

NC STATE UNIVERSITY



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Newsletter

September-October 2019

inside:

2

Elongate
Hemlock Scale
Control
Measures

3

Update
Fraser fir
Cone
Research

4

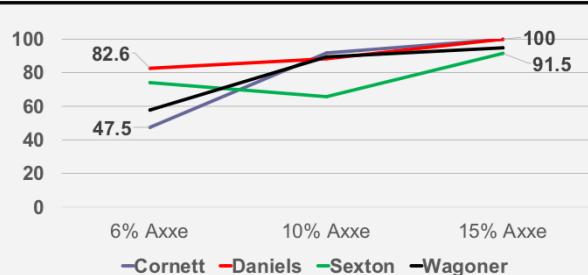
NCDA & CS
Update
EHS Shipping
Regulations

Update: Fraser fir Cone Control Research Jeff Owen, NCSU Christmas Tree Specialist

Purpose: To identify effective rates and timings of Axxe herbicide (40% ammonium nonanoate) to selectively kill emerging cones on Fraser fir Christmas trees without damaging the trees.

Background: After 7 years of Fraser fir cone control research in North Carolina, efforts have narrowed to using chemical pruning agents to kill tender emerged cones in Spring. Of 20 products tested, herbicidal soaps (fatty acid/alcohols) are the most effective at killing immature cones. Treated, they dry out and become tiny persistent brown cones. By stopping cone hormonal activity early in the season, surrounding foliage develops more fully. Initial testing was conducted using manual backpack sprayers but has progressed to high pressure hose sprayers. With effective pruning agent(s) identified, additional work focused on identifying optimum rates, spray volumes, and timings to selectively kill cones without harming trees.

Methods: In NC, cones occur most reliably on larger trees. Abandoned fields are frequent cone study sites. High pressure sprayer treatment of tree tops can involve widespread off-target spray and drift. To avoid treatment contamination, 10- tree clusters were treated in all 2018 & 2019 studies except the Cartner farm. There, use of scattered 2.5 m (7-8 ft.) trees permitted a replicated design involving eleven single tree reps for each of three Axxe treatments. Rates of Axxe (40% ammonium nonanoate) included 6%, 10%, 13%, and 15% depending on the site. Scythe was also applied at some locations at 10% and 15% rates. In 2018, cones were sprayed at four different sites on May 3, 4, 8, and 9. In 2019, the Cartner study was treated on April 29. At Mt. Jefferson State Park, treatments were replicated one week apart on April 24, May 1, and May 8. In June, the number of cones killed, damaged, or missed, plus evidence of tree damage were recorded.



2018 Combined Axxe Results from 4 Farms - % Cones Killed:

There was a clear rate response across 4 locations treated. Best control occurred at 15% rates of Axxe. Bud abortion and foliage stunting was observed after May 8 and 9 treatments, but not after May 3 and 4 treatments.

continued pg 3

Control of Elongate Hemlock Scale-Summer to Early Fall

To date, the best controls of EHS are either Talus, Safari, or a combination of either Sniper + Dimethoate or Asana + Dimethoate. Understand that even with the best treatments, 100% control of scale is not possible. The various windows for EHS are discussed along with the other pests that can be controlled with each product(s).

