Pest Inventory Software Could Stop 'Terrorist' Invasions

The pest detection protocol being developed by the U.S. Forest Service with other partners will be used with other tree inventory software, such as here in Dublin, Ohio. Photo by Scott Macus.

By Don Dale

Okay, you couldn't compare them to the Department of Homeland Security or the X-Men, but these tree people are working toward securing the nation against foreign invaders. Sure, the invaders are usually six-legged rather than two-legged, but they are every bit as dangerous to the economic and aesthetic life of the United States as the human variety.

Tree pests, sometimes domestic but often foreign, have the potential to wreak havoc on urban and rural tree species. They currently go by exotic names such as emerald ash borer and Asian longhorn beetle, but in the past they have also come in the form of infections such as Dutch elm dis-

ease and sudden oak death. They are organisms that can virtually destroy entire regions or species of trees before city foresters and arborists become aware that they are a formidable foe.

The stalwart defenders? They are a dedicated group of tree people who think that these critters can be prevented from depleting our urban and wilderness forests. They think this can best be accomplished by detecting them early enough to take precautionary measures, and early enough to enact controls or quarantines before the pests do widespread damage. At least, before they become national disasters.

But that methodology would require a system of identifying and inventorying those pests or their symptoms early in the game in any city in America. And that sys-

tem is what they are trying to set up.

"If it doesn't appear that signs and symptoms come from a known pest, there is currently no national protocol for discovering pests before they become catastrophic in nature," explains Scott Maco. That method could very well be I-PED, the pest detection and reporting protocol and software being developed by a partnership spearheaded by the U.S. Forest Service. Maco is a team member and a research and development analyst for The Davey Institute, a branch of Davey Tree. He's also the company's project manager for I-PED, which this summer will have its second test run in urban tree inventory settings around the country.

I-PED is an offshoot of, and likely will be an integral component of, the i-Tree

This is an example of the tree pest detection protocol introduced in the I-PED software.

Pest Signs & Symptoms

☑ Unknown
Asian Longhorn Beetle
Emerald Ash Borer
Dutch Elm Disease
Etc

Foliage Yes	☑	None Visible
Twigs/shoots/branches Yes	☑	None Visible
Trunk Yes	☑	None Visible
Base/roots Yes	☐	None Visible

| Loc | Dim | Maint | Cond | MCTI | Pest |

Signs

☑ Exit holes (none)

☑ Frass (none)

☑ Fruiting bodies (none)

☑ Insect presence (none)
Insect bodies
Protective covering

Symptoms

☑ Canker (none)

☑ Gummosis/bleeding (none)

☑ Crown dieback (none)

☑ Abnormal growth (none)
Gall/burl
Epicormic sprouting
Withes' broom

Other Write in sign or symptom

suite of software tools, which has already utilized this partnership approach in developing comprehensive tree analysis software and training information for urban forest managers. The i-Tree software has been free to users since its 2006 release and includes applications and utilities for inventory data collection. Though still in development, the pest detection protocol is on track to become an element of the i-Tree offerings.

There are three main objectives of the pest detection component. The first is to simply increase awareness of pests associated with urban trees, which is not necessarily something done in the course of a routine inventory. The second is to identify new pests and take action before they cause a catastrophic loss of trees. Third, a national approach to pest identification will be possible, and management can be made easier with a standardized data collection and reporting system that utilizes a publicly accessible repository of data.

Dan Twardus, the Forest Service group leader from the Forest Health Protection unit in Morgantown, West Virginia, explains that i-Tree is a suite of tree analy-

The I-PED system basically consists of a means of field identification and reporting of pests, such as the emerald ash borer shown here, or their signs and symptoms, such as foliage or trunk damage. Photo courtesy of Edward Czerwinski, Ontario Ministry of Natural Resources, Bugwood.org

sis software that has been in development and use for some 20 years. It is being used by urban foresters across the nation as a tree advocacy and management tool. The pest detection aspect was an idea he had that could make the Forest Service more proactive against pest invasions, using arborists and community foresters as the front line of defense.

Twardus says the eruption of the emerald ash borer as a devastating pest in the Midwest is a good example of what I-PED developers hope to avoid in the future. This borer is a native of China and was accidentally introduced into Southeast Michigan. Before anybody knew what was happening, ash trees were being killed by the thousands throughout the Midwest. It is now almost a certainty that all urban and forest ash trees, at least in the Eastern states and possibly nationally, are in danger of being eradicated.

"Finally, after some years, someone found one of these little green beetles," Twardus says, and a name was given to the culprit. But what could have happened if it had been detected while still in one isolated community? He thinks that this disaster could have been averted, and I-PED is a system that could have provided that early warning.

