Box Tree Moth – U.S. Compliance Agreement Program

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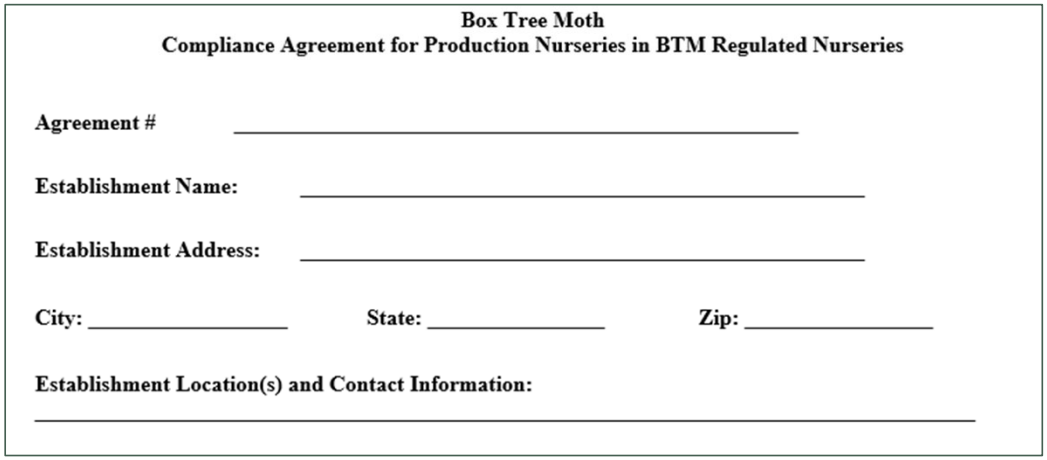
VIRGINIA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES

Overview

- Box tree moth (BTM) in the U.S.
- Industry preparations
- BTM Identification Guide and Training
- BTM: Compliance Agreement Program
- Questions



Box Tree Moth
Compliance Agreement for Production Nurseries in BTM Regulated Nurseries

