

Progress
Education
Science
Technology

Vol. 16 No. 4 Dec. 2011

Quarterly Newsletter
on
Forest Pest Management
Issues

PEST is a quarterly newsletter that provides up-to-date information on existing forest pest problems, exotic pests, new pest management technology, and current pesticide registrations in pine seed orchards and plantations. The newsletter focuses on, but is not limited to, issues occurring in the Western Gulf Region (including, Arkansas, Louisiana, Mississippi, Oklahoma, and Texas).

Announcement:

Paladine Registered - On May 13, the FDACS approved the conditional registration of Paladine® (dimethyl disulfide) soil fumigant to control/suppress weeds, plant pathogens, and nematodes in soils to be planted with vegetables, strawberry, blueberry, ornamentals, and **nursery stock**. The EPA registration numbers for the Arkema, Inc. products are 55050-4 and -5.

(Source: PREC Agenda, 6/2/11 via Chemically Speaking, May 2011).

Forest Pest Management Cooperative



Nantucket Pine Tip Moth, *Rhyacionia frustrana* (Comstock)

Texas Forest Service, Forest Pest Management,
P.O. Box 310, Lufkin, Texas 75902-0310

Pesticide General Permit

On October 31, 2011, the Environmental Protection Agency (EPA) issued a final National Pollutant Discharge Elimination System (NPDES) Pesticide General Permit (PGP) for point source discharges from the application of pesticides to waters of the United States. This action was in response to a 2009 decision by the U.S. 6th Circuit Court of Appeals in *National Cotton Council, et al. v. EPA*, which found that point source discharges of biological pesticides, and chemical pesticides that leave a residue, into waters of the U.S. were pollutants under the Clean Water Act (CWA). As a result of the Court's decision, NPDES permits are required for these discharges beginning on October 31, 2011.

EPA's PGP covers discharges in areas where EPA is the NPDES permitting authority, which include six states (Alaska, Idaho, Massachusetts, New Hampshire, New Mexico, and Oklahoma), Washington, D.C., all U.S. territories except the Virgin Islands, most Indian Country lands, and federal facilities in four additional states (Colorado, Delaware, Vermont, and Washington). The remaining 44 states and the Virgin Islands are authorized to develop and issue their own NPDES pesticide permits. EPA has worked closely with those states since the Court decision and to date most of the authorized states have reported that their general permits either are or will be finalized by October 31, 2011.

In areas where EPA's PGP applies, all eligible Operators will be covered under the PGP automatically until January 12, 2012 without having to submit a Notice of Intent (NOI). For any discharges that occur beyond January 12, 2012, Operators who are required to submit NOIs (as identified in the PGP) will need to submit those NOIs at least 10 days prior to discharge (or 30 days prior to discharge to National Marine Fisheries Service (NMFS) Listed Resources of Concern). This means that

Continued on Page 2

Pesticide General Permit (continued from Page 1)

an Operator required to submit an NOI who has a discharge occurring on January 13, 2012 would need to submit an NOI by January 3, 2012 (or December 14, 2011 for discharges to NMFS Listed Resources of Concern) to ensure uninterrupted permit coverage. The Agency encourages those Operators who are required to submit NOIs to do so as early as possible. EPA developed an electronic NOI (eNOI) system to simplify NOI submission.

The provisions of the PGP are designed to improve protection of our nation's water quality by minimizing discharges of pesticides to waters of the U.S. EPA's final permit covers discharges of biological pesticides, and chemical pesticides that leave a residue, from the following pesticide use patterns:

- Mosquito and other flying insect pest control,
- Weed and algae control,
- Animal pest control, and
- Forest canopy pest control.

The final PGP requires additional protective measures beyond Federal Insecticide, Fungicide and Rodenticide (FIFRA) pesticide label requirements. Specifically, the final permit requires permittees to minimize pesticide discharges through the use of pest management measures and monitor for and report any adverse incidents. Some permittees are also required to submit NOIs prior to beginning to discharge and implement integrated pest management (IPM)-like practices, which should reduce the amount of pesticides discharged to waters of the U.S. Record-keeping and reporting requirements in the permit will provide valuable information to EPA and the public regarding where, when, and how much pesticides are being discharged to waters of the U.S. Many of the revisions reflected in the final permit are designed to streamline the requirements as well as incorporate flexibility and reduce burdens on small entities.