What is I-PED – which stands for Inventory, Pest, Evaluation and Detection – exactly? The best way to look at it, Maco says, is to look first at i-Tree. These peer-reviewed software tools were developed by a partnership of USFS, Davey Tree, the International Society of Arboriculture, the Society of Municipal Arborists and the Arbor Day Foundation with funding primarily from the federal government. Go to www.itreetools.org to get a complete picture of this system of urban tree management.

In general, i-Tree provides two different software components for urban tree analysis and various utilities to inventory trees, assess storm damage and determine the best tree species to use in specific geographic areas given the environmental benefits desired. In addition, utilities are available that allow users to utilize PDAs to collect field data. But i-Tree is not only free to users, it is also continually evolving as welcome feedback is collected and worked into the system.

Maco notes that I-PED, when it is implemented, could be used as one more component of the i-Tree suite, or it could be used in conjunction with any of the other commercially available programs. Portability of the system is critical to widespread adoption and is a goal of the development team. It basically consists of a means of field identification and reporting of pests or their signs and symptoms, such as foliage or trunk damage. It will come with its own training protocol and manuals as well as online support. Go to www.pest.itreetools.org to see what is happening with I-PED.

The ultimate primary end user will be a city worker or arborist assigned to carry out a community's tree inventory program. With I-PED as a component of a general tree inventory, a worker would note specific pests or damage. The I-PED protocol will include a network of local or national experts who would be available to help identify potential problems and come up with the guidelines and resources for dealing with identified pest concerns.

"We're actually still working on that mechanism," Maco says, but the group hopes to link with pertinent organizations such as the National Plant Diagnostic Network, Animal and Plant Health and Inspection Services (APHIS), university Cooperative Extension programs and the Bugwood Network. Private companies and consultants would also be natural users of I-PED, since they are on the front line of pest detection and control.

Ultimately, this information collected in

If data was compiled at the regional and national levels, it could be a valuable weapon in the early detection system against invasive pests, such as this Asian Longhorn beetle. Photo courtesy of Pennsylvania Department of Conservation and Natural Resources - Forestry Archive, Bugwood.org

cities around the country would be included in a national database. If this data was compiled at the regional and national levels, it could be a valuable weapon in the early detection system. A forecasting component might be developed as a result of analyzing this data over time. It would be a terrific alert system for communities surrounding a pest outbreak, for example.

So, how is the pest detection system pro-gressing? The first test was run in four cities last summer. Data gathering and pest protocols were tested by volunteer city foresters in Chattanooga, Tennessee; Dublin, Ohio; Ithaca, New York; and Wilmette, Illinois. "It went well. Everything worked," Twardus notes, but many kinks are still being worked out of the system.

Andy Hillman is the city forester for Ithaca. He is also the past president of the Society of Municipal Arborists who used SMA contacts to recruit volunteers to beta test the I-PED system. He's an unabashed fan as well as partner. One of his employees, as well as a Cornell University team, tested the system in Ithaca last year. He agrees with Twardus that there are still bugs in the system, but that the system is all the better for working out those challenges in field trials.

"It made sense for city foresters like me to help with the beta testing," Hillman says, because these are the folks who will be the end users. In Ithaca, a PDA was used as an input device when looking at street and parkland trees for pests and symptoms. The city's trees have already been inventoried, he says, but this new component will be a welcome added function in future updates. The I-PED software features pull-down menus using the i-Tree platform to

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prompt questions about insect or disease signs, and that platform seems sound and has "great potential."

Hillman says that a city such as Ithaca could derive great benefits not only from knowing what its pests are, but also from any national detection network that results from the I-PED effort. This tool, integrated with his existing inventory program, could not only prevent a citywide tree disaster, it could also avert quarantines that might be damaging to nurseries and landscapers over a large region.

"That could have a significant effect on a city," he points out. And the potential effects on national security are also real, given that protecting urban forests ultimately will provide a defense for rural forests. The fewer pests that migrate out of the cities into the wild, the less chance there is for another catastrophe such as Dutch elm disease or the emerald ash borer.

Maco confirms that a second round of testing will be conducted this summer, once changes from last year's feedback are integrated. Once released, possibly early in 2009, the software will be a valuable management tool. What could be better than having a pest detection system that can be dovetailed with existing programs, used in the field to collect data and then piggy-backed with other tree information to provide a solid base for management of urban trees?

He notes that this has been an ideal partnership, in that all parties are invested in the idea that preventing disasters in America's forests is a worthwhile cause. If exotic pests in particular can be recognized and neutralized early-on, these tiny terrorists will not be able to diminish the national landscape. Maybe they don't carry guns or make arrests, but this team certainly could give invasive pests a serious butt-kicking. 🌲