Agreement # _____

Establishment Name: _____

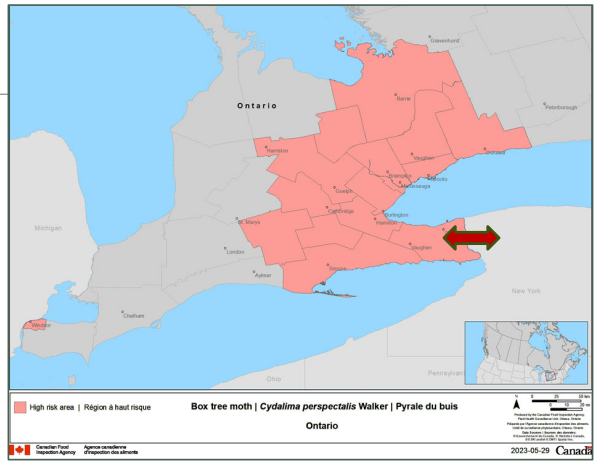
Establishment Address: _____

City: _____ **State:** _____ **Zip:** _____

Establishment Location(s) and Contact Information:
_____

BTM in the United States

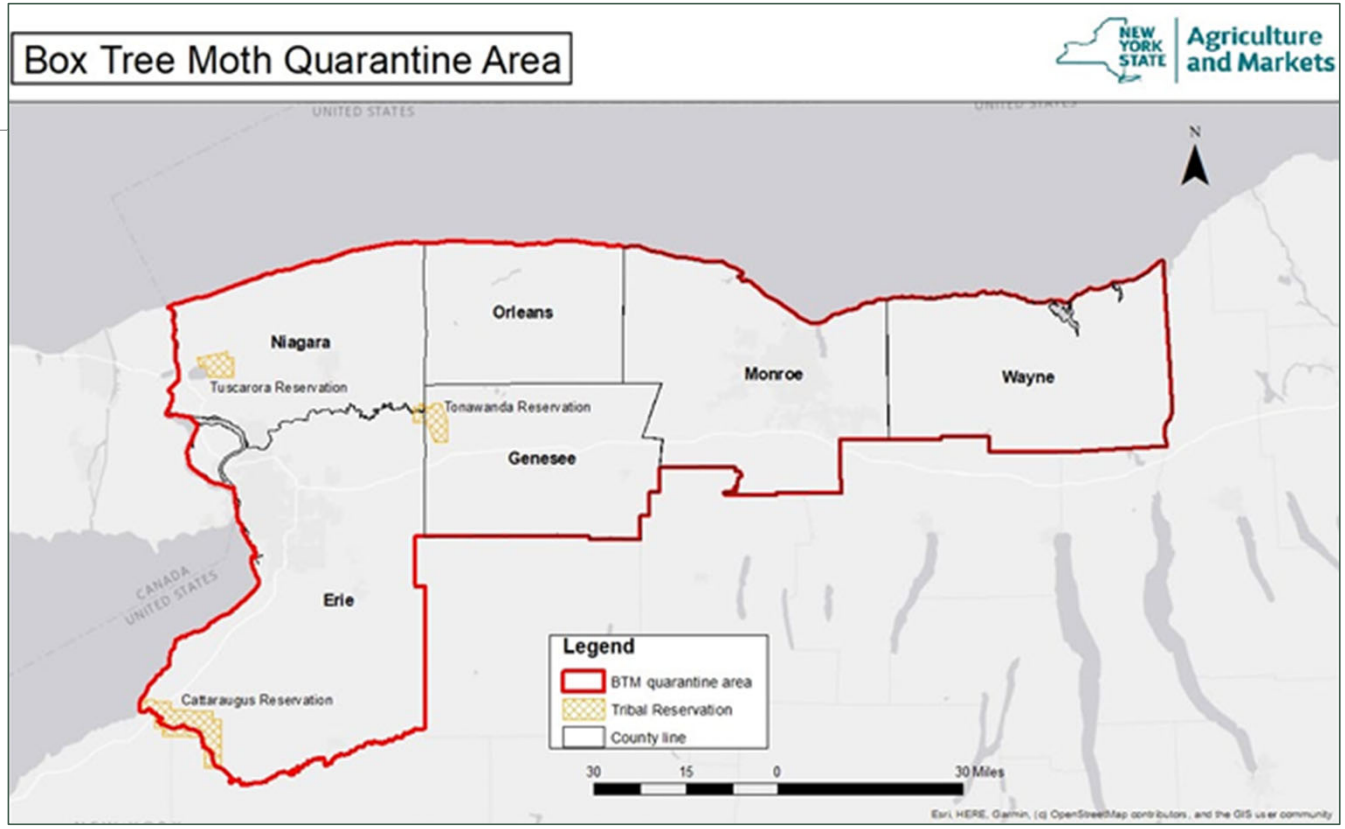
- Box tree moth has been confirmed in the United States: **Four states**
- First introduced into New York across the U.S./Canadian Border
- Both in the **environment** and in **nurseries**
- United States Department of Agriculture (USDA) Plant Protection and Quarantine (PPQ) actively managing a federal quarantine
- Prohibits the movement of boxwood plants out of quarantine, unless treated, inspected 100%, and labeled > Changing to new Compliance Agreement program



New York

- Six counties

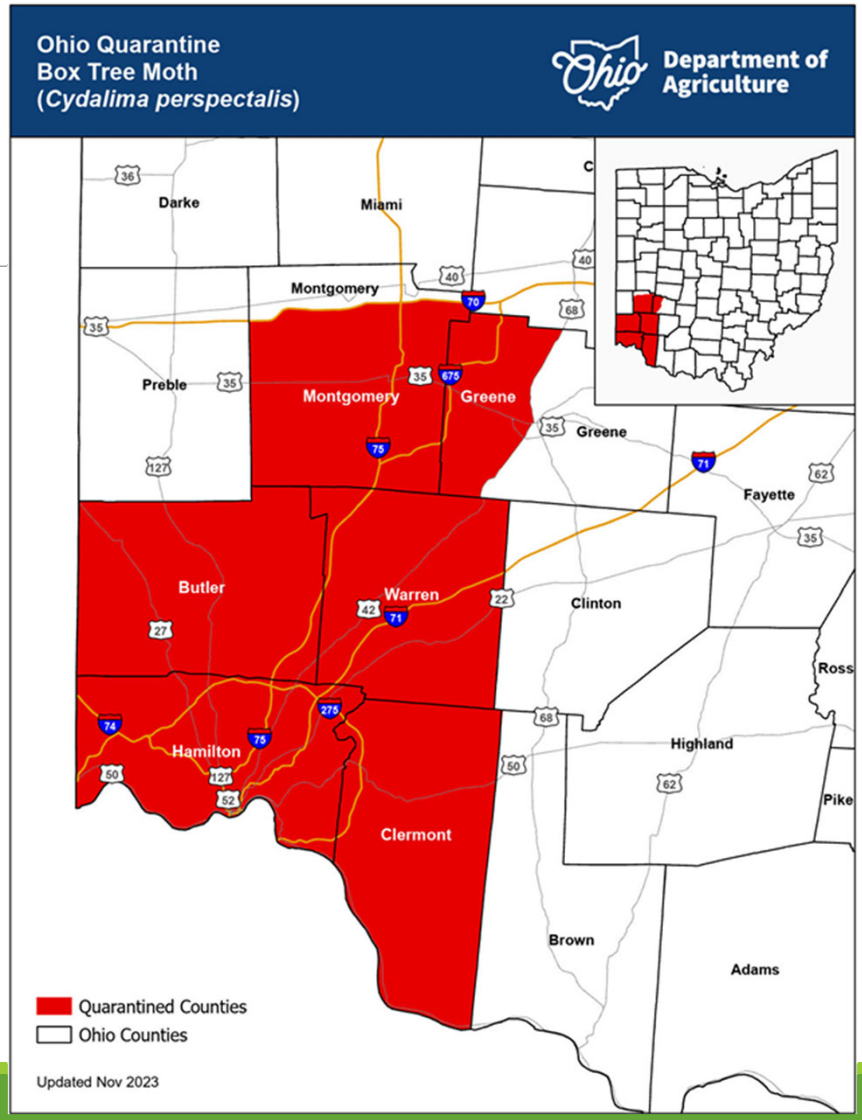
- **Erie, Genesse, Monroe, Niagara, Orleans, Wayne**