As a result of consultation with federal resource agencies as required by the Endangered Species Act (ESA), the permit includes additional requirements for certain Operators who discharge to waters of the U.S. containing NMFS Listed Resources of Concern. EPA's website (www.epa.gov/npdes/pesticides/) includes information on these resources, including their geographic locations. Operators with discharges to waters of the United States containing NMFS Listed Resources of Concern must determine their eligibility for coverage through additional ESA-

related criteria outlined in the permit and submit an NOI and annual reports and implement IPM-like practices.

The PGP does not cover, nor is permit coverage required for, pesticide applications that do not result in point source discharge to waters of the U.S., such as terrestrial applications for the purpose of controlling pests on agricultural crops, forest floors, or range lands. Also, agricultural runoff and irrigation return flows continue to be exempt from permitting, as provided under the CWA.

EPA developed this general permit to provide an option for Operators to comply with the CWA permit requirements. Without a general permit, entities applying pesticides would have to obtain coverage under individual permits to legally discharge these pesticides to waters of the U.S. Individual permits generally take longer to obtain and typically are more burdensome than general permits. Additionally, the purpose of the permit is to provide coverage for discharges of pesticides to waters of the U.S. and, provided all of the permit requirements are met, shield the permittee from liability from citizen lawsuits.

In the first 120 days after the effective date of the PGP, as the Agency does with many newly established regulatory and permits programs, EPA will focus on compliance assistance and education of the permit requirements and obligations, rather than on enforcement actions. The Agency will continue to conduct outreach with permittees, with a focus on small entities affected by this permit, particularly in areas with NMFS-listed species.

History

In developing the PGP, EPA conducted extensive outreach and participated in more than 200 meetings with stakeholders between the Court's 2009 decision and issuance of the final permit. A draft permit was proposed on June 4, 2010, for public comment, and on April 1, 2011, EPA posted online a pre-publication version of the draft final permit to assist states in developing their own permits and for the regulated community to become familiar with the permit's requirements before it became effective. EPA's final PGP is nearly identical to that posted in April, except that requirements have been added to

Continued on Page 3

Pesticide General Permit (continued from Page 2)

protect endangered species and additional state-, territory-, and tribe-specific water quality requirements applicable to discharges in those areas. During ESA consultation with EPA, NMFS determined that certain NMFS-listed species of salmonids, eulachon and sturgeon were resources of concern based on its review of EPA's biological evaluation of the effect of discharges to be covered under the permit. EPA expects that a small percentage (approximately 2%) of pesticide discharges covered under the permit will occur to waters of the U.S. that contain NMFS-listed species and their critical habitat. These ESA-provisions were considered only for areas for which EPA's permit applies. The 44 NPDES-authorized states are not bound by the same ESA consultation requirement under the federal NPDES program, and, thus, the 44

states are not necessarily obligated to adopt similar ESA provisions for listed species in their areas.

State-, territory-, and tribe-specific requirements are the result of CWA Section 401 certification requirements that provide those states, territories, and tribes with an opportunity to add conditions to EPA's permit to ensure that discharges covered under EPA's permit are consistent with any state specific water quality requirements.

For More Information

More information on the NPDES requirements for discharges from pesticide applications including EPA's final PGP, the accompanying PGP fact sheet, and an interactive tool to help potential permittees determine their permitting requirements are available at: www.epa.gov/npdes/pesticides.

Contact: Jack Faulk at faulk.jack@epa.gov.

Thought You Might Be Interested to Know . . .

How Death Anxiety Affects Pest Control Perceptions

By Bruce Colman

(Source: Tree Care Industry Magazine, Jan. 2006)

A pesticide applicator works in the crosshairs of two major anxieties. The fear of insects is thought to exist almost at birth. Many people have irrational fears of chemicals, mostly I believe, because we tend to fear what we don't understand. All fears are rooted in a base anxiety called "death anxiety." We fear insects because there lays a suspicion that they could kill or harm us. While most people receive insect bites without any adverse reaction, that fact still doesn't mean we won't go far out of our way to eradicate any potential threats.

I have been a certified pesticide applicator for more than 22 years. In that time I have experienced a wide range of reactions to both insects and pesticides. Most of the time a person's reactions to insects or pesticides tell us more about that individual than about the insects or pesticides.

Mrs. "M" wanted to meet me to go over her landscape before I did her pest control application. Her landscape had been installed about a year ago and this was the beginning of fall. Our practice is to inspect each plant and apply pesticides on any plants that will benefit. This generally means that if we find an insect or disease in a high enough concentration to cause visible damage, we make the appropriate application. So Mrs. M and I start to walk around her

clean, small, but well-designed landscape. I point out a few issues on some plants and I can see in her eyes a fairly high level of anxiety over what I was showing her. Soon she is going from plant to plant showing me minor insect, fungal, and bacterial damage. At this point I start making statements like "yes, this is a slight problem, but the plant looks great overall and is going to be OK." Finally I stop Mrs. M and tell her that every plant has something damaging it, in a minor way, but that most of the time - 99 percent of the time - the overall health of the plant will not be affected. Then she says "but you are going to spray every plant, aren't you?" I assure her that I will spray all the plants that will benefit from the application.

