

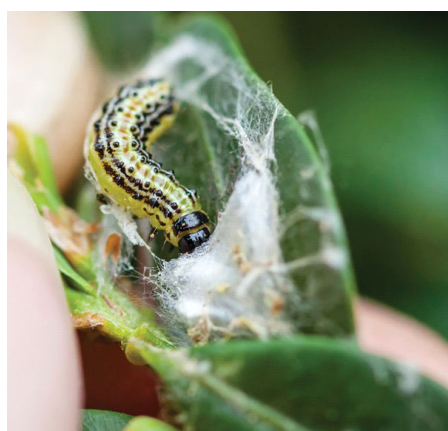
GROWERTALKS

Cover Story

4/1/2019

The Bane of Boxwoods

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Poor boxwood. They've had a rough go of it in recent years.

Not only have North American shrub growers and landscapers been dealing with the scourge of Boxwood Blight for the past seven years, but now they have a possible new pest to lose sleep over—the box tree moth (BTM).

Pictured: The larvae of the box tree moth is not only destructive, but also unsightly with its frass-covered webbing.

We'll talk about blight in a bit, since there is current research that's been published and there are more-tolerant cultivars coming into the market, and because BTM is brand new. It's so new that it hasn't even made its way into the U.S. yet, but it was sighted—for the first time ever in North America—in Ontario, Canada, in August 2018. And by a nature photographer, no less, who saw an adult BTM fluttering around in her pollinator garden, took a photo and posted it to the iNaturalist website, where a moth expert friend of hers realized what it was. From there, the Canadian Food Inspection Agency (or CFIA, which is like our APHIS) got involved and officially confirmed the presence of BTM in three areas of Ontario.

But just because it's not in our neck of the woods yet doesn't mean there's not a chance of it coming this way. In fact, researchers and growers are preparing for what they feel is the inevitable arrival of these new boxwood pests.



BTM: What we know

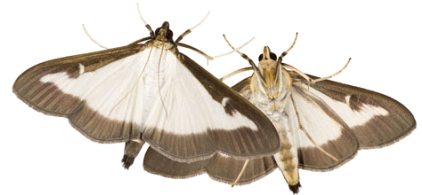
So far, reports from the sightings in Canada have said that only the adult moths had been seen and they won't know until spring if they had enough time to lay eggs that overwintered. That's when the BTM really becomes a problem. Once the green-and-black caterpillars hatch, they can quickly defoliate and kill large hedges of boxwood. Along with the eating damage they cause, BTM caterpillars create a mass of webs that serve as protection from predators and also a toilet because the webs are usually covered with their frass (a fancy word for poop), making an infested boxwood look like a writhing, icky mess.

"The reason why it's so insidious is that it feeds deep within the plant, not only on foliage, but also will eat off the stem," said Rich Cowles, Agricultural Scientist at the Connecticut Ag Research Station, who—even as a nursery crop pest expert—wasn't aware of BTM before it landed in North America. "This group of moths will kill the plant outright."

Pictured: A pheromone trap captures male box tree moths, allowing detection at low populations.

The BTM (*Cydalima perspectalis*) is native to China, Korea and other parts of Asia, and feeds only on boxwood. It was first discovered in Europe in 2007—a shipping center in Germany that receives products from China is believed to be the source—and quickly devastated much of the native boxwoods there, especially in the United Kingdom, which has large areas of naturally growing boxwood forests. German officials believe over 90% of the defoliation in the country's largest boxwood forest within one year was due to BTM.

"It's in almost every country now," said AmericanHort's Dr. Jill Calabro. "It was found in Sochi (Russia) during the Olympics because they moved some infested boxwood from Italy into Sochi. So it's established pretty much throughout Europe and has really created a lot of devastation there."



Pictured right: The adult box tree moth has 1.5-in., paper-white wings with a dark brown border.

CFIA's official statement about the BTM in February said that they were implementing "provisional measures to contain the pest," but there's still a fear it may find its way south. Certainly, the caterpillars can attach themselves to people, plants or vehicles, but the adults can fly up to 2 miles, so they have the potential to spread relatively quickly.

Unfortunately, BTM doesn't have any natural predators—scientists have observed that birds and other animals don't like to eat the caterpillars because they contain toxins that are distasteful. And because Canada has much stricter pesticide laws, their arsenal to fight the BTM is much smaller than here in the States. It shouldn't have any problems surviving Canadian or Northern U.S. winters, with reports from China saying BTM larvae can still live when temperatures are as low as -22F (-30C) (see sidebar).