Ohio

- Four full counties: **Butler, Clermont, Hamilton, Warren**

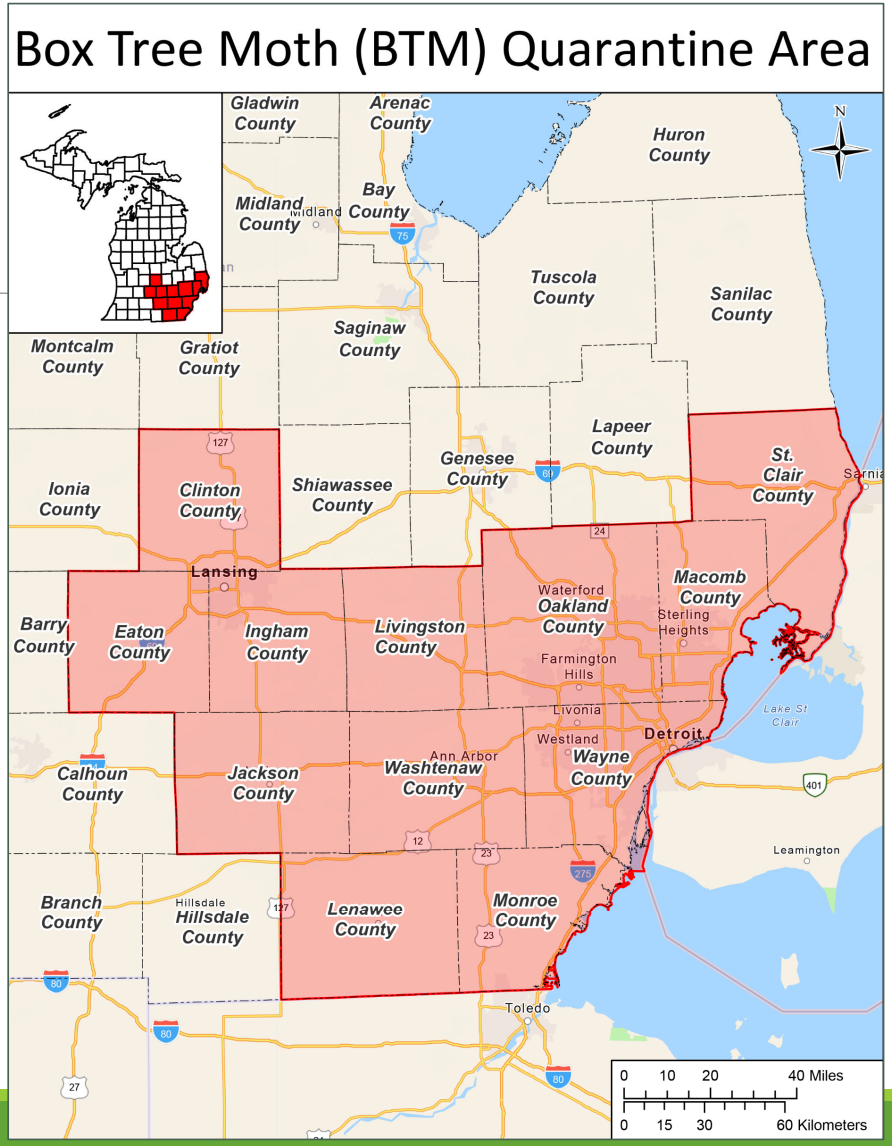
- Two partial counties: **Greene, Montgomery**



