

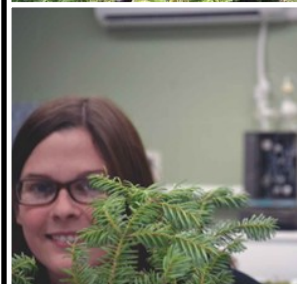


NECTRA

North Eastern Christmas Tree Research Alliance

RESEARCH BULLETIN

Vol. 1, Issue 2 - October 2026



Who We Are

The North Eastern Christmas Tree Research Alliance is a cooperative association composed of invested growers and leading Christmas tree specialists and researchers from the northeastern area of the United States and Canada. Our objective is to facilitate research, enhance dialogue, assist growers and coordinate opportunity and advancement for the Christmas tree industry. We are a registered non-profit society.

We welcome new members and advisors!

Contact Us

Email ctreealliance@gmail.com

Mail P.O. Box 52. Nova Scotia,
Canada. B0R 1E0.

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Letter from our Treasurer

Welcome to our second NECTRA Bulletin. Our group is composed of interested growers from across Canada and the United States and includes a significant number of crop scientists and extension specialists as advisors. The alliance is working! Experiences, challenges and shared research or trial insights have already led to new initiatives, wider collaboration, and joint projects. On some challenges, we have found assistance from unrelated work.

A good example was the mention of clethodim herbicide for grass control. It is not registered in all jurisdictions, and the old standard Prowl (sethoxydim) had been removed from the Canadian market. Thanks to a discussion at a NECTRA meeting, a grower from Vermont (Bob), sharing information from a scientist in Connecticut (Jatinder) was heard by...

Continued on next page

a weed specialist in New Brunswick (Vanessa) who also happens to be the province's Minor Use Coordinator. Vanessa is in the process of clethodim registration expansion and is now assisting the Christmas tree sector in the coordination of a label expansion, which is currently being coordinated by an IPM technician from Ontario (John).

Another example: We were assisting the A GIFT SEED program with provenance (regionally sourced) balsam fir samples from across North America for genomic analysis coordinated by Dr. Whitehill at North Carolina State University. When transport challenges for the samples were discussed at a NECTRA meeting, John Steele from the Ontario Ministry of Agriculture, Food and Agribusiness, and Dr. Messier from the University of Waterloo Christmas Tree Lab joined forces and expertise to assist in the coordination and preservation of material. It's a good thing they did, because material was damaged in transit, but they had already devised an insurance back-up plan. Growers seeking answers to trees bred for future climate change will be thankful for this work.

Some of the work is collaborative on a larger front. A project initiated by Dr. Cowles in Connecticut, for access to certain balsam fir sources, is being coordinated at the University of New Brunswick with the leadership of Dr. Mayrinck, and is providing an opportunity for Audrey Dunlap from Connecticut to refine needle abscission prevention products as she works to achieve her Master's degree. We should also mention the collaborative phytophthora management work in Quebec, proving that grafted stock bud break timing is essentially controlled by the parental grafted tissue and not the root stock, a vital piece of information as we go forward with trees of great growth traits, but no original score as to bud break timing for the "ortet", or original parent. The parents are long since gone, but we can move forward with confidence by examining the grafted plus trees. We have Dr. Ron Smith, and now Joel Tremblay, MSc, to thank for these advances.

But here is the rub: most of our major projects have been funded with industry seed money from the Real Christmas Tree Board. These funds are then utilized to secure government-based research support grants or programs. If we lose the Real Christmas Tree Board, much of what we hope to accomplish will be hindered. In this Bulletin, you will find an interesting article on adelgid control which may be outside the working sphere for some of us, but crucial for many others, and of course we are always on the lookout for controls which might work for related pests. Herein you will also find timely information on the glyphosate conundrum currently harming Christmas trees. However, the most important article is one we requested Rich Cowles to write. Rich has become a very important advisor over the years to growers across the continent, helping to solve many problems, including conifer root aphid and spider mite challenges. He is also currently advising our work on additional woolly adelgid controls. The list goes on and on! In this article, Rich has eloquently summarized both his research history, funded by the RCTB and industry needs for the future. It is a required read as you consider your vote.

We at NECTRA can only ask that growers consider the need for the research funding supplied through the Real Christmas Tree Board. The vote is in front of us, as the previous vote failed by a whisker, but many late ballots could not be counted. If individual growers have issues, we will of course still listen and respond, but the resources required to seek solutions to the problems confronting Christmas tree growers will be greatly diminished. Please consider your vote carefully.