Death anxiety is the generalized, and unconscious, fear we all have over our own death. It is a fear we all live with from day to day. Most of the time we have a general acceptance of our impending death but we continue to function in a basically healthy way. Sometimes, though, we become overwhelmed. When this happens we become overly sensitive to any death or decay. We also commonly project our anxiety to things around us, including the plants in our landscapes.

Continued on Page 4

Death Anxiety (continued from Page 3)

Death anxiety can also elicit a different response from a customer. Mrs. "T" had been a customer for many years. One day I knocked on the door to tell her I was there for the regularly scheduled pest control application. She was glad to see me as she was worried about the health of the tree that I was there to treat. She then asked me if I had an organic pest control that I could use to treat the plant. She recently had been diagnosed with cancer, and she was worried about any potential carcinogens in her environment. I thought about the fact that the vehicle I drove to her house was a diesel truck and the exhaust was a known carcinogen. And I thought

about the fact that none of the pesticides we used were known carcinogens. But instead I told her there was an organic product that I could use. She accepted the new work change order, I was able to take care of the tree and she was able to feel safer.

Of course there are as many ways that death anxiety can affect how someone will respond to plant disease and pesticides. These are only two examples.

As a plant health care specialist it can be difficult to balance responsible stewardship of the environment and meet the needs of our customers. By better understanding our customers, we can bring balance to our work.

Washing Pesticide Contaminated Clothing

(Source: *Vegetable & Small Fruit Gazette*, April 2011, Volume 15, No. 4, Penn State Extension via Rutgers Cooperative Extension Plant and Pest Advisory, September 8, 2011)

Applicators know how important it is to be careful when using pesticides. We all strive to use the least toxic, effective option, read the label and follow the directions, calibrate, measure carefully and wear the required personal protective equipment.

But after you finish making a pesticide application, it is also important to be careful with the clothing you were wearing. If you throw contaminated clothing in with the rest of the family's laundry, you risk exposing your family to that pesticide. Also, if you do not clean your clothing properly, you risk exposing yourself the next time you wear it.

Here is a list of tips that should help you be safe. You might want to clip this list out and hang it by your washing machine.

- Discard clothing if it becomes soaked with a highly toxic pesticide.
- Do not wear contaminated clothing or boots into the house to avoid bringing pesticide residue into your living space.
- Take protective clothing off inside out as you remove them to keep most of the pesticide inside, and away from the surface that will be handled by the person doing the laundry.
- Pre-rinse clothing and boots outside using a hose or a designated and marked washtub.
- Wash goggles, respirator (remove the charcoal filter first), gloves and boots in hot, soapy water

after each use. Store clean protective equipment away from where pesticides are stored.

- Designate a separate hamper to identify contaminated clothing so the person who does the wash knows it needs special attention.
- Make sure the person who does the laundry knows what pesticide was used, and reads the label for any special instructions for cleaning.
- Keep unlined rubber gloves in the wash room to handle the pesticide-soiled clothing. Carefully wash the outside of the gloves after every use and only use them for this purpose. Launder pesticide contaminated clothing the same day to avoid having it sit around where family members could come into contact with it.
- Wash contaminated clothing separately from the rest of the family laundry.
- Use hot water.
- Use heavy-duty liquid detergent to remove oil-based pesticides. (Emulsifiable concentrates are oil-based.)
- Do not overfill the washing machine. Wash only a few garments at a time.
- Double rinse the load.
- Re-wash the contaminated clothing two or three times if necessary.
- Clean the machine after you wash the load by running one complete cycle on empty, using hot water and detergent.
- Line-dry the clothing to avoid contaminating the clothes dryer.

6 Ways to Reduce Herbicide Spray Drift

(Source: Crop Life <http://www.croplife.com/news/?storyid=3350> via OK ECS Pesticide Report, June 2011)

Growers need to take precautions to reduce off-target drift when applying herbicides this spring, said Purdue Extension weed scientist Bill Johnson.

"Drift reduces product efficacy on the intended target and can result in damage to sensitive plants," he said. "It also can deposit illegal residues on edible crops, especially organic or processed crops that are checked for contaminants."