Michigan

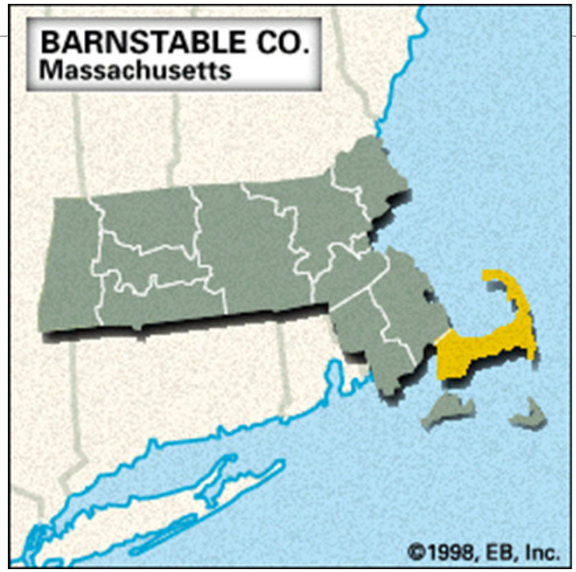
- Twelve counties

- **Clinton, Eaton, Ingham, Jackson, Lenawee, Livingston, Macomb, Monroe, Oakland, St. Clair, Washtenaw, Wayne**



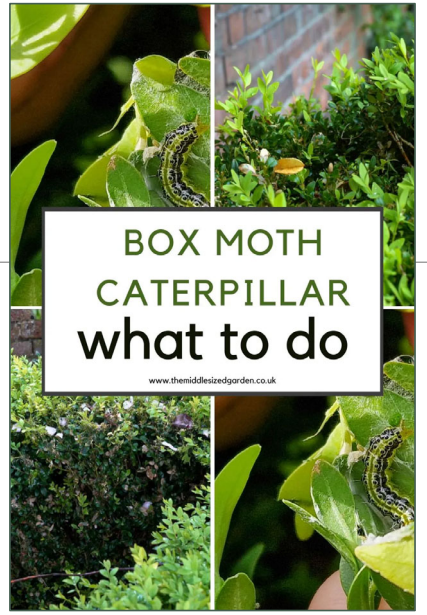
Massachusetts

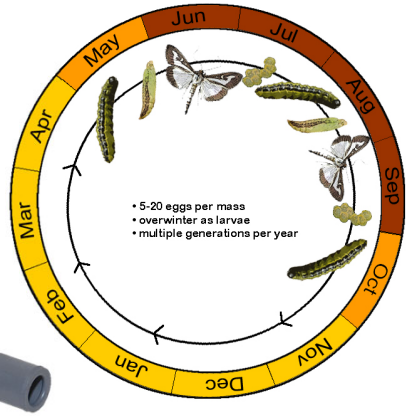
- One county: **Barnstable**
- Not quarantined yet, however whole state may be quarantined by USDA
- Limited state authority to quarantine
- USDA still working on what extend a federal quarantine will be placed



Industry Preparations

- Know who your suppliers are and where they are located
- Begin training staff to identify and recognize evidence of box tree moth
  - Evidence: *Frass, feeding damage, webbing, overwintering structures*
  - Life stages: *Eggs, caterpillar, pupa, moth*
- Have products on-hand (trapping supplies, treatment chemicals)
- Understand the compliance agreement program
- Prepare a Pest Management Plan



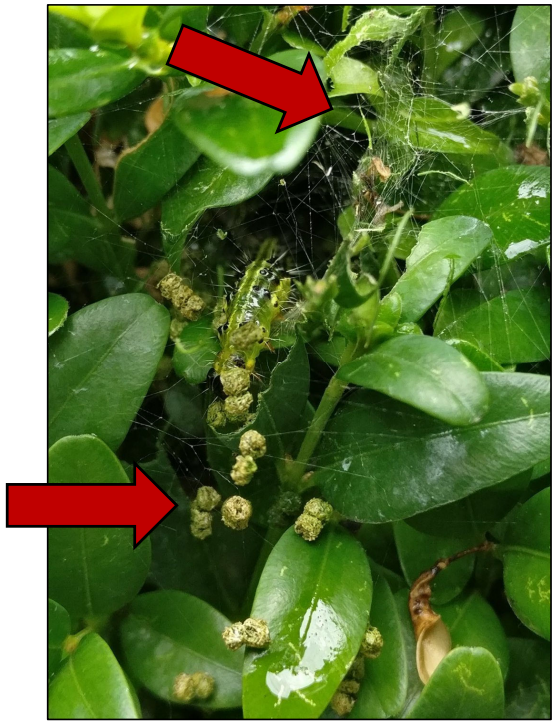


Life Stages & Evidence

Eggs

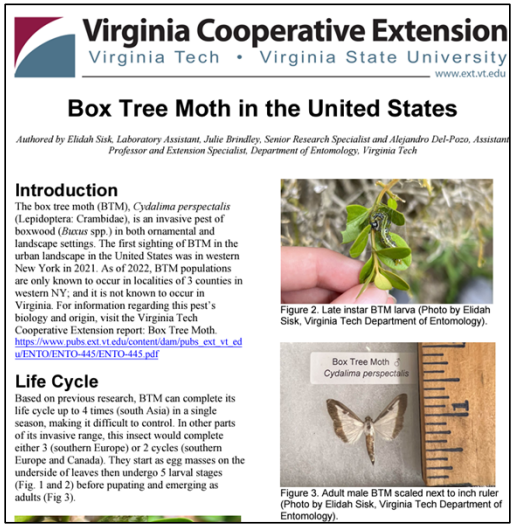
Pupa / Caterpillar

Adult



BTM ID guides and Training

- Lots of resources available for BTM ID guides
- Ohio, Michigan, New York, USDA
- Virginia Tech Resources
  - *Local Cooperative Extension Agent*
- Horticulture Research Institute