The biggest challenge experts see is not at the production stage, where nursery growers would have better success at controlling the pest, but at the homeowner level. A consumer can buy clean boxwood from the garden center, but once it's planted in their yard, all bets are off—especially if their next-door neighbor has boxwoods that are infested with BTM.

But don't freak out yet!

As members of the horticulture industry, we've all learned the benefits of optimism, and there are reasons to be wary, but also hopeful.

Saunders Bros., located in Piney River, Virginia, is one of the largest producers of boxwood in North America, so they have significant reason to be on high alert about BTM. But Bennett Saunders, GM for Saunders Genetics (a company created by Saunders Bros. to find, test and market boxwood cultivars), says they're confident industry and government researchers will find ways to keep the BTM from becoming an epidemic.

"We're obviously very concerned about the moth, but there are a number of things working in our favor here," he explained. "Number one is that we have seen what it can do in Europe, with box tree moth and blight. With the USDA and land-grant university scientists across the country, we have a large group of very informed scientists who understand lepidopterans and all of these methods that have potential to, at a minimum, slow down or even stop this pest."

According to Jill, APHIS has been monitoring BTM for about 10 years, knowing there was the potential for it to make its way over the Atlantic, so they created new pest response guidelines, just in case. APHIS announced in early March that it's still evaluating the need for a Federal Order requiring certification of boxwood entering the U.S. from Canada; however, a Pest Alert bulletin was issued to ports of entry. APHIS said surveillance and monitoring along the border, in addition to entry points, will be heightened. And the Horticultural Research Institute (HRI), AmericanHort's research arm, will monitor BTM as part of its Boxwood Initiative, which also includes researching prevention and control of blight.

Also, many North American landscapes and neighborhoods may have a number of boxwoods, but nothing like the acres of wild boxwood forests that are in Europe, so there's less host material for the BTM to survive on.

And, fortunately, there are traps and monitoring systems that researchers have been using in Europe that could be used here. There are controls available, too, including pyrethroids, chlorantraniliprole and *Bacillus thuringiensis* (Bt) products like Xentari and DiPel. Pheromones could also be developed as a mating disruption tool.

"There's been a tremendous amount of work, and there's a good understanding, of the pheromones that the females use to attract males," said Rich. "Whenever you're talking about lepidopteran pests, knowing what the pheromone is provides an incredibly potent potential tool—not only for monitoring for the presence of the pest for quarantine-type measures—but also, if you're talking about a nursery, you can use mating disruption for managing this pest." (Rich was quick to point out that pheromone traps don't work as well once boxwoods are in the landscape, since every house or business that had a boxwood would need to set out traps, which is unrealistic.)

"People would probably know if it had been there for more than a few years because the boxwoods would have been absolutely shredded and dead. People would have noticed," said Rich. "So we might be lucky; it might just be in one little neighborhood."



The latest on Boxwood Blight

Since Boxwood Blight was found in North America in 2011, researchers have been working diligently to find ways to prevent and control the fungus. Although it has spread to 28 states within seven years (it was first found in North Carolina and Connecticut), there have been some positive breakthroughs with regard to management and communicating best practices.

Dr. Chuan Hong, Professor of Plant Pathology at Virginia Tech University, has been studying the disease since it was first discovered in the U.S. seven years ago.

“Boxwood has been historically a care-free plant that didn’t have a lot of disease or insect issues, so that’s why Boxwood Blight really made headlines,” he explained. “And boxwood is very important—it’s one of the oldest ornamental plants in America and Europe. People are really

attached to it because some have had specimens on their property for generations.”

Pictured: Boxwood Blight up close. Photo courtesy of Bennett Saunders.

Chuan has coordinated several Boxwood Blight projects funded through Farm Bills. Specifically, his lab has conducted many different trials on preventing and controlling blight. One such study is adding a layer of mulch around the boxwood plant, which he found very effective in preventing the pathogen that remained in fallen leaves on the ground from splashing back onto the boxwood in water and causing new infection.

“This is particularly important for boxwood replanting and regeneration; it could cut new infections by up to 100%,” explained Chuan. “Blight is inactive in the winter, but if a plant was infected during the summer, those affected leaves that fall on the ground after the season leave the door open to new infection the next spring by allowing the spores to spread. But if you cover the old leaves, it physically prevents the fungus from splashing onto boxwood foliage.”

He’s also really delving into the pathogen’s biology in hopes to develop novel management strategies for the disease.