Matthew Wright, NECTRA Treasurer

A Pictorial Guide for Monitoring Silver Fir Woolly Adelgids on Nordmann fir

Dr. Gary Chastagner and Dr. Marianne Elliott

Washington State University

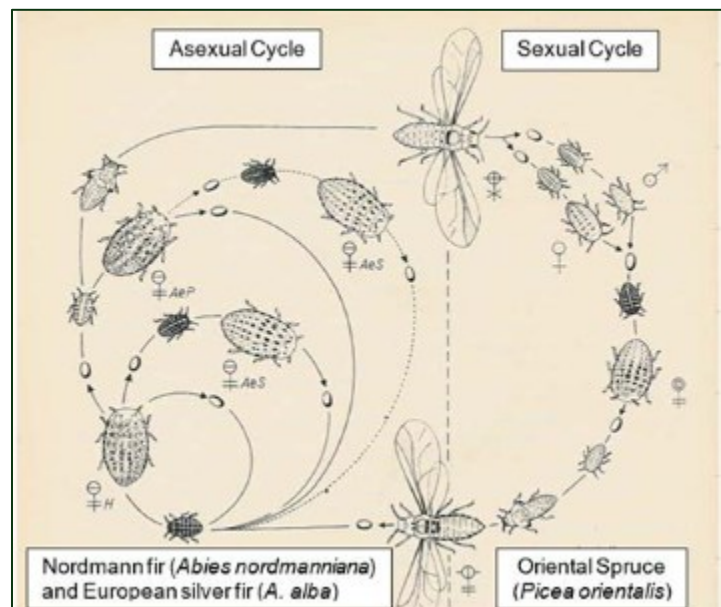
chastag@wsu.edu; melliott2@wsu.edu

Introduction

Nordmann fir (*Abies nordmanniana*) Christmas tree growers should be on the lookout for the silver fir woolly adelgid [*Adelges (Dreyfusia) nordmannianae*]. In Europe, this insect is a serious pest on Nordmann fir Christmas trees. Although damage from this pest has rarely been seen in the PNW, it has been sporadically detected on Nordmann fir Christmas trees in a few plantations since 2010 in the Puget Sound region of Western Washington.

Symptoms

The silver fir woolly adelgid has a very complex life cycle. Research at WSU Puyallup indicates there are two generations per year. It primarily attaches to newly emerging shoots and symptoms associated with this adelgid result from the feeding of this pest on newly emerging shoots and needles. Infested needles are often chlorotic, shortened, and twisted downwards. The severity of symptoms varies depending on the level of infestation. Needles on lightly infested shoots may be the same length as non-infested needles, while elongation of needles on highly infested shoots is very stunted and the shoots with be deformed, shortened, brown, and dry.



A Summary of Research at WSU Puyallup

- Once detected, adelgid populations rapidly increase over a two-to-three-year period.
- Life cycle studies indicated there are two generations of this pest in the PNW and that the first generation of crawlers typically appear 3 to 4 weeks prior to bud break.
- Host susceptibility trials found there was considerable genetic variability in susceptibility between seed sources of Nordmann fir, and that limited damage occurred on Turkish fir.
- Over a three-year period, the highest level of damage to multiple fir species occurred on Nordmann and European silver firs. Very limited, if any damage was observed on common North American *Abies* species of Christmas trees.

- One of the most striking findings was the apparent natural collapse of adelgid populations and the limited damage that occurred in infested plantings five to six years after the initial detection of this pest.
- Postharvest trials indicate there was no risk that adelgids on Nordmann fir would spread via the movement of cut Christmas trees or boughs under our test conditions.
- In a limited control trial, foliar applications of OnyxPro and Ultor were the only treatments that significantly reduced the damage caused by the adelgids. There was no residual control from the treatments one year later so growers would need to treat trees every year to control this pest.
- Foliar applications of pesticides should be applied to protect newly emerging shoots and needles for the crawlers.

Monitoring Fields

Even though this pest is not widely distributed in North America, growers are encouraged to monitor their Nordmann fir plantings for this pest. Symptoms and various life stages are evident throughout the year. Spring is an excellent time to monitor fields to determine if this pest is present and make decisions about controlling it. Look for trees with light green to yellow foliage and then check the shoots for symptoms and life stages of the adelgid on the shoots and needles. On the next page, there are pictures illustrating the range in symptoms and pest life stages.