Virginia Cooperative Extension
Virginia Tech • Virginia State University
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Box Tree Moth in the United States

Authored by Elidah Sisk, Laboratory Assistant, Julie Brindley, Senior Research Specialist and Alejandro Del-Pozo, Assistant Professor and Extension Specialist, Department of Entomology, Virginia Tech

Introduction

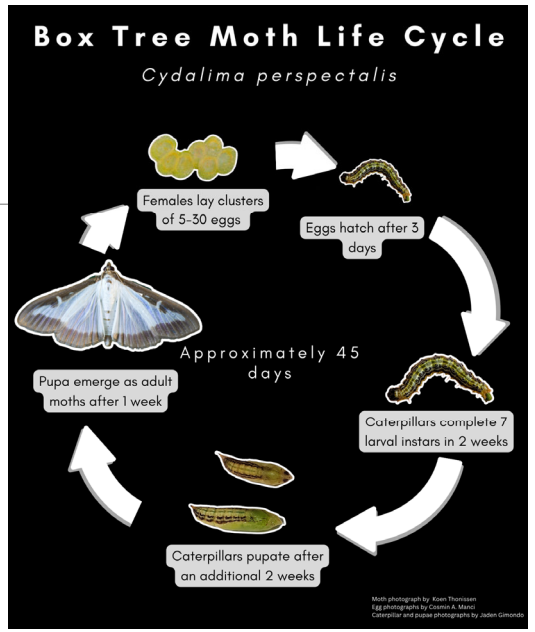
The box tree moth (BTM), *Cydalima perspectalis* (Lepidoptera: Crambidae), is an invasive pest of boxwood (*Buxus* spp.) in both ornamental and landscape settings. The first sighting of BTM in the urban landscape in the United States was in western New York in 2021. As of 2022, BTM populations are only known to occur in localities of 3 counties in western NY, and it is not known to occur in Virginia. For information regarding this pest's biology and origin, visit the Virginia Tech Cooperative Extension report: Box Tree Moth. https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/ENTO/ENTO-445/ENTO-445.pdf

Life Cycle

Based on previous research, BTM can complete its life cycle up to 4 times (south Asia) in a single season, making it difficult to control. In other parts of its invasive range, this insect would complete either 3 (southern Europe) or 2 cycles (southern Europe and Canada). They start as egg masses on the underside of leaves then undergo 5 larval stages (Fig. 1 and 2) before pupating and emerging as adults (Fig 3).

Figure 2. Late instar BTM larva (Photo by Elidah Sisk, Virginia Tech Department of Entomology).

Figure 3. Adult male BTM scaled next to inch ruler (Photo by Elidah Sisk, Virginia Tech Department of Entomology).



BTM Compliance Agreement Program

- Different than other compliance programs
  - Designed for those nurseries that **have box tree moth**
  - Not an exclusion program
  - Not a zero-risk program

- Similar approach to Boxwood Blight Cleanliness Program
  - *Training staff, Inspection/Scouting, Trapping, Pre-shipment treatment, Visual inspection*

- Administered by state departments of agriculture
  - Audit of records

- Allows for continued shipments of boxwood plants **out of quarantined areas**

AGREEMENT SUMMARY

This Compliance Agreement (CA) provides **conditions required for the movement of boxwood plants from areas regulated for box tree moth (BTM) to non-regulated areas**.

The signer, on behalf of the establishment named, agrees to process, and move regulated articles (*Buxus* spp; boxwoods), in accordance with the provisions of Federal and State regulations and the terms of this CA.

The establishment agrees to grow and ship boxwood plants in accordance with the requirements below. **Boxwoods may only be shipped if accompanied by a certificate verifying that all conditions of this CA have been met**.

The **establishment must implement a systems approach for growing boxwood plants**, involving multiple mitigation protocols to reduce the risk of spreading BTM from regulated areas, as outlined below. The establishment must develop a pest management plan (PMP) for BTM to enter the CA and the PMP must be approved by the State Certifying Authority.

Designated/assigned staff must be trained to identify the pest, its life stages, and signs of its presence such as webbing, frass, or feeding damage.

This CA does not preclude the inspection, sampling, and testing of plants by State or Federal authorities. This CA expires on or at the discretion of the State Certifying Authority.

