is time to initiate a control measure or rescue treatment. In an IPM program there are nonchemical and chemical control methods available. Nonchemical control methods should be used first if available and feasible. The techniques or tactics you choose will depend on the target pest and the amount of control needed. IPM promotes the use of four basic pest control methods, as explained below.

Cultural Control: Controlling a pest with cultural methods involves modifying or disrupting the pest environment to make it less habitable. Many cultural control tactics can be thought of as preventative because they keep pest populations from developing or delay their impact. Examples of cultural control tactics include:

- Sanitation practices (e.g., removing infested,diseased, or susceptible trees).
- Eliminating alternative hosts or habitats (e.g., removing nearby weedy species that serve as a reservoir for pests and diseases).
- Forest thinning
- Diversification of forest stands

Mechanical or Physical Control: This method involves the use of hands-on techniques or simple equipment or devices to reduce pest populations. This is often achieved through activities that directly remove or exclude the pest from the system. Examples of removal include the use of traps to remove insects or pest animals, or hand removal of weeds.

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Techniques that focus on removal can be particularly effective if pest populations have not already reached high levels. Exclusionary tactics limit pest access to the plant or into an area. Examples of exclusion include the use of tree guards to prevent damage to the trunks of young trees, or the use of fencing.

Biological Control: This method involves the use of living organisms (i.e., natural enemies) to reduce pest populations (typically insects and weeds). Introducing or encouraging natural enemies can reduce the severity of potential pest outbreaks. Conservation of natural enemies (i.e., protecting and maintaining existing populations) is a readily available form of biological control for any landowner. Common conservation practices include limiting the use of broad-spectrum pesticides that kill a wide range of beneficial organisms, and providing habitat that promotes the establishment and survival of natural enemies.

Chemical Control: This method involves the use of pesticides to reduce pest populations. Pesticides can be an important tool in pest management, especially when nonchemical methods fail to provide adequate pest control. However, they must be selected and used with care and attention. One of the most important factors when selecting a pesticide product is its safety. Although pesticides are often designed to kill pests, some active ingredients or product formulations are more toxic than others and may pose a greater risk to human health and/or the environment. A product's label provides signal words (Caution, Warning, Danger) to indicate relative toxicity to humans. The label also contains information on potential hazards to humans and the environment as well as ways to mitigate potential harm. Always read and follow the label directions for any pesticide product used.

Evaluating Results

An important, but often overlooked, step is to evaluate the results of your control efforts. Because of the variability present in any biological system, the effectiveness of an IPM plan may change over time or between sites. Understand that IPM plans are not static, but constantly evolve as more information is collected and new control tactics are developed. There is seldom a single correct solution to a pest problem. Regular monitoring will help you to determine how well you are meeting your pest management goals and if changes are needed. Be aware that some control tactics may be slow to show noticeable results. It is also important to evaluate any potential negative impacts your control efforts may have on the target treated, natural enemies present, and the environment before deciding to continue using them in the future.

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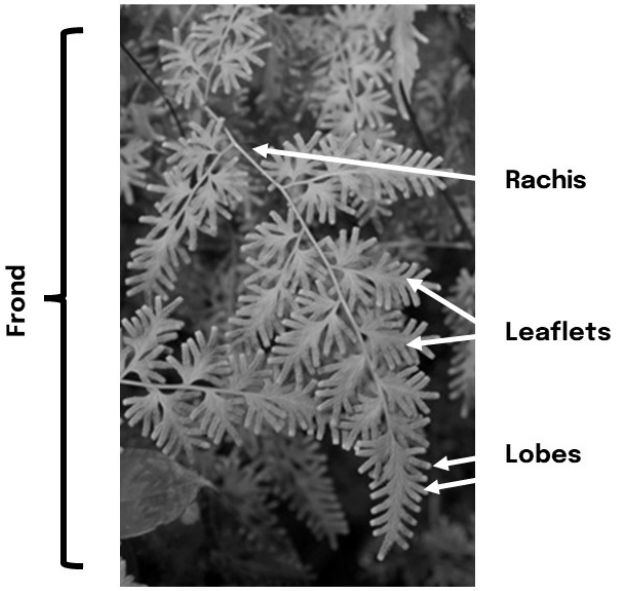
Climbing fern, continued from page 5.



Anatomy of a Japanese climbing fern frond. Original image by Chris Evens, University of Illinois. Modified by Jennifer Gagnon, Virginia Tech.

Stems: Thin, wiry, difficult to break, green to straw colored or reddish. Mostly deciduous in late winter.

How to Control Japanese Climbing Fern

Cultural Control: Do not plant Japanese climbing fern. Remove existing plants. Bag and dispose of plants in a dumpster or burn them. Clean shoes, clothes, dogs, and equipment before leaving infested areas. Tiny spores can hitchhike, so use extreme care to prevent spreading them. Minimize disturbance within miles of where this plant occurs.

Mechanical or Physical Control: Fire is ineffective because the fern quickly regrows after being burned. Hand-pulling will not effectively remove the rhizomes.

Biological Control: There is no known effective biological control agent for Japanese climbing fern.

Chemical Control: Chemicals (herbicides) are the best way to control Japanese climbing fern. If possible, treat when plants are young, before they start forming spores. Herbicide application is most effective from July to October.