Acknowledgements

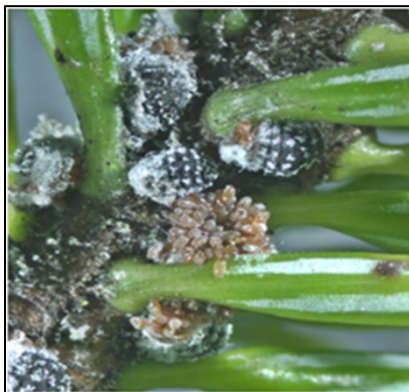
- Portions of this research described in this document were supported by the WSDA Specialty Crop Block Grant program, PNWCTA Advanced Research program, and the WSDA Christmas Tree License Research program.
- Collaborators included Dr. Art Antonelli (WSU), Dr. Ulrik Brauner Nielsen (University of Copenhagen), Chal Landgren (OSU), Dr. Richard Cowles (CTAgES), and Dr. Nathan Havill (USDA Forest Service).
- The assistance of industry stakeholders who donated seedlings and assisted in culturing trees in research plots at Puyallup is greatly appreciated.

About the Author

Dr. Chastagner and Dr. Elliott represent yet another important illustration of the benefit of funded research, collaborative partnerships, outreach and the sharing of information. They (and others) are actively advising the east coast efforts to address phytophthora and other root diseases. Contributors noted in this article (Chal Landgren, Ulrik Neilsen) have also provided data and knowledge to further crop protection across country, state or provincial borders. The work of crop specialists the world over has facilitated most crop protection initiatives and pest management registrations.



Tree with chlorotic, infested shoots



Female adelgids producing eggs in the spring

Monitoring for Silver Fir Woolly Adelgid on Nordmann fir



Newly emerged needles infested with adelgid crawlers



Symptoms on lightly infested needles



Symptoms on moderately infested needles



Severely stunted and curled infested needles



Stunted, distorted needles on a highly infested shoot



Severely infested shoot with distorted needles and waxy covered adelgids

Christmas Trees and Glyphosate Concerns – A Literature Review

Dr. Christopher Wilson EdD, Med

Senior Sales Representative, Melvin Weaver & Sons

Introduction

Firstly, growers must consult their local county agents and tree specialists to meet all state/provincial and federal label guidelines and restrictions.

Secondly, there is no documented evidence of glyphosate (or its formulations) surviving at harmful half-life levels in the soil to be absorbed by the roots of transplanted Christmas trees or accumulating over years to cause latent damage.

The major concern however is that glyphosate *can* survive and remain active for years inside the living tissue of a tree if it is directly absorbed via accidental above-ground exposure.

The breakdown of how glyphosate behaves regarding soil, roots, and long-term tree damage is structured into two distinct scenarios: in the soil and inside the plant tissue.

Scenario 1. In the Soil (Transplant Safety)

Immediate Inactivation: Glyphosate is non-residual in soil. Upon contact with dirt, it binds tightly and almost irreversibly to soil particles. [1, 2]

No Root Uptake from Soil: Because it binds so strongly to soil, it does not leach into the root zone in a bioavailable form. Research from institutions like Michigan State University Extension and Penn State confirms that Christmas trees can be safely transplanted into fields immediately following a broadcast application of glyphosate without risk of root absorption. [1, 2]

Soil Microbe Breakdown: In the soil, glyphosate is consumed and broken down by microbes, carrying a typical environmental half-life of 7 to 60 days. [1]

Scenario 2. Inside the Plant Tissue (Sub-Lethal Internal Accumulation)

While glyphosate won't hurt a transplant from the soil, it *will* cause delayed, long-term damage *if it accidentally contacts the tree directly during application*.

The Translocation Trap: If a sub-lethal dose of glyphosate hits green needles, low basal branches, exposed surface roots, or the thin, pigmented bark of young conifers, it is rapidly absorbed into the tree's vascular system (phloem). [1, 2]

Long-Term Internal Half-Life: Unlike in the soil, glyphosate *does not break down quickly inside living plant tissue*. Studies on forest vegetation have shown trace amounts can persist in perennial root systems for a decade or more. [1, 2]

Delayed Age-Related Damage: In the fall, the tree moves sugars (and the trapped glyphosate) down into its roots. The following spring, when the sap rises, the glyphosate is translocated up to the new growth points. This causes latent damage that appears as the tree ages, including witches' brooms (dense, stunted

needle clusters), chlorosis, distorted shoots, reduced winter hardiness, and bark splitting. Symptoms can continually manifest for 2 to 3 years after a single misapplication. [\[1, 2, 3, 4\]](#)

Table 1: Summary of Differences between Glyphosate in Soil and in Tree Tissue

Factor	Glyphosate in Soil	Glyphosate in Tree Tissue
<i>Bioavailability</i>	Inactive (bound to soil particles)	Highly active (moves through phloem)
<i>Half-life / Persistence</i>	Short (weeks to months)	Very Long (can persist for years)
<i>Risk to Transplants</i>	None (safe to plant into treated soil)	High (if sprayed directly on young bark/needles)