Training

- Nursery must educate and train personnel on the following:
  - Identification of BTM
  - Recognize signs and life stages of BTM
  - Understand the Compliance Agreement and requirements
  - Trapping and scouting techniques
  - Knowledge of BTM regulations and regulated areas

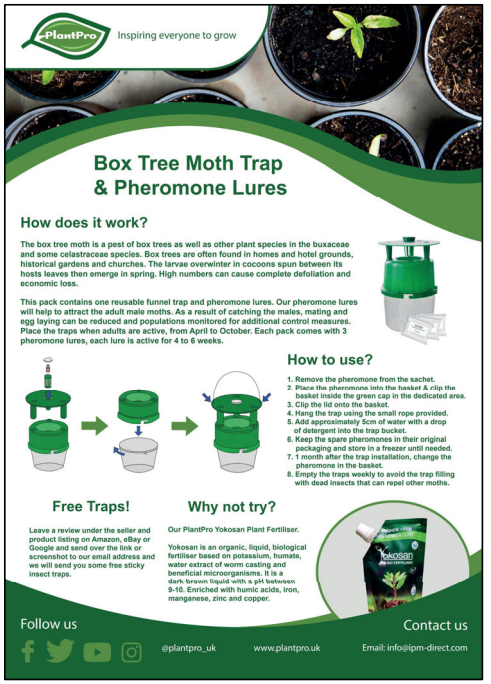
- Resources are available on [APHIS BTM website.]

USDA Animal and Plant Health Inspection Service
U.S. DEPARTMENT OF AGRICULTURE

Trapping

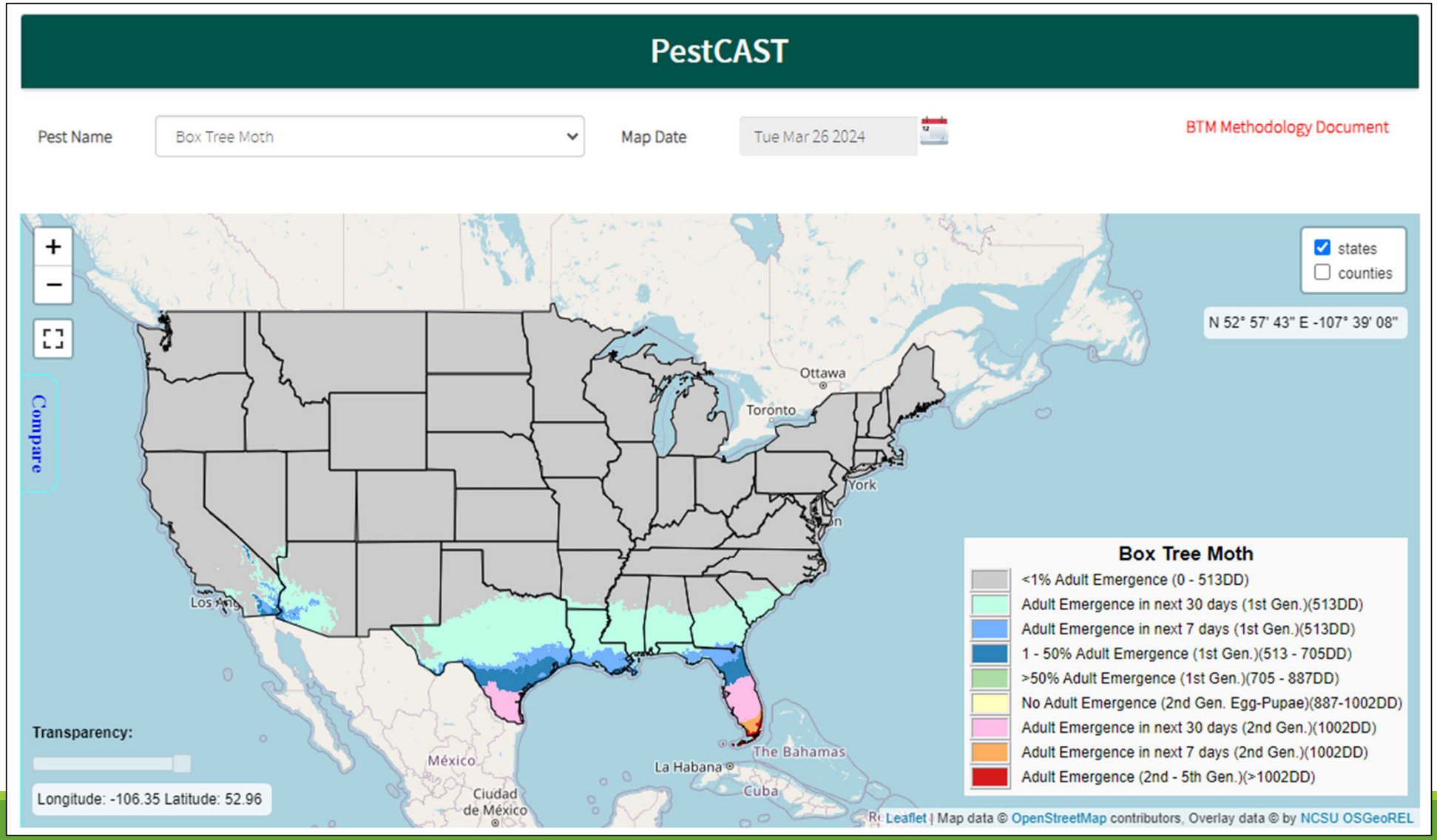
- Nurseries must establish a trapping program during flight periods
  - Maintain traps in production (in field and in greenhouses (1 trap)
  - Lures changed out every four weeks
- Trapping should inform/influence treatments in production
- More trapping specifications are found in the Compliance Agreement template
- Bucket Trap & Lure