There are two types of herbicide drift — vapor and particle. With vapor drift, the application reaches its target but at some point moves off-target after application. With particle drift, the portion that moves off-target never reaches its target.

Particle drift can occur with any pesticide application, regardless of product formulation, and is directly associated with nozzle type, droplet size, sprayer boom height, wind speed, and sprayer pressure.

"Injury symptoms from drift will depend on the product used, environmental conditions and sensitivity of the plants in the path of air flow," Johnson said. "Low concentrations of glyphosate may or may not show injury symptoms, while low concentrations of 2,4-D or dicamba may show major symptoms on sensitive plants such as tomatoes, grapes, and roses."

Here are six common ways to reduce particle drift, according to Johnson:

1. Use the lower end of the recommended pressure range for a particular nozzle to produce coarse droplets.
2. Lower the boom height but ensure the spray pattern is maintained.
3. Rather than increasing pressure to provide higher outputs, increase the nozzle size to increase the spray volume per acre while keeping within the recommended pressure.
4. Spray when wind speeds are below 10 miles per hour. Some herbicide labels specifically state that applications should not be made when wind speeds exceed 10 mph.
5. Spray when the wind direction is away from sensitive areas.
6. If possible, use a drift control agent.

Vapor drift presents a bigger challenge to herbicide applicators. "Vapor drift is much harder to control than particle drift," Johnson said. "Vapor drift is a function of the herbicide formulation and ambient temperature."

Temperature and weather conditions favorable for long-distance vapor drift most commonly occur from mid-April to mid-May but can continue into June and July. "Long distance movement usually occurs at night when the temperature is cool and there is light air movement," Johnson said. "When such days occur, being aware of a volatile herbicide's ability to vaporize can help applicators manage potential drift problems by either not spraying until conditions improve or by choosing a formulation of the product that is less subject to volatilization."

Will My Tree Make It? Assessing Pine and Shade Tree Damage from Drought

(Source: Texas Forest Service Newsroom; <http://txforestservicetamu.edu/main/default.aspx?dept=news>)

Texas remains mired in one of the worst droughts in state history, and it's creating disastrous effects on trees and forests across the state.

After one of the driest years on record, many shade trees went into dormancy as early as August, dropping their leaves and branches in a desperate act of self-preservation. Pine trees with normally thick, green crowns ended up cloaked in red, dead needles, while foliage on cedar trees turned completely brown.

The sight has created a dramatic effect on the Texas landscape and left many landowners wondering whether or not their tree is dead — or if it might recover and produce new leaves next spring.

Assessing trees damaged or killed by drought can be tricky, according to Dr. Ronald Billings, Texas Forest Service Forest Health Manager. He suggests grouping the trees into three different categories — definitely dead, likely to live, and questionable — to help with the task.

Continued on Page 6

Will My Tree Make It? (continued from Page 5)

Definitely dead

It is easier to make this call for pines, Ashe junipers (cedars) and other needle-bearing, conifer trees. The determination can be more difficult for hardwoods, which are more commonly thought of as shade trees. In most cases, a red pine is a dead pine, Billings said, explaining that the same can be said for cedars with red needles. Once all or most of the foliage of a pine or cedar tree turns red or brown, the tree is incapable of recovering.

Pine trees in this stage probably are already infested with tree-killing bark beetles and will eventually harbor wood-boring insects, termites and other critters. Such trees should be cut down and removed, particularly if they are likely to fall on homes, buildings or power lines.

Shade trees — like water oaks, for example — that have lost all their foliage and are beginning to drop limbs or lose large patches of bark are most likely already dead and should be removed. Hypoxylon canker, a fungus that appears as gray or brown patches on the trunk of the tree, is another sign of a dead shade tree.

Likely to live

This category includes shade trees with at least some green or yellow leaves still attached to the limbs. In fact, even those that have dropped all their leaves may still be alive. Some native shade trees, such as post oaks and live oaks, are more drought-resistant than others, like water oaks or elms.

You can use a scratch test to determine if the tree is dead or just dormant. If you scrape the bark off a small branch or limb and find green, moist tissue underneath, the tree is still hanging on, waiting for the next rain. That means you may need to wait until spring to see if the tree makes a recovery — unless the tree starts to drop large branches and patches of bark, which is a sign of death. If there is no green, moist tissue, the tree is likely dead.

An exception is the baldcypress, which also is known as a cypress tree. The tree is a conifer, but unlike pines and cedars, its foliage generally turns red and drops from the tree in the fall or during periods of drought stress. Cypress trees usually will re-sprout in the spring. If in doubt, apply the scratch test or wait until spring to be sure.

