How Christmas Tree IPM Can Face the Challenges of the Next 20 Years
So have you heard about the Dolly Parton challenge?
A little entomology humor...
Integrated Pest Management textbook definition:

IPM is a strategy for keeping plant damage within bounds by carefully monitoring crops, predicting trouble before it happens, and then selecting the appropriate controls – biological, cultural, or chemical as necessary.
Another way to look at IPM

Integrated pest management (IPM) is socially acceptable, environmentally responsible and economically practical crop protection.
The goal of IPM is to get you to here!

✓ With only limited pest damage
✓ Without costing you a fortune
✓ Without damage to the environment
✓ With confidence!
Twice as many bugs – yet cut pesticide use by 75%!

<table>
<thead>
<tr>
<th>Over last 30 years</th>
<th>BWA #1 problem</th>
<th>Now seldom found</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spider mites bad</td>
<td>Now not so bad</td>
<td></td>
</tr>
<tr>
<td>Grubs an issue</td>
<td>Now seldom a problem</td>
<td></td>
</tr>
<tr>
<td>Cinara aphids rare</td>
<td>Now most growers treat for</td>
<td></td>
</tr>
<tr>
<td>Not known:</td>
<td>Rosette bud mites, scales, rust mites</td>
<td></td>
</tr>
</tbody>
</table>
Balsam woolly adelgid

Balsam twig aphid

Spruce spider mite

Hemlock rust mite
But what about the next 20 years?

What are the new issues?
Christmas Trees: A Pathway For Invasive Species

By KAILEY FOSTER • DEC 17, 2019

Stores that sell Christmas trees are required to get inspected by a team out of UDAF. Pop up Christmas tree stands are not required to have these inspections. If you want to know if a Christmas tree stand has been tested, talk to the owner of a test stand.
UNWRAPPING THE ENVIRONMENTAL IMPACT OF CHRISTMAS TREES

Kaileigh Bunting // Contributor

Standing an average of nine feet tall—topped decidedly with twinkling lights and fragile ornaments—Christmas trees are a must-have for most households celebrating the holidays. According to The National Christmas Tree Association, 56 million trees are sold over the holidays in the United States alone and account for $2 billion in sales. While most people don’t realize, however, is that even a natural Christmas tree can cause more harm than good.
Christmas trees at the Beverly Tree Farm in Beverly, Mass.
Photographer: Joseph Prezioso/AFP via Getty Images

Christmas Tree Farmers Worry About Life Without Chlorpyrifos

Dec. 23, 2019, 6:00 AM

* Various state bans, potential Canadian action put the chemical off limits for some
* Some tree farmers already transitioning to other methods

Adam Allington
Reporter
Pesticide Resistance

Preliminary Report on Potential Resistance to Bifenthrin in Balsam Twig Aphid in Avery County, NC

Clyde Sorenson, Jerry Moody, Austin Thomas, and Gabe Zilnik

- The labeled rate for bifenthrin is 3.2 oz ai/acre, which corresponds to a dose in this assay of 0.12 ug/ul
- Our most “resistant” population exhibited an LC$_{50}$ of 6.4 ug/ul, which corresponds to a field rate of 10.25 lbs ai/acre, a 29 fold increase over the most susceptible!
Indiana is losing Christmas tree farms, and a changing climate poses problems for those that remain

London Gibson, Indianapolis Star  Published 5:00 a.m. ET Dec. 24, 2019

A lot has changed since Jeanne Hopwood first started selling Christmas trees in 1986, but perhaps the most pressing change has been Indiana’s climate.
Weather has always been a factor

Bugs don’t have calendars

- March 16, 2010
- Feb 21, 2011
- Jan 30, 2012
- Feb 15, 2013
- March 9, 2014
- March 18, 2015
- March 15, 2016
- Feb 10, 2017
What’s changed with pest control due to weather lately?

Twig aphids hatching earlier

Parasitic wasp surviving better?
WHAT CAN REALLY BE DONE ABOUT THESE ISSUES?

NOTHING IS GOING TO MAKE THESE ISSUES GO AWAY – BUT IPM CAN ADDRESS THEM
With IPM you can craft the common sense solutions

If you focus too hard on the problem...

..the solution can often evade you.
What has always worked?
How IPM works:
IPM then and now:
I asked growers –
What are your IPM successes?
What do you have problems with?
This is not IPM...

I get the impression that people view IPM as an impossible goal they aren’t even coming close to achieving.

Photo of Alexis Veness posted by Kevin Massey to Linville Gorge Facebook Group
IPM in Christmas trees should have some form of...

<table>
<thead>
<tr>
<th>Cultural practices – site selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground cover management</td>
</tr>
<tr>
<td>Prescription soil fertility</td>
</tr>
<tr>
<td>Scouting</td>
</tr>
<tr>
<td>Protecting natural enemies</td>
</tr>
<tr>
<td>Safe, lawful, effective pesticide application</td>
</tr>
</tbody>
</table>
What’s the #1 issue with growing Christmas trees in North America?

That is – what’s wrong with this picture?

We’re growing the majority of Christmas trees off site from where they are naturally found!
Fraser Fir – where it’s from

Being native to high elevations means:

-- It’s cold!
-- There’s not a lot of competition
-- It’s humid
-- Soil pH is low

PHOTO: Adam Gravett
We’ve taken the tree off the mountain top...

We’ve moved the poor tree
Others have moved it even farther…

Trees growing in New York state
With climate change...