Nursery size (acres)	No. traps
<10	3
10 to 100	4
101 to 250	5
251 to 500	9
501 to 1000	13
1001 to 2000	19



Scouting

- Nurseries must have a written scouting program, including BTM as a target
- Scouting must be performed by personnel who are trained to identify BTM
  - Monthly during flight periods
- Scouting records must be kept and must include **date**, **time**, **observations**, **personnel who performed the scouting**
- Tool for identifying flight periods: SAFARIS BTM adult phenology model


PestCAST
Pest Name
Box Tree Moth
Map Date
Tue Mar 26 2024
BTM Methodology Document
Compare
states
counties
N 52° 57' 43" E -107° 39' 08"
Ottawa
Toronto
York
Box Tree Moth
<1% Adult Emergence (0 - 513DD)
Adult Emergence in next 30 days (1st Gen.)(513DD)
Adult Emergence in next 7 days (1st Gen.)(513DD)
1 - 50% Adult Emergence (1st Gen.)(513 - 705DD)
>50% Adult Emergence (1st Gen.)(705 - 887DD)
No Adult Emergence (2nd Gen. Egg-Pupae)(887-1002DD)
Adult Emergence in next 30 days (2nd Gen.)(1002DD)
Adult Emergence in next 7 days (2nd Gen.)(1002DD)
Adult Emergence (2nd - 5th Gen.)(>1002DD)
Transparency:
Longitude: -106.35 Latitude: 52.96
México
Ciudad de México
La Habana
The Bahamas
Cuba
Leaflet | Map data © OpenStreetMap contributors, Overlay data © by NCSU OSGeoREL

Treatment(s): Production and Pre-Shipment

- Treatment must be performed on boxwoods in:
  - Outdoor Production Areas: A Pest Management Plan must be documented and implemented when BTM is found in production.
    - Treatment must be selected from an approved list for the life stage discovered
  - Pre-Shipment: An approved insecticide must be applied to any host plants leaving establishment within 7 days of shipment.
    - Treatment must be documented
    - Treatment must be with an approved insecticide

- Note: Certified, enclosed production areas to prevent BTM from entering are **EXEMPT** from treatments

Pre-Shipment Inspection

- The nursery must visually inspect all outbound shipments (after treatments) for BTM life stages and evidence

- Inspections must:
  - Be completed by trained personnel
  - Be completed no more than 24 hours before shipments leave

- Any living stage of BTM or plants with evidence of BTM must not leave the establishment and reported to the State Certifying Authority
- Shipments that have been inspected and are free from BTM life stages and have no evidence of BTM may be shipped under the Certificate

Certification

- A shipping certificate will be issued to the nursery for shipment
- Only those boxwood plants that have been treated and inspected to be found free of live BTM can use the certificate for shipment
- The certificate must accompany the plants being shipped, at all times during the movement of the boxwood plants
- The carrier must furnish the certificate to the receiver of the boxwood plants

Treatment Resources

Table 1. Products for use as the pre-shipment treatment. Specific products listed are those that were tested in 2023, but use of products with the same active ingredient and percent active ingredient and rate are also acceptable.

Active ingredient	Commercial name	EPA Reg. #	REI	IRAC[1] Chemical Class	Rates	Remarks
bifenthrin	Talstar P (7.9% active ingredient)	279-3206	12 hrs	3	21.7 oz/100 gal	Tested by FPML[2], 100% mortality for eggs, 1st to 3rd instar; complete control of 2nd instars when exposed to foliage treated 4 and 7 days prior. Mortality 98% in NY field test mixed populations of small and large larvae (Sept. 2023) at 21.7 oz/100 gal).
chlorantraniliprole	Acelepryn (18.4% active ingredient)	100-1489	4 hrs	28	16 oz/100 gal	Tested by FPML, 100% mortality for eggs, 1st to 3rd instar; complete control of 2nd instars when exposed to foliage treated 4 and 7 days prior. Mortality 97%-99% in NY field mixed populations of small and large larvae test (July & Sept. 2023).
lambda-cyhalothrin	Scimitar GC (9.7% active ingredient) Restricted use.	100-1088	24 hrs	3	5 oz/100 gal	Tested by FPML, 100% mortality for eggs, 1st to 3rd instar; complete control of 2nd instars when exposed to foliage treated 4 and 7 days prior. Mortality 95% in NY field test (Sept. 2023).