Pines with a few yellow or red needles scattered throughout an otherwise green canopy have a good chance at survival. Pine trees typically shed a large portion of their older needles every year as winter approaches, and then put on new needles in the spring.

Though it's not as feasible to water your forest, any yard trees that show signs of life (green inner tissues or green foliage) should be watered deeply to reduce lingering drought stress.

Questionable

Questionable trees are those that appear to fit somewhere between the Definitely Dead and Likely to Live categories.

A pine that is topped with brown or red needles but still has green foliage in its lower branches is alive, but likely will eventually die. That's because bark beetles likely will invade the lower trunk at some point, killing the tree in stages.

When inspecting a questionable pine tree, look for popcorn-sized masses of resin (pitch tubes) or brown dust in the bark fissures. These are early signs of attacks by pine bark beetles. The foliage of the infested pine may still be green, but the tree is doomed. This is particularly true if you find bark beetle galleries or trails beneath the bark. Pines with these signs of bark beetle attack should be removed as soon as possible.

In the case of shade trees, those that have many dead or dying limbs or mostly bare branches may or may not survive. A few green, yellow or red leaves may remain for a while as the tree slowly dies, or it may recover when rains return.

It's important to note that not all trees may be stressed from the drought alone. Some trees may also be suffering from insect infestations, disease or other forest health problems. If you're unsure or have any questions, visit the Texas Forest Service Web site at <http://texasforests.tamu.edu/> or check with a certified arborist, forester or tree care professional.

Deciding whether to remove a questionable tree can be a tough decision for both property owners and professional tree care experts. Removal should be considered if a severely drought-stressed or fire-damaged tree is close to a house or other structure on which it might fall. If it is away from such areas, it

Continued on Page 7

Will My Tree Make It? (continued from Page 6)

may be more feasible to wait and see if the tree makes a comeback.

Resources

View examples of trees in each of the three categories on the Texas Forest Service facebook page: <http://on.fb.me/rB5946>.

Not sure what kind of tree you've got? Check out Texas Forest Service Tree ID <http://texastreeid.tamu.edu/>.

Need more help?

Visit the Texas Forest Service Web site at <http://texasforestservice.tamu.edu>; download the Texas Forest Service Professional Management Services Referral List at <http://tfsweb.tamu.edu/uploadedfiles/frd/referral.pdf> or go to the International Society of Arboriculture Texas Chapter Certified Arborist List at http://isatexas.com/Consumers/Find_a_Local_Arborist.htm.

Tree Specialists Trained at Injection Workshops

A workshop on new technologies for injecting trees with systemic pesticides was offered in five different Texas locations last month.

Texas Forest Service, Forest Health representatives Don Grosman, Ron Billings and Joe Pase were the principal presenters in workshops held in Conroe, Midland, Austin, Dallas and Overton, TX.

Forester Bill Upton and Staff Assistant Larry Spivey assisted with equipment demonstrations. Office Associates Harold Read and Debbie Johnson, Forester Dawn Vollmer, Assistant to Associate Director Debbie Allman, Staff Assistant Monica Jadowski, Business Administrator Sharon Klinker, Urban Forestry Manager John Giedraitis and representatives from the Texas chapter of International Society of Arboriculture helped with registrations.

A total of 87 foresters, certified arborists and tree care professionals, including 22 Texas Forest Service

urban and district foresters, attended the workshops. Each gathering included a summary of major insect and disease pests of trees in Texas and a discussion of available systemic insecticides and fungicides for protecting high value trees, as well as new application tools.



A field demonstration was held at each site to showcase various injection applicators, including Mauget's capsules (left), Arborsystem's Direct Inject Portle, Sidewinder's Bug Buster, Arborjet's Tree IV and Quik-jet, and Raibow Treecare Scientific's Pine Infuser. Emamectin benzoate, a new systemic insecticide that Texas Forest Service's Forest Pest Management Cooperative recently developed for control of insect pests, was featured in

the workshops.

If you have any interest or need for tree injection training, feel free to contact Don Grosman (936/639-8170; dgrosman@tfs.tamu.edu). He would be happy to come out and visit with you.

Alien Invasion!

By Carrie Madren, *American Forests Magazine*, Winter 2011.

The mile-a-minute weed's delicate, triangular leaves look bucolic enough, but I'm snatching handfuls of it off scraggly bushes that cower beneath. Petite thorns curve backward and claw at clothing; where they graze my forearms, itchy red bumps irritate for hours. I feel strangely heroic in thick gloves, ripping out the prickly strands and rescuing the now-sparse, hillside native vegetation from this wicked vine. Sweat dampens my forehead as I ball up the offending foliage like string and cast it near the path below.