Products containing glyphosate and metsulfuron methyl are most effective and can be combined. Metsulfuron methyl is less damaging to surrounding native vegetation than glyphosate. When applying herbicide, it is important to use a surfactant to improve adherence to the plants.

Now, I know you are waiting with bated breath to know if the fern recently found in southeast Virginia is the nonnative Japanese climbing fern or the native American climbing fern. And the answer is, unfortunately, the nonnative. A positive identification was made by Darren Loomis with the Virginia Department of Conservation and Recreation this week.

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You Ain't From Around Here! Nonnative Invasive of the Quarter: Japanese Climbing Fern (*Lygodium japonicum*)

by Jennifer Gagnon, Virginia Tech

Approximately one million years ago, I was a researcher at one of the most beautiful places in the southeast, the Jones Ecological Research Center at Ichauway, in southwest Georgia. My research job entailed designing experiments, implementing them in the forest, and periodically collecting data. Most of the research plots I collected data from have faded from memory. But one plot in particular sticks in my mind.

This plot always felt creepy because it had been invaded by the nonnative invasive Japanese climbing fern. I collected data in the growing season (summer) and dormant season (winter). In the summer, the plot was danker and more humid than the surrounding forest and dark, due to the dense climbing ferns on the stems of the mature longleaf pines. In the winter, the cold-sensitive climbing ferns died back, leaving behind a shroud of dead biomass. During both seasons, it just felt, well, slimy.

When I moved to Virginia in 2005, I was delighted to learn Japanese climbing fern was not in the commonwealth. So, as you may imagine, last month I was dismayed to hear from a landowner who thought he found it on his property in southeast Virginia. He had some rather convincing photos and was waiting on a positive identification from a local forester. Japanese climbing fern has been identified in North Carolina, West Virginia, and Tennessee, so it is certainly possible that it is in southeast Virginia. But there is a native look-alike, the American climbing fern, which occurs in many Virginia counties. So, as we waited for the verdict, I decided to make Japanese climbing fern my nonnative invasive of the quarter.

Ferns, as a group, are ancient and abundant. Ferns make up an ancient division of vascular plants, some of them occurring as long as 358.9 million years ago. They reproduce from spores instead of seeds. Plants began reproducing by spores long before they began reproducing by seeds. When released, spores are carried by wind and a small percentage of them fall in areas suitable for germination. The number of known species of ferns is about 10,500 but estimates range as high as 15,000 because new species are still being identified.

You may not think of ferns as being viney. But Lygodium, the genus Japanese climbing fern is in, contains about 40 species of ferns that are native to mostly tropical areas across the world, with a few species native to temperate areas in eastern Asia and North America. Lygodiums are unusual in that the rachis, or midrib, of the frond is thin, flexible, and long, and as the frond unrolls, the rachis twines around supporting structures, like branches, so that each frond forms a distinct vine.

Japanese climbing fern is native to eastern Asia, including Taiwan, Japan, Korea, southeastern Asia, India, and eastern Australia. It was likely introduced to Florida in 1932 as an ornamental perennial. Today, Japanese climbing fern is present throughout the southeastern U.S., Oklahoma, Texas, and Hawaii. Japanese climbing fern can invade a wide variety of habitats but prefers moist soils. It invades forests, swamps, marshes, river and stream banks, pine plantations, pastures, roadsides, fence rows, and other natural and disturbed areas. And like many nonnative invasives, Japanese climbing fern is good at reproducing. It reproduces via spores, self-fertilization, and underground root systems, called rhizomes.

An invasion by Japanese climbing fern changes the feel and the composition of a pine forest. Image by: Florida Division of Plant Industry.

Japanese climbing fern can have major ecological impacts. Vines climb into the forest canopy and smother the crowns of individual trees. They also create deep shade, reducing light to the forest floor, which can eliminate growth of understory vegetation. Dense masses of Japanese climbing fern outcompete native plants and prevent native plant seeds from germinating. In addition, the vines on the tree trunks create a fuel ladder for fire. Fuel ladders allow fire to travel up the stems into the crowns, often resulting in tree mortality. As such, prescribed fire cannot be used as a tool for controlling Japanese climbing fern. Finally, the vines obstruct sight-lines through the forest, reducing the aesthetic appeal and hunting opportunities.

Like many nonnative invasives, there are some uses for Japanese climbing fern. I admit, up close, this is a beautiful, delicate, lacy looking plant, and it is used as an ornamental. In its native environments, it is used to treat renal ailments, colds, kidney stones, inflammation, snakebites, wounds, ulcers, scabies, boils, and other skin conditions. The vine is also used by crafters. And for those of you with an adventurous palate, the young fronds are edible (I have eaten fried fronds from other species of ferns and they are indeed tasty).

How to identify Japanese climbing fern:

Leaves: Rachis is wiry and twines. The compound leaves (fronds) are oppositely arranged along the rachis, usually triangular, 3-6" long, and 2-3" wide. The light green leaflets that make up the fronds are highly dissected or lobed. Lobes are pointed or rounded at the tips, and flat at the margins when no sporangia are present (sterile leaflets). Fertile leaflets have margins that curve over rows of sporangia. Leaflets are fuzzy underneath.

Climbing fern, continued on page 4.

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