[1] IRAC or Insecticide Resistance Action Committee has developed a numbering system for each mode of action to select the most appropriate rotation alternatives by assigning a unique group number. (https://irac-online.org)
[2] USDA-PPQ-Science and Technologies' Forest Pest Methods Laboratory (FPML)

Table 2. Recommended products to treat boxwood for BTM in the production system.

Active ingredient	Commercial name	EPA Reg. #	REI	IRAC Chemical Class	Rates	Remarks
Bacillus thuringiensis, kurstaki	Javelin WG (85% active ingredient)	70051-66	4 hr	biological	1.0 lb/100 gal	Highly effective when early larval stages are targeted. Used in Europe[3] and Canada to control BTM. Applied in NY pilot project, in urban gardens area-wide control experiment with high degree of control achieved. Two applications timed 7-10 days apart achieve good control. Sprays should target young larvae for best results. No residual efficacy.
spinosad	Conserve SC T&O (11.6% active ingredient)	62719-291	4 hr	5	6 oz/100 gal	Tested by FPML, 100% mortality for eggs, 1st to 3rd instar. Mortality 98-100% in NY field test (July & Spet, 2023). Rutgers lists 99% mortality for 1st and 2nd instars. This product is short lived. Should not be used when residual control efficacy is needed.
methoxy fenozide	Intrepid 2F (22.6% active ingredient)	62719-442	4 hr	18	8 oz/100 gal	Tested by FPML, 100% mortality for eggs, 1st to 3rd instar; Complete control of 2nd instars when exposed to foliage treated 4 and 7 days prior, once molting occurred. Mortality in NY field test (July 2023) was 98-99%. User may see active caterpillars after application. Product prevents molting, and caterpillars do not die until they try to molt.

[3] Barbero, F., C. Pogolotti, S. Bonelli, C. Ferracini. 2024. Is microbiological control of the box tree moth feasible? Effectiveness and impact on non-target diurnal Lepidoptera. Biological Control. 188:105427.

Treatment Resources Cont'd

Table 3. Recommended adjuvant products[4] to include with insecticides[5] when treating boxwood for Box Tree Moth.

Commercial name	Active ingredient(s)	Rates
Pentra-Bark	Alkylphenol ethoxylate, polysiloxane polyether copolymer, propylene glycol	6 fl. oz./100 gal.
Stik-Kote	Polyether modified heptamethyltrisloxane	12.75 fl. oz./100 gal.
CapSil	Blend of polyether-polymethylsiloxane-copolymer and nonionic surfactant	6 fl. oz./100 gal.
Induce	Alky aryl polyoxylkane ethers, alkanolamides, dimethyl siloxane, and free fatty acids	16 fl. oz./100 gal.
Polymer Taxi	Acrylic polymer sodium	128 fl. oz./100 gal.
Aero Dyne-Amic	Methyl esters of fatty acids, alcohol ethoxylate phosphate ester, alkyl phenol ethoxylate	64 fl. oz./100 gal.
Nu Film P	Pinene (polyterpenes) polymers, petrolatum, alkyl amine ethoxylate	16 fl. oz./100 gal.

[4] .Tested by Cornell Cooperative Extension Suffolk County. Based upon ratings immediately after application, on two cultivars (*Buxus* x 'Green Mountain' and *B. microphylla* 'Winter Gem') Pentra-bark and Stik-Kote had the highest ratings for wetting and spreading of spray material on both new and old foliage. Most other adjuvants also provided at least moderate wetting and spreading on old and new foliage, similar in most cases to the water-based controls. Ratings after dark under UV light showed very good coverage on new foliage among all adjuvants and the dye control treatments, and on old foliage in nearly all adjuvant treatments. Coverage with Nu Film P was somewhat less, though not always significantly, on old foliage compared with other adjuvants tested. Nu Film P may still be an option to consider for organic production situations.

[5] Choice of material might depend upon insecticide and adjuvant modes of action, label recommendations and whether tank is mixed with other products.

Questions?

Resources

- https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/ENTO/ENTO-445/ENTO-445.pdf (Virginia Tech Resource)
- https://www.aphis.usda.gov/aphis/ourfocus/planthealth/plant-pest-and-disease-programs/pests-and-diseases/box-tree-moth/box-tree-moth (USDA's BTM landing page)
- https://www.hriresearch.org/the-basics-of-box-tree-moth (HRI training on box tree moth)
- complianceagreements@vdacs.virginia.gov (VDACS' Compliance Program)
- Compliance Agreement for BTM document