“Our goal is to really get the disease under control,” said Chuan. “In the short term, we really need to figure out a way to protect the existing boxwood, especially the historic plantings in American gardens.”



So far, the disease seems to appear only in the landscape, but the disease pressure on nearby historic gardens and production nurseries is mounting. Unfortunately, all the disease-free boxwood in the world is no match for the trifecta of spreading spores, contaminated soil and wet conditions.

Pictured: A row of boxwood suffering from Boxwood Blight. Photo courtesy of Bennett Saunders.

Last year was unusually wet for the East Coast and mid-Atlantic states.

With the help of two hurricanes, Bennett said their area of Virginia saw 90 in. of rain; the average is usually in the low 40s. It was what Bennett called “the perfect storm” and many more landscapes were affected by blight.

Knowing the signs and symptoms, and how to remove the infected material has been extremely valuable in keeping the disease from becoming worse, thanks in part to the priority set—and money spent—on learning more about Boxwood Blight.

“The USDA and land-grant universities have been given millions of dollars in grants and have, in turn, given us many common-sense methods to mitigate the blight,” said Bennett.

Chuan said that more science-based disease-management strategies and technologies are urgently needed to win the battle against this destructive disease.

“Many of the recent boxwood blight epidemics began with an accidental introduction of the pathogen via purchase of contaminated, but asymptomatic, plant stocks,” he said. “Thus, the first priority is to develop a better understanding on the disease biology and make sure that only blight-free plant stocks are marketed, sold and shipped. Equally important is to better manage the disease at sites of contamination to prevent it outwardly radiating to nearby boxwood plantings and production.”

The next generation of boxwood

At the MANTS show in January, there was a lot of buzz around the Saunders Bros. booth and the company's new line of what they call “more blight-tolerant” boxwood varieties. Called NewGen, the collection starts with two new cultivars, with more on the way in the next few years.



Bennett, who manages this new product, said they've been extensively trialing the NewGen varieties for several years, planting them next to infected boxwood and showing very little damage under heavy to moderate disease pressure. (NewGen is also touted as leafminer-tolerant, too.)

Pictured: On the right is NewGen Independence (cv SB108, PP28888) in trials July 2018. This is three years after planting the plant (spring 2015) immediately beside a Buxus sempervirens, which was almost totally defoliated by boxwood blight. Bennett Saunders says this shows the better

blight tolerance of the NewGen Independence. Photo courtesy of Bennett Saunders.

To his knowledge, Bennett said there are no cultivars completely resistant to blight and the goal is to eventually weed out the most susceptible varieties and replace them with NewGen and other more-tolerant ones. For instance, the cultivar Justin Brower used to be their No. 1 seller, but because it's a blight magnet, Saunders Bros. isn't growing it any longer. He said they've pared down their boxwood offering significantly.

“To me—the future of Boxwood Blight—the answer is best management practices and more-tolerant cultivars combined,” said Bennett. “I really think that will minimize the severity of blight.”

For past 10 to 15 years, Europe has been dealing with both blight and BTM. So this summer, Bennett plans to travel to Europe to learn more about how they've handled blight—and especially educate himself on the BTM, so that he can bring back more information to help prepare themselves in case it makes its way to the States. But he and the Saunders Bros. team have gotten used to dealing with disease and insect issues. As we're living in a more global world, new pests have become the “new normal.”

“We're going to have to deal with this on many fronts, on human health and plant health,” he said. “In turn, our research people have to be on top of their game to tell us what we can do.

“Ten years ago, we thought it was the end of the world because of the brown marmorated stinkbug. And it was tough to control for two or three years, but now it’s kind of like another aphid. As far as in the nursery and landscape, we have way more chemistries in the United States that we can use that are not available in Europe. I know that is looked down upon sometimes, but in this particular case, I’m very glad that we have them.” **GT**

IBox Tree Moth Stats

- **Species:** *Cydalima perspectalis*
- **Larvae:** Lime-green caterpillars with black striping feed on leaves and bark; the most destructive life stage
- Boxwood is its only known host plant
- **Symptoms:** Defoliated (“skeletonized”) plants and webbing with frass deposits
- **Adults:** Moths with a wingspan of 1.5 in., paper-white wings with a dark brown border or brown with small, white spots
- Ideal temperature range is 70 to 90F (21 to 32C), but activities are known to occur outside of this range. Eggs hatch when temperatures are at least 52F (11C) and larvae regularly survive winter temperatures below -22F (-30C) in parts of China. Two to four life cycles per year are common in the EU; each lasts around 45 days.