*Site selection becomes that much more important!*
What’s really important is how we modify the microenvironment…
You like this?
I don’t...
In North Carolina, we like to be a bit wilder…
I like this so much better! 😊

Ground covers are the **backbone** of Fraser fir IPM

- We’re modifying the micro-environment
  - Keeps soil cool
  - Less stress on the tree
  - Better root development
- Getting rid of grass reduces competition for nutrients
- Clover provides a more natural source of nitrogen
- Predators have a home
Nitrogen is like candy...
How we get the ground covers we want

‘Chemical Mowing’

- Low rates of typically Roundup
- Apply over the top of tree foliage
- 1-3 applications per year
- Clean up problem weeds in the fall
Creating a forest...

...creating habitat
Mama needs pollen & nectar

THE HOVER FLY

Baby eats bugs!
Ground covers predators
IF YOU FEED THEM
THEY WILL COME

If you don’t have the natural seed bank...

SOW CLOVER

To maintain biodiversity of flowering weeds...

USE CHEMICAL MOWING (8 oz Roundup/A)

For an added bonus ...

LET FIELD BORDERS GROW UP

For marketing (choose & cut especially)...

PLANT POLLINATOR BORDER/GARDEN
Di-Syston years

Pie-Chart of Predators

- Lady Bugs
- Lace Wings
- Dusty Wings
- Aphid Midge
- Hover Flies

1999-2000

2015

2016

With Sivanto

With Sniper
Field borders

Allow weeds with woody stems to grow up in field borders
PREDATORY MITES

1. Requires high humidity
2. Prefer woody stems as habitat
3. Are affected by pesticides
It doesn’t have to be large...
You’re providing habitat...

Why not advertise that fact with your customers on:

✓ Social media
✓ Signage on your farm
✓ Flowering borders for predators and photo ops!
What can you plant to bring in good bugs?

- Red clover
- Sunflowers
- Milkweed
- Yarrow
- An herb garden
- Any good pollinator mix
Interplanting: Just quit doing it…

The second most important cultural practice
Scouting
Farms that scout

- Make time for it
- Train their employees
- Use good hand lens
- Record what they find
- Make appropriate treatment decisions based on scouting
- Scout after treating
We look for symptoms

We beat trees

We focus on newest growth – littlest shoots

We use a good hand lens
Don’t just scout for pests
Balsam Twig Aphid

More insecticides are used to control the balsam twig aphid than any other pest in Fraser fir grown in western North Carolina. Scouting is key to twig aphid management. Managing ground covers are important in providing a habitat for predators.

On-Line Information:

CTN 19: Balsam Twig Aphid on Fraser Fir – fact sheet with life cycle, scouting, threatment thresholds, and pesticide choices

Focus on Aphid Control – includes control of twig aphids and Cinara aphids

Pest Predators – many of which feed on twig aphids

Photo Gallery:

![A balsam twig aphid egg](image1)
![A twig aphid hatching from an egg](image2)
![Adult balsam twig aphid](image3)
Pesticides and application
## Percentage of acreage treated

<table>
<thead>
<tr>
<th>INSECTICIDE</th>
<th>1994</th>
<th>2000</th>
<th>2006</th>
<th>2013</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimethoate</td>
<td>2%</td>
<td>21%</td>
<td>35%</td>
<td>47%</td>
<td>23%</td>
</tr>
<tr>
<td>Di-Syston</td>
<td>65%</td>
<td>50%</td>
<td>32%</td>
<td>0.2%</td>
<td>0%</td>
</tr>
<tr>
<td>Asana</td>
<td>12%</td>
<td>17%</td>
<td>13%</td>
<td>16%</td>
<td>2%</td>
</tr>
<tr>
<td>Sniper (Talstar)</td>
<td>---</td>
<td>0.3%</td>
<td>6%</td>
<td>48%</td>
<td>43%</td>
</tr>
<tr>
<td>Lorsban</td>
<td>6%</td>
<td>8%</td>
<td>5%</td>
<td>0%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Lindane</td>
<td>22%</td>
<td>24%</td>
<td>2%</td>
<td>1%</td>
<td>0%</td>
</tr>
<tr>
<td>Horticultural oil</td>
<td>3%</td>
<td>0.1%</td>
<td>1%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Safari</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>4%</td>
<td>5%</td>
</tr>
<tr>
<td>Envidor</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>2%</td>
<td>6%</td>
</tr>
<tr>
<td>Sivanto</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>3%</td>
</tr>
</tbody>
</table>
### Relative importance of insecticides

<table>
<thead>
<tr>
<th>INSECTICIDE</th>
<th>Percentage of total estimated pounds ai/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Di-Syston 15 G</td>
<td>58.5 %</td>
</tr>
<tr>
<td>Lindane</td>
<td>27.2 %</td>
</tr>
<tr>
<td>Dimethoate</td>
<td>9.9 %</td>
</tr>
<tr>
<td>Asana</td>
<td>0.5 %</td>
</tr>
<tr>
<td>Savey</td>
<td>0.1 %</td>
</tr>
</tbody>
</table>
Issues I see with pesticides

- Treating when you don’t need to
- Killing off all your predators when you don’t need to
- Overusing one material
- Mixing products together when you don’t need to
- Not rotating materials
- Not applying with enough coverage
- Expecting too much out of mistblower
So remember – pesticides kill pests...

... they also cause pests

You can’t build resistance to being eaten...
You can’t really do anything about public perception...

But what if also made this the public perception of growing Christmas trees?
Why not advertise what you see every day...
Ever heard of Stemilt?

Known as a beneficial insect to orchardists, a ladybug was added to Stemilt’s logo in 1989 to signify the company’s commitment to the environment.
My, how time flies…
What's your IPM super power?

- Pesticide application
- Cultural practices
- Scouting
- Biological control
- Quality control
- Record keeping
- Advertising

ChristmasTrees.ces.ncsu.edu