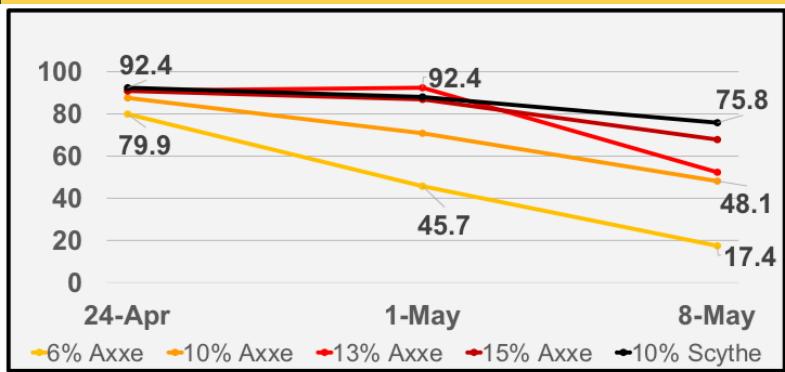
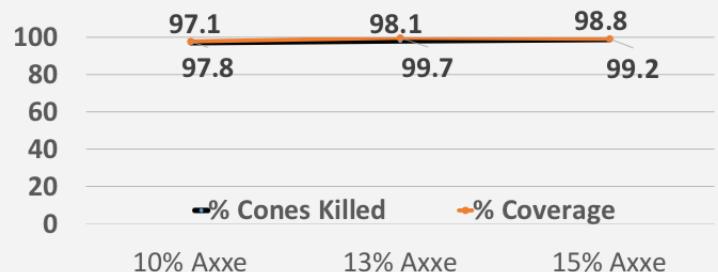
Living scales can be found on 3 and 4 year old needles back in the canopy of the tree and even the systemic Safari performs best when applied with good coverage. Use a high pressure sprayer and create a mist that will move back to the underside of 3 and 4 year old needles.

Mistblower applications have typically not successfully controlled EHS. However, mistblower applications have kept EHS from spreading to other trees even when applied prior to bud break. For growers with limited acreage, a backpack mistblower is an effective way of applying materials for EHS control.

Pests Controlled	Treatment Description
SCALE	TALUS: This insect growth regulator will only have activity against the immature stages of scales. The use of Talus will have the least impact on natural controls.
RBM SCALE (Partial control) BTA (for next year) SSM (not eggs) HRM (not eggs)	DIMETHOATE alone: Will control RBM and BTA and will give partial control of EHS. If scales are not bad, this treatment may give enough control and keep scales from spreading. Dimethoate provides a knock-down of SSM and HRM. It will have less impact on natural controls than if Sniper or Asana are added and even though scale control will not be as good, in fields with a lower infestation level, this may be enough to get control when applied with adequate coverage.
RBM SCALE BWA BTA (for next year) SSM HRM (not eggs)	SNIPER + DIMETHOATE or ASANA + DIMETHOATE: Using one of these combinations will control RBM and BTA and will give better control of EHS, though it will also have a greater impact on natural controls. Dimethoate provides a knock-down of SSM and HRM. Sniper will provide good control of SSM.
SCALE BWA	SAFARI — either foliage application or trunk application: Safari by itself will control EHS and BWA. This time frame should give the best scale control with this product. Control of these pests may take several months. A trunk application of Safari will also provide EHS control in younger trees.
RBM SCALE BWA BTA (for next year) SSM (not eggs) HRM (not eggs)	SAFARI + DIMETHOATE: Using this combination during shoot elongation will provide good control of both BWA and EHS without causing either SSM or HRM to become more of a problem. Safari control of BWA will take several weeks and EHS control may take several months. Dimethoate will control RBM and provide knock-down of SSM and HRM. When Dimethoate is applied in June, the BTA is killed before it has a chance to reproduce and lay the egg for next spring.

Update: Fraser fir Cone Control Research - continued from pg 1

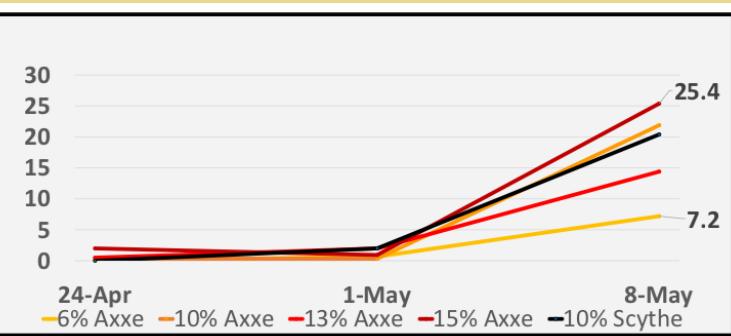
2019 Cartner Tree Farm - % Cones Killed: All rates of Axxe applied provided nearly total cone kill at the spray volume applied (2 L. or 0.5 gal. per tree). Live cones represented gaps in coverage rather than poor product performance. Almost no injury to buds or foliage was observed as a result of these April 29 treatments.