Safer Glyphosate Formulations for Christmas Trees

No formulation of glyphosate is 100% "safe" to spray directly over the top of actively growing young Christmas tree transplants. However, there is a specific *type* of formulation that is substantially less toxic to conifers: [\[1\]](#)

Use "Surfactant-Free" or "Conifer-Release" Formulations: The primary reason glyphosate damages trees during targeted or dormant applications is the built-in *surfactant* (wetting agent) found in standard retail products like Roundup Pro. Surfactants break down the protective, waxy cuticle layer on conifer needles, allowing the herbicide to penetrate the tree. [\[1, 2\]](#)

What to buy: Look for glyphosate formulations without added surfactants (often sold under forestry/aquatic labels or generic industrial labels). By using a surfactant-free product, the conifer needles can naturally repel the spray droplets, providing a significantly wider margin of safety during targeted applications. [\[1, 2\]](#)

How to prevent glyphosate damage: Action plan for growers

Because young transplants have thin bark, low branches, and a smaller overall system, preventing accidental above-ground exposure is critical. University extensions recommend a multi-step protection strategy: [\[1\]](#)

1. Perfect Your Timing (The Golden Rules)

Conifers are highly sensitive to glyphosate during the spring and summer when buds break and new candle growth is succulent. [\[1, 2\]](#)

Pre-Budbreak (Early Spring): Apply glyphosate only *before* the tree buds swell and break dormancy.

Post-Hardening (Late Summer/Fall): Wait to apply mid-season glyphosate until *late August or September*, after the trees have completely "hardened off" and formed tight dormant buds. Hardened needles possess a thick, waxy coating that resists glyphosate penetration. [\[1, 2, 3, 4, 5\]](#)

2. Modify Application Equipment

Never use a standard broad-spectrum broadcast boom spray over active plantations. [\[1\]](#) [\[2\]](#)

Use Semi-Directed Basal Sprays: Keep the spray nozzles low to the ground. Direct the spray *only* at the weeds around the base, completely avoiding the tree's foliage and young trunk. [\[1\]](#) [\[2\]](#)

Shielded Sprayers & Hoods: Fit your tractors or backpack sprayers with physical spray hoods or drift shields. This traps the spray pattern over the weeds and prevents drift from floating upward onto the lowest branches. [\[1\]](#)

Wicking or Smearing Tools: For escaped weeds or tall thistles, use specialized carpet-roller or rope-wick applicators (such as *Mankar* systems). These tools physically wipe the glyphosate directly onto the weeds without aerosolizing the chemical into a drifting mist. [\[1\]](#) [\[2\]](#)

3. Adjust the Dosage

Keep Rates Low for Transplants: If spraying around young trees (less than 2 years field-planted), lower your glyphosate concentrations to the minimum effective rate (often **8 to 16 oz/acre** of a standard 3 lb ae/gal product). Young weeds will die, but the tree can better tolerate minor, accidental micro-drift. [\[1\]](#)

4. Switch to Safer Herbicide Alternatives

Relying entirely on glyphosate increases the risk of accidental tree damage and builds weed resistance. Integrate these conifer-tolerant alternatives into your management cycle: [\[1\]](#)

For Grasses (Over-the-Top Safe): Products containing Clethodim (*Select Max, Arrow*) or Sethoxydim can be safely sprayed *directly over the top* of young Christmas trees at any growth stage. They kill annual and perennial grasses completely but will not harm conifers.

For Soil-Level Pre-Emergence: Apply Flumioxazin (*SureGuard*) or Oxyfluorfen (*Goaltender*) right after transplanting. They prevent weeds from germinating for months, eliminating the need to spray glyphosate near your delicate young trees later in the season.

For a Safer Burndown alternative: If you need a broad-spectrum burndown but want to completely eliminate the risk of latent systemic tree damage, switch to Glufosinate (*Finale*). Glufosinate is a contact-only herbicide; even if a tiny droplet hits a lower branch, it will only burn that single spot and *cannot translocate* through the vascular system to kill the rest of the tree. [\[1\]](#) [\[2\]](#) [\[3\]](#) [\[4\]](#)

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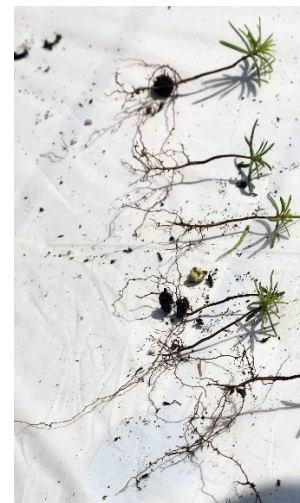
About the Author

Dr. Christopher Wilson is a Senior Technical Sales Representative with Melvin Weaver & Sons, an agricultural supplier based in Lancaster, Pennsylvania. He brings more than 32 years of experience in agribusiness technical sales and management, complemented by a background in agricultural operations and education. His work focuses on identifying and evaluating emerging chemistries, technologies, and management strategies that provide practical solutions for growers.