As a weed warrior, I joined a local army of volunteers dedicated to defending local forests against non-native invasive plants, which were once purposefully planted for erosion control or landscaping appeal, but have now grown wildly out of control across every U.S. region.

"It's a big mess," says Mike Ielmini, National Invasive Species Coordinator for the Forest Service. Estimates reveal that our country's alien-plant problem exceeds the size of California in acreage, including both public and private lands. And with our global village becoming even more interconnected, the invasive species problem will grow.

"I think it's going to seriously affect forests in the future," says Carole Bergmann, a forest ecologist for Montgomery County, Maryland, especially when combined with invasive non-native insects and viruses, such as gypsy moths and sudden oak death. The problem is so massive that it is widely considered to be the biggest threat to biodiversity after habitat destruction. It is a challenge that affects

us locally — and often personally, as we witness invasions in our local forests — as well as nationally.

Carole Bergmann, forest ecologist for Montgomery County, MD, holds up a clump of Japanese stiltgrass as she teaches future weed warrior volunteers about foreign species.



Though the invasive threat seems to have spiraled out of control, ecologists and foresters aren't giving in. In this article, *American Forests* investigates our growing American invasive plant problem, and how we're defending our forests.

Ecological Enemies

It wasn't until the early 1980s that invasive plants began to spark national concern, says Sarah Reichard, research assistant professor at the University of Washington. That's when the United Nations appointed a group of scientists to examine invasive weeds in natural areas. "It was eye-opening for people," she says.

Now, over 1,000 invasive non-native plant species have been identified within the U.S., most sharing common characteristics that give them unfair advantages over natives: They can establish quickly, and reproduce rapidly and widely. A single princess tree, for example, can produce 20 million seeds that are easily transported long distances by wind and water. In addition, invasive species' seed banks can survive for more than seven years in the soil.

Foreign heritage has excused invasives from the complex array of natural controls present in their native lands, such as herbivores, parasites, pathogens, and competition with other species. Without controls, invasive vines and shrubs create dense stands that crowd out native seedlings and dark shade that blocks succession and understory growth. Invasive vines that lurk at forest edges have the power to strangle and topple tall trees, creating canopy holes that encourage more invasive growth.

Many alien plants also create trouble for animals by crowding out the native plants that wildlife depend on for food. English ivy, for example, hides the leaf litter that robins and towhees dig through for insects. And herbaceous invasives — such as garlic mustard — replace native wildflowers that serve as host plants for butterflies.

Left unchecked, these outlaw species drown plant diversity, creating a near monoculture of ecologically

Continued on Page 9

Alien Invasion (continued from Page 8)



Bamboo was prized for its ability to screen for privacy, but left alone, it can take over natural areas.

worthless vegetation. Take, for example, Japanese stiltgrass, which blankets eastern U.S. forest floors in a lush carpet of green, disrupting succession of other species. The ammunition of these tiny, bamboo-like grasses is their seed abundance: Each plant produces hundreds of tiny seeds, which can embed themselves alongside roads and trails just as easily as in the forest interior.

“We don’t even know how it happens in some forests,” says Luke Flory, a researcher at Indiana University who studies Japanese stiltgrass. All it takes, he says, is a hitchhiker seed buried in a hiking boot, all-terrain vehicle, or mountain bike tread.

In the worst cases, invasives can alter the natural cycle of the forest landscape. Highly flammable cogongrass, a new threat, has the ability to turn forests into savannahs. Currently, cogongrass is the target of the largest effort in history to shut out an invasive plant: \$10.6 million from the American Recovery and Reinvestment Act of 2009 is at work fighting the invader in Alabama, Georgia, and Mississippi.

Invasives weren’t always our horticultural enemies. Years ago, we imported foreign species for the same qualities that now make them invasive: tenacity and resistance to pests. Japanese honeysuckle, prized as a shady ornamental plant, was often planted around porches. Bamboo was valued for thick, fast-growth screening; kudzu was imported for erosion control. Others arrived as stowaways that sneaked past border controls, like Japanese stiltgrass, which was once used as packing material.

Now we’re paying the price. Invasive species rob forests of valuable ecosystem services and capabilities — degrading soil quality, water

abundance, and diversity. The ecological, economic, and health costs of all types of invasive species exceed \$138 billion per year, with plants alone responsible for \$34.7 billion in losses, according to a 1999 report led by David Pimentel at Cornell University. In the past decade, as invasives grew out of control, that figure has likely skyrocketed.