2019 Mt. Jefferson State Park - % Cones Killed: Total coverage was not achieved in 4-5 m.(12-15 ft.) trees. 13% and 15% Axxe and 10% Scythe rates provided effective cone control on April 24 & May 1 treatments. Two lower rates of Axxe were less effective than higher rates at the volumes of spray applied. All treatments lost efficacy by the May 8 treatment date with an Axxe rate effect clearly evidenced.

Mt. Jefferson State park - % Tree Injury: Two percent or less of buds and foliage exhibited any injury after the first two treatment dates. During this period, buds progressed from first visible stages of activity to red-tip or golden buds. More injury was evidenced on the third date when foliage buds had progressed to the white bud scale stage with green starting to show on some buds on some trees. More damage occurred at the 10% rate of Axxe than at the 13% rate. By May 8, no rate was safe.

Cost of Axxe "Trees per Hectare (Acre)"			
Rate	247/ha (100/ac)	1235/ha (500/ac)	2470/ha (1000/ac)
10% Axxe	\$692 (\$280)	\$3,458 (\$1,400)	\$6,916 (\$2,800)
13% Axxe	\$899 (\$364)	\$4,495 (\$1,820)	\$8,991 (\$3,640)
15% Axxe	\$1,037 (\$420)	\$5,187 (\$2,100)	\$10,374 (\$4,200)
Hand Picking	\$309 (\$125)	\$1,544 (\$625)	\$3,088 (\$1,250)



Exploring Cost: Cost of treating cones increases with the average number of cones per tree (loosely related to the size of tree) and with the number of trees with cones. This will vary among fields, seasons, and regions. Assumptions in this example were based upon the 2 L. or 0.5 gallon usage that was effective at the Cartner Tree Farm study. The price of Axxe used was the online advertised price

which may not be the cheapest. It was assumed that one man paid \$15 US could pick a tree in 5 minutes (12 trees per hour). Of course, the cost of spraying is more than the cost of hand picking as the cost of hand picking is more than an hourly wage.

Discussion: With thorough coverage and spray volume at the right time, Axxe and possibly Scythe can be used to selectively kill cones without injuring Fraser fir. As cones mature, treatment with either product becomes less effective. As foliage buds mature to the white bud scale stage, the risk of damage greatly increases. Stage of growth is critical. Dates will vary with season, elevation, or latitude. With treatment costs that range from nearly \$700/Ha to over \$10,000 US, additional work is needed to find a less expensive treatment for controlling cones.

NCDA & CS Update - Elongate Hemlock Scale Shipping Regulations



ELONGATE HEMLOCK SCALE IS STILL OF HIGH REGULATORY SIGNIFICANCE for states that don't have the pest. Several states will be inspecting NC Christmas trees and cut greenery specifically to ensure infested material is not allowed entry into their state or is found quickly at the final destination. Florida, Wisconsin, Oregon, Washington and California may have a zero tolerance for elongate hemlock scale in any life stage. Material found to be infested with elongate hemlock scale will be issued a stop sale by the state department of agriculture and **destroyed** and the producer may be prohibited from shipping to that state for the remainder of the season. At least one west coast state is developing regulation that will require advanced notification of all NC shipments that will be enacted by this shipping season. Simply put, do not ship material infested with elongate hemlock scale. Don't hesitate to call or email me if you have questions, or would like me to look at your trees prior to shipping.

Sincerely,

Christy Bredenkamp, Extension Agent
Agriculture-Horticulture



4

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