Recent Research Photo Spotlight



Cultivator designed in Quebec to develop raised outplant beds for seedlings



Fungicide trials in seed beds

The Past, Present and Future of Christmas Tree Research

Dr. Richard S. Cowles

*Valley Laboratory, The Connecticut Agricultural Experiment Station
153 Cook Hill Rd., P. O. Box 248 Windsor, CT 06095*

Part I. The Real Christmas Tree Board: Essential for supporting applied science

In the United States, the Morrill Act of 1862 provided a mechanism for the Federal government to fund the Land Grant system, in which 30,000 acres of federally owned land per senator or legislator, with the intent that each state could use that land to fund colleges that would train future farmers and thereby improve the nation's agricultural productivity. Each state's designated land grant university has three missions: teaching, research, and extension, all with the original intent to serve agriculture's needs. This system has historically been extremely successful. Educated farmers can better understand scientific principles that improve agricultural productivity. They also know that they should bring new problems to the attention of extension specialists, who might be able to directly address the problem, or if it is beyond their knowledge, they can take a new problem to experiment station research specialists (usually located at the university) to solve their problems. The researcher then shares the appropriate solution to the problem resulting from their research with the extension specialist, who then extends this information to the grower who first experienced the problem, along with other farmers who may need this information. When the system is working well, research scientists keep an eye open for new research problems to solve and there is seamless communication in both directions from grower to extension specialist to research specialist.

Unfortunately for Christmas tree growers, land grant universities have deemphasized their agricultural mission, evidenced by weak institutional support of the cooperative extension system, not hiring scientists experienced in field experimentation, and dissolution of core agricultural departments. For example, entomology, plant pathology, weed science, and soil science are applied subject areas essential to agriculture. Traditionally, each land grant university in every state had a department devoted to each of these disciplines. As our economies have diversified and populations have grown, the relative importance of support for agriculture has diminished at land grant universities. With urbanization, students at the Land Grant Universities now mostly pursue majors in subjects unrelated to agriculture, and the agricultural disciplines are often viewed as obsolete. From the University's point of view, maintaining these departments doesn't make sense, because value is measured in the number of college credit hours being taught to undergraduate students (courses in entomology are often taught at the graduate level because they are specialized subjects). Out of New England states, no land grant university has maintained an entomology department. The University of Massachusetts is a prime example. Their historically outstanding Department of Entomology was subsumed into a combined Plant Soil and Insect Science Department (abbreviated PSIS, thankfully it wasn't the Plant, Insect and Soil Science Department!) in 2002, and by 2006 the faculty members of this new department were told to find other departments to join, and the PSIS Department was dissolved. Cooperative extension has become the poor relation of the tripartite land grant university missions. For example: until recently, extension professionals hired at UConn were asked to bring in 100% of their salary from grants – a disgraceful situation in which there was a revolving door of hiring and losing trained professionals, because there aren't enough grants available to pay those salaries. In my opinion, a land grant university should honor its commitment to its three foundational missions by paying the salaries of teachers, researchers, and extension professionals alike.

With respect to support for Christmas tree research, land grant universities have shifted their focus from hiring research specialists for specific crops (for example, a Christmas tree and ornamentals plant pathologist like Dr. Gary Chastagner, just retired from Washington State University) to be much more specialized within the discipline, such as having expertise in the molecular biology of plant/disease interactions. What is often lost with these hires is any practical understanding of agricultural crops. Universities that used to have campus-based research/extension specialists with significant interest in Christmas tree research subject matter included Rutgers ([New Jersey] entomology [Jim LaShomb]) and Penn State (plant pathology [Bill Merrill, Jr.], entomology [Paul Heller], and weed science [Larry Kuhns]), but those positions have disappeared. In their place we sometimes find that the universities are filling positions with county-based extension specialists, if at all. There continue to be “powerhouses,” where the Christmas tree industry is so important that their respective universities have maintained a critical mass of campus-based research and extension specialists. These centers are in the states of Oregon and Washington, Michigan, and North Carolina. Note that these centers have taken on the role of providing support to Christmas tree industries in the Pacific Northwest, Midwest, and Southeast, respectively. The special role of the Connecticut Agricultural Experiment Station for filling a support role in the Northeast is the subject of the next Part.