Agencies and forest managers alike know the situation is critical, but the alien-species problem is just one of many — including wildfires — pressing for funding and attention. A downturned economy has also set back our defense of forests. But can we afford to lose this ecological battle? “It’s like a hole in the bucket,” says Ielmini of the Forest Service, “We’re losing \$138 billion a year just on this problem.”

Assessing The Damage

We know that invasives are everywhere, but exactly how much of the U.S. is under siege by alien plants is anybody’s guess. No U.S. agency has had the resources to do an intensive inventory on public and private land, but according to estimates, invasive plants have affected more than 100 million U.S. acres — including tens of millions of Forest Service acres, and over 2.4 million acres of the National Wildlife Refuge System. In addition, invasives spread daily: The U.S. Department of Agriculture estimated in a 1998 study that invasive nonnative plants spread on public lands at the rate of 4,600 acres per day.



Japanese knotweed crowds out natives in much of the eastern US, some western states, and has even reached Alaska.

Different species plague each region, explains Cynthia Huebner, research botanist with the U.S. Forest Service’s northern research station. Mid-Atlantic forest invasives range from Japanese knotweed to tree of heaven, Oriental bittersweet, and

Continued on Page 10

Alien Invasion (continued from Page 9)

dozens more. Midwestern invaders include autumn olive, privets, stiltgrass, and garlic mustard.

In southern forests, according to James Miller, research ecologist for the Forest Service's southern research station, some 10,000 native plant species must now compete with nearly 400 non-native invasive plants. The worst invaders include Japanese honeysuckle — which has affected some 12 million southern forest acres — as well as kudzu, privets and Chinese tallow.

In the Pacific Northwest, less light penetrates the canopy of dark coniferous forests, limiting non-native invasions to some extent. But problem species still include Atlantic ivy, English holly, and butterfly bush. Saltcedar trees have become the bane of western states' riparian zones as dense saltcedar thickets tap water tables and monopolize riverbanks without providing food to local wildlife.

"There are new species coming in [to the U.S.] probably every day," Huebner says. A small number — possibly as small as 1 percent — of non-natives turn out to be villainous. Predicting which ones will be helpful and which will be harmful is a challenge of agency cooperation and research, both at the borders and in the field.

In every region where development touches landscapes, invasives follow. "Anything that's disturbed is more likely to be invaded," Huebner says. Natural disturbances — a tornado, a fallen limb, a natural treefall — create opportunity for an invasive seed waiting for a patch of sunlight. Human-caused disturbances, such as new trails, roads, or mowing, bring additional opportunities. In contrast, less fragmented wilderness forest tracts stand the best chance of shutting out invasives.

For these reasons, "urban and suburban areas are much more affected than rural areas," Bergmann says. That's because most invasives first take hold in urban regions, where vines and shrubs are introduced as landscaping or erosion control, or tracked in as seeds by hikers or vehicles. The plants then spread to nearby natural areas, where visibly distressed forests are enough to call some to arms.

Weed Warriors To The Rescue

The Capital Crescent Trail near Washington, D.C., cuts through a skinny urban forest tract under

constant siege. "I don't want to live in a neighborhood where vines pulling trees down is normal," says Lynnwood Andrews, as she joins up with other weed warriors early one August morning. In a gorge below the urban trail, mile-a-minute weed grows over dense clumps of porcelain-berry — invasives conquering invasives — a poignant snapshot of ecological anarchy.



Weed warrior coordinator David Brooks is literally up to his waist in invasives.

For weed warrior volunteers, part of the reward is saving a sapling from a net of porcelain-berry, or seeing plots that used to drown in vines begin to host small native bushes again. They also like the fact that they can do something tangible to defend the local forests they love.

On a small scale, such labor-intensive hand-pulling can successfully keep native plants safe while getting to the root of the problem. But knowing the enemy's seasonal schedule is key. Because of invasives' long-lasting seed banks, volunteers must wrangle weeds before they go to seed, or hand pulling is useless until next year, when the problem has multiplied.

Though many local parks rely on volunteers to help control invasives in patches, they're only a small part of our regional and national defense, which managers are piecing together with limited funds.

Defending Forests

To someone looking out over an acre cloaked in leafy vines or carpeted in alien grasses, ecological ruin seems imminent. But researchers, foresters, and ecologists are figuring out how to halt the enemy advance. Prevention, they agree, is our best defense.