We need to ask how research to support Christmas tree production can be supported in the modern Land Grant University environment. My reading of the situation is that there are two scales of research activity: we can call one “big science” and the other “applied science”. At universities, the success of a research scientist is measured not only by the number and quality of their publications, but by the amount of grant support dollars obtained. There is a good case to be made that the empire-building “big science” grants, such as the multimillion-dollar program that Dr. Justin Whitehill is leading at NCSU is necessary in the long run to push the frontiers of science using cutting-edge technology. These are the kinds of grants that large universities love because they bring in overhead money that keeps their facilities functioning. However, “big science” probably can only be supported by federal grants, which leaves nagging practical production problems that still need to be solved (see Part III). In the original Land Grant University model of grower-extension-research scientist relationship, there was an expectation that if a problem were important enough, the university scientist associated with a commodity would drop everything and dedicate time to solve a new or urgent problem affecting “their” commodity. Now that scientists at universities are divorced from commodity responsibilities, no scientist is tasked with being responsible for solving problems specific to that crop’s needs. One of the only ways to attract the specialized scientist’s attention is through funding to work on specific problems. This is where funding opportunities from the Real Christmas Tree Board becomes so important. Obtaining grant funds can be difficult, and anybody working at a land grant university as either a research or extension scientist is hungry for funding to support their work. Making it clear that funding can support results-driven research may tip either a research scientist or extension specialist in the direction of working on problems that are important to Christmas tree growers. I think that most researchers recognize that the level of funding available from the RCTB is a relatively small amount, but astute individuals may recognize ways to use these funds as “seed money” to either support a master’s student or to develop a project in which experimental results can be used to support much larger grant proposals from federal agencies. In this way the effects of RCTB funds can be multiplied by either training young scientists, who may continue in a career working with Christmas trees, or trigger new and larger projects supported through federal funding to work on fundamental questions related to the original RCTB grant.

The Real Christmas Tree Board has supported many projects of importance to growers: the projects I have worked on have included using fertilizers at the time of planting to improve establishment, ways to thwart

Phytophthora root rot, insecticides to manage armored scales, do-it-yourself deer repellents, and manipulation of fir tree physiology to enhance needle retention. Because of the historical changes outlined in this article, Christmas tree growers need to recognize that finding ways to fund research is important to keep the industry healthy over the long term. The RCTB has served the industry well to direct funding to scientists interested in helping the industry. The last part of this article will outline some of the major challenges facing our industry, each of which would be worthy of research funding.

Part II. Fixing a broken system: A new model for applied Christmas tree research for the Northeast

Part I showed that for parts of the country, the Land Grant system is still functioning and fulfills the regional needs of Christmas tree growers. In those regions (the Pacific Northwest, Midwest, and Southeast), the major Christmas tree industries in Oregon, Washington State, Michigan, and North Carolina respectively have pressured their universities to maintain effective programs to support their industry. The Northeast region is quite different. The fact that we live in smaller states means that there is fragmentation of Christmas tree growing, in which no one state has a critical mass to support the kind of research and extension programs that we can see in other major growing regions. It took me many years at my current position to understand why I was being called upon by growers' associations in New Hampshire, Vermont, Massachusetts, Rhode Island, New Jersey, and Pennsylvania to provide advice to growers, give presentations, and to diagnose various problems. The reason is that these states didn't have Christmas tree researchers or extension specialists available. Where the land grant universities have left voids for extension support to Christmas tree growers, the state associations in some cases fill this void. Problems found by growers are brought to the attention of leaders within the associations, and then they reach out directly to researchers (usually Dr. Jatinder Aulakh and me at the CAES).