In Wisconsin, Department of Natural Resources Invasive Plant Coordinator Kelly Kearns is on high alert for stiltgrass, which hasn't yet spread to that state. She's implored residents to report any sightings

Continued on Page 10

Alien Invasion (continued from Page 9)

of the invader, so that they can be eradicated immediately. So far, she has been successful at keeping stiltgrass out of state lines.

For a preventive strategy to work, education is key. Teaching homeowners and landscapers how to identify local invasive threats and the risks of planting invasive species (such as barberry, winged burning bush, and English ivy) would help slow the invasives' advance. Keeping problem plants from spreading also requires careful cleaning of forestry and firefighting equipment, especially tire treads, to prevent spreading seeds to other natural areas.

The second line of defense involves early detection and rapid response. Weed warrior volunteers, cooperative weed management groups, hikers, and hunters can be invaluable in bringing attention to new infestations. At that point — when the invasion is small — hand-pulling can be effective.

When a nuisance plant becomes established in thick stands, however, agencies and land managers must resort to treatment, which can include integrated pest management techniques, annual mowing, or chemical treatment. For infestations of some species that gain a foothold — such as cogongrass — herbicides are the only option. The most common herbicides, like glyphosate (Roundup) or triclopyr (Garlon), kill all that's green, but new grass-specific herbicides target just the grasses and leave other plants alone.

During treatment, the biggest mistake that forest managers can make is to remove invasives but ignore the next steps: re-treating an area in subsequent years, and replanting the native species. "You may end up in a money pit or make the problem worse," says Huebner, unless you stick with treatment for years.

Over time, infested acres can be returned to their natural state.

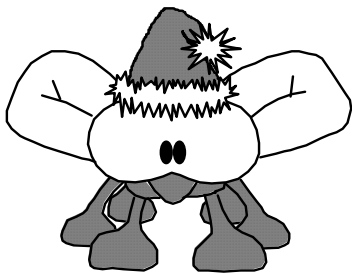


This mid-Atlantic forest has been spot-treated with herbicide.

Still, we've much to learn. How to stop invasive plants from spreading is a topic that the U.S. Forest Service and other agencies are grappling with, Miller notes.

Better laws would help. Some states, such as Washington and Oregon, have state noxious weed laws, which require the removal of certain problem invasive species on both private and public properties. Better cooperation between landowners would strengthen our defenses, too. There's often a gray area regarding who has responsibility for marginal lands bordering highways and railways, where invasives tend to thrive.

Meanwhile, anyone who cares to defend local forests can join the invasive-fighting ranks by learning what enemy plants look like, gearing up in leather gloves, and squelching local invasive uprisings.



**Santa Bug says
"Wishing Y'all a Great Pest-Free Holiday Season
and a Happy New Year!!!!"**

INSECTS



three body parts
four wings
six legs
head
thorax
abdomen
antennae
exoskeleton
moult

cocoon
colony
hive

egg
grub
larva
caterpillar



Insects:

ant
bee
beetle
butterfly
cicada
cockroach

cricket
dragonfly
firefly
flea
fly
grasshopper
horsefly

ladybug
mosquito
moth
praying mantis
stick bug
termite
wasp



Find all of these insect words and phrases in the grid above.

Forest Pest Management Cooperative's

P.E.S.T. Newsletter

Dr. Donald M. Grosman, FPM Coop Coordinator

Dr. Ronald F. Billings, Manager, Forest Health

Mr. William W. Upton, Staff Forester II

Mrs. Billi L. Kavanagh, Research Specialist I

Mr. Larry Spivey, Resource Specialist I

Texas Forest Service, Forest Health

P.O. Box 310, Lufkin, Texas 75902-0310

Phone: (936) 639-8170; Fax: (936) 639-8175

e-mail: dgrosman@tfs.tamu.edu

FPMC Members

Anthony Forest Products Co.

ArborGen

The Campbell Group

CellFor Inc.

Forest Investment Associates

Hancock Forest Management Inc.

International Forestry Co.

North Carolina Division of Forest Resources

Plum Creek Timber Co.

Texas Forest Service

Rayonier Inc.

U.S.D.A. Forest Service,

Forest Health Protection (R8)

Weyerhaeuser NR Co.

The use of trade, firm, or corporation names in this publication is for the information and convenience of the reader, and does not constitute an endorsement by the Texas Forest Service for any product or services to the exclusion of others that may be suitable. The Texas Forest Service is an Equal Opportunity Employer.

Texas Forest Service
Forest Health
P.O. Box 310
Lufkin, TX 75902-0310

Non-Profit Organization

U.S. Postage

PAID

Lufkin, TX

75901

Permit No. 86