The fragmentation of our industry into relatively small states suggests that regionalization of support could be an effective way to support the Christmas tree industry's needs. The Connecticut Agricultural Experiment Station (CAES) is exceptional because it was founded in 1875, 13 years before the Hatch Act established a formal system for the federal government to fund the agricultural research activities in each state to support the land grant mission. The CAES is the only agricultural experiment station remaining independent of its state's land grant university. As a result, Connecticut has two agricultural experiment stations, The Connecticut Agricultural Experiment Station and the Storrs Agricultural Experiment Station (UConn). One consequence is that the CAES has been insulated from some of the pressures found at universities that resulted in dissolving specialized departments. For example, we still have an Entomology Department. As a small state, I have found that we (growers and CAES researchers) cut out the extension intermediary. Since about 1960 and starting with Dr. John Ahrens, scientists at the Valley Laboratory of the CAES have continuously provided research support to the Christmas tree growers of Connecticut. Recognizing this, the Director of the Connecticut Agricultural Experiment Station, Dr. Jason White, announced at the CCTGA Fall Field Day in 2025 that he was naming our institution a Center of Excellence for Christmas Tree Research (CECTR). Recent Christmas tree research at the CAES has principally been carried out by Dr. Jatinder Aulakh and me, but other CAES scientists have contributed their expertise as needed, including Drs. James LaMondia, Yonghao Li, DeWei Li, Nate Westrick, and Ms. Michelle Salvas. An increasing number of extension specialists in the region know that we welcome collaboration, and so the CAES and the CECTR can model at a regional scale how the land-grant cooperation between growers, extension specialists, and researchers should work, with a geographic and economic scale like the other powerhouse centers. To this end, all researchers and extension personnel in the Northeast, including in

eastern Canada, will be invited to participate in CECTR as a virtual center, to promote collaboration among all the members.

The newly formed (about 1 year old) North Eastern Christmas Tree Research Alliance curiously geographically matches the area I anticipate being served by CECTR. It provides a channel of communication between Canadian and U.S. growers (members) and researchers (advisors) to discuss research needs and results. A result of the formation of the North Eastern Christmas Tree Research Alliance is a noticeable improvement of interstate and cross-border communication between Canadian and U.S. growers on our common needs and discussions among researchers from both countries.

I am hopeful that growers across the U.S. and Canada will recognize the value of maintaining the RCTB and will vote “yes” at the next referendum. If there is a “no” vote, then NECTRA as a regional growers’ group could coordinate support for Christmas tree research focused on the needs of the Northeast, if there was interest in coordination among various state growers’ associations to support such an effort.

Part III. Research needs in Christmas tree production

This Part intends to provide “food for thought” for Christmas tree growers and researchers regarding areas that I believe are worthy of research efforts. These were quickly written, and so there are certain to be many other important problems to consider.

Weed Management and Herbicides

- (1) Tools to measure glyphosate safety to conifers. Recent damage to trees sprayed in various ways with several glyphosate products through the Northeast points towards unpleasant surprises arising from changes in product formulation that have reduced the safety of familiar glyphosate trade name products in our plantings. Physical tests to measure the potency of surfactants in commercial products could identify those products that are still compatible with long-established weed management practices and identify those likely to not be safe to our trees, without having to put whole fields of planted trees at risk.
- (2) Weed management alternatives to glyphosate. This would be useful for growers who need to avoid further glyphosate exposure to their trees, to find suitable alternatives in case glyphosate is banned, and to manage weeds that have become resistant to glyphosate.
- (3) Alternatives to PFAS – based herbicides. Legislators and regulators will eventually realize that pesticides containing polyfluorinated components can no longer be justified, because they last forever in the environment. Some of these are pesticides we commonly use, and so it would be forward-thinking to find alternatives to these products now.

Insect Management, Insecticides, and Biological Control

- (1) Best practices for chemical control of adelgids. Balsam woolly adelgid has become increasingly damaging to balsam and Fraser firs grown in regions where balsam fir are native, probably due to warming winters. Several products are available and effective, but growers need data showing which application techniques are most effective.
- (2) Landscape – level suppression of adelgid populations through releases of a generalist adelgid predator. Many of the problems with balsam woolly adelgids arise because wild balsam firs

provide a population reservoir from which crawlers blow into managed stands. *Sasajiscymnus tsugae* is a ladybeetle generalist predator that feeds on all adelgid species available. Releases of this commercially available species (in the U.S.) could provide biocontrol of adelgids in forests and reduce the risk of crawlers blowing into managed fields. This species should be evaluated for release in Canada to manage both balsam woolly and hemlock woolly adelgids.

- (3) Alternatives to bifenthrin and lambda cyhalothrin (PFAS molecules) suitable for root dips, leader sprays, stump sprays, and BWA-targeting foliar drench sprays. As mentioned earlier under herbicides, PFAS molecules may soon be banned. Alternatives need to be identified in the U.S. in anticipation of these active ingredients being banned.

Disease Biology and Management

- (1) Christmas tree species susceptibility to various *Phytophthora* spp. Researchers in North Carolina tested all available species of firs for their susceptibility to *P. cinnamomi*. This is an uncommon *Phytophthora* species in the Northeast. Species specific interactions are common with many diseases, and so those susceptibility tests may not predict well which species of firs can grow well in our soils. Having a more complete test of the pathogenicity of the dozen *Phytophthora* species commonly found in the Northeast would provide better data to match which species can be grown at different sites.
- (2) The potential for soil amendment with gypsum to suppress *Phytophthora* root rot. High levels of calcium in soil solution are known to interfere with multiple aspects of *Phytophthora cinnamomi* biology. We need to know whether incorporation of gypsum in soil is useful against other species of *Phytophthora*, and whether there are economic benefits from this practice.
- (3) The potential for potassium phosphite for preventing losses from PRR. It is known that phosphites can be effective for protecting avocado and apple trees from PRR. We do not know whether this will be true for Christmas trees.
- (4) *Phytophthora* species diversity in the Northeast. Currently, we are aware of about dozen species of *Phytophthora* that can cause PRR of Christmas trees in the Northeast. It is not currently known what the geographical range is for each of these species.
- (5) Developing a simple testing method for growers to detect presence of PRR. Nurseries and Christmas tree growers currently need to send samples to specialists to determine whether they are infected by *Phytophthora*. A simple bioassay method can be tested to determine whether it is useful to growers for them to detect the presence of *phytophthora* in transplants they purchase, in the soils of their fields, or in tissues obtained from diseased trees.
- (6) Tests of slow sand filtration to mitigate *Phytophthora* presence in nursery irrigation ponds. Nurseries are at a disadvantage in managing PRR because open irrigation ponds are needed to provide enough water to satisfy their needs. Slow sand filtration has been developed by German scientists to use bioremediation to eliminate *Phytophthora* from irrigation water. These methods need to be adapted and tested to determine how effective they are.
- (7) Test of approaches to develop suppressive soils. Soils in forests commonly do not allow *Phytophthora* organisms to thrive, a condition called suppressive soils. Research should

investigate the biological conditions that lead to suppression of *Phytophthora*, so that these conditions might be replicated in production fields and nurseries.

- (8) Tests of biological control of *Armillaria* root rot. A fungus that parasitizes *Armillaria* spp., *Entoloma abortivum* needs to be tested to see how readily it can be grown in the laboratory. The goal would be to generate spores or mycelium inoculum to suppress local populations of *Armillaria* causing root rot in Christmas tree plantings.

Improving Soil Health and Plant Growth

- (1) How to increase microbial biodiversity in the rhizosphere. Long-term use of herbicide strips within rows of Christmas trees might be leaving the soil with depleted microbial diversity, which in turn may be influencing root disease dynamics. Establishing tree-compatible groundcover, wood chip mulch, or mowing residue may improve soil organic matter and improve the soil microflora. The economics and growth performance of trees with these various systems need to be compared.
- (2) Optimized fertilization. Curiously, application rates for nitrogen, phosphorus, and sulfur/sulfate inputs required to grow premium Christmas trees is poorly understood. Tissue testing and surveys of farms to measure plant quality could help to quantify the tissue levels optimal for fertilization.

Genetic Improvement and Improved Needle Retention

- (1) Standardized and reliable needle retention bioassays. Genetic improvement of Christmas trees requires that advanced selections of trees have exceptional needle retention traits. Recent discovery that previous needle retention testing methods are not always reliable for revealing the best performing trees means that our community needs to step back and examine testing methods more thoroughly to discern weaknesses caused by changes in plant physiology and by the testing conditions, themselves.
- (2) Optimized preharvest foliar sprays to improve needle retention. We (Audrey Dunlap and I) have found that synthetic auxins can improve needle retention in harvested true firs. This approach needs to be studied to determine whether we can further improve upon the method that we tested.

About the Author

Dr. Richard S. Cowles is a research entomologist at the Connecticut Agricultural Experiment Station (CAES). His many contributions to the applied science of Christmas tree production have directly helped growers with some of the industry's most persistent and costly challenges, including white grubs, weevils, adelgids and *phytophthora* root rot. Many of his projects have formed the groundwork for registrations of what are now commonly used chemical treatments for emerging pests. He has presented to Christmas tree growers throughout the northeastern United States and Canada and is a recognized resource for practical pest management research.



(BWA) Trials

Left: Altus
(flupyradifurone)
Trial Forestry Basal Bark
treatment rate

**Exact # molecules as Admire
treatment.**

Date of Treatment
April 29, 2025

Right: Assessment Photo
July 26, 2026

Delivery: Tee Jet AIXR 4
nozzle Spray 2 seconds for every
inch dbh
Calibrated delivery per inch for
bottom 4.5 feet

Altus top closeup



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