**How to practice IPM in managing beneficial and pest insects in Fraser Firs in Minnesota, Dr. Vera Krischik, Department of Entomology, University of Minnesota, 612.625.7044,** **krisc001@umn.edu****, May 29, 2014**

**Websites to visit**

Search for pesticides registered in Minnesota at Kelly solutions, [www.kellysolutions.com/MN/](http://www.kellysolutions.com/MN/)

Insecticides and miticides for PA Christmas Tree (Penn State Univ.), <http://www.entomology.umn.edu/cues/2014%20Mn%20xmas%20tree%20meeting/2011%20Christmas%20Tree%20Insecticides-Miticides.pdf>)

Pesticides Labelled for Christmas Trees in North Carolina (NC State University), http://www.ces.ncsu.edu/fletcher/programs/xmas/pesticides/index.html

Fraser Fir IPM (NC State University), http://fraseripm.blogspot.com/

Fir manual, “Christmas Tree Diseases, Pests, and Other Threats” (Oregon State University), http://www.entomology.umn.edu/cues/2014%20Mn%20xmas%20tree%20meeting/Diagnostic%20Field%20Book-proof.pdf

It was nice to speak with the Christmas tree growers at the winter meeting in Minneapolis. We talked together for about an hour about potential insect and abiotic issues and looked over a new Fraser fir publication from Oregon State University. The slideshow I provided and a link to the new manual can be found at my CUES website (www.entomology.umn.edu/cues). You need to scroll down on the right hand side to the Christmas tree management site and click on the slideshow, or the insecticide and miticide recommendations from Penn State, or the new “Christmas Tree Diseases, Pests, and Other Threats” from Oregon State University.

So let us review the best ways to reduce insect and disease problems in Fraser Firs, since these trees have fewer biotic issues than our previously planted Christmas tree species. Good management will create an environment that will favor beneficial insects and not pest insects.

**Site selection:** Site selection is important for more than just *Phytophthora* root rot control. The site on which trees are located will determine rainfall, humidity, and temperature which affect both pest and predator development. Site selection can also impact what pests are prevalent. A grower might not have a lot of control over where to grow Christmas trees, but knowledge about a difficult site can aid in scouting and pesticide selection.

**Avoid interplanting:** Interplanting young trees with older trees produces a mixed age stand that is difficult to manage for pests. Though not all growers can avoid interplanting because of land constraints, it should be avoided when possible.

**Ground covers:** Managing ground covers for a diversity of flowering weeds is the single most important tool in encouraging natural predators. Ground covers also increase the humidity and reduce soil temperatures which improve tree growth and lessen problems with spider mites. These same ground covers also provide habitat for wildlife and pollinators.

Christmas tree growers have the unique opportunity of creating habitat for pollinators as well as increasing the natural predators that give them free pest control. Managing field roads and borders for flowering weeds also greatly increases biodiversity in the field. Honey bees, bumble bees, and other native pollinators are in decline in the US. When Christmas tree growers switched from killing all the groundcovers around their trees to maintaining a living groundcover, people started noticing these returning to tree fields. Insect predators (insects that eat other insects) and parasitoids (insects that complete part of their life cycle inside of their insect host) are important in controlling many Fraser fir pests. Providing a suitable habitat for these in the field helps growers to continue to reduce pesticide use. Many predators of Fraser fir pests such as lacewings, lady beetles, and hover flies also depend on pollen and nectar sources at some point during their life cycle. The groundcovers which are maintained around trees as well as fields borders which grow up in weeds are very attractive to butterflies, bumble bees and honey bees.

**Fertility:** Nitrogen especially will feed not only the tree but pests. Taking soil samples so that fertilizers are applied only when necessary is a good way not to make a pest problem such as elongate hemlock scale worse. A good fertility program also creates a stronger, faster growing tree that will reduce the rotation length (the number of years it takes to grow a tree to harvest size).

**Culling:** Certain individuals are genetically more susceptible to pests such as mites and scales. By cutting and removing the most susceptible individuals, pesticide use becomes more effective and at times can even be avoided entirely.

**Scouting:** There is no one pesticide or combination of pesticides that will keep trees pest free. All pesticide applications have a cost; the product, labor and impact on beneficial insects. Often the best pest control is to do nothing at all, but you can safely do this only by accurately knowing what pests and predators are in your trees. A good quality magnifying lens with at least 7X power that you can see pests clearly with.

* White plastic plate to beat the foliage over to collect mites and small insects.
* Flagging to mark problem trees. This should be of a color that is not used in tagging trees.
* Pocketknife to cut off bark samples.
* Clippers to cut off shoots and branches.
* Plastic bags to collect samples in and a sharpie to write dates and location on the bag.
* Camera to take photographs of problems. A cell phone camera is typically good enough.
* Map of the field so that problems can be recorded. Use a GPS unit to mark location of problem areas so maps can be developed.
* Scouting form so that scouting results can be recorded before and after any treatments.
* Shovel for digging in the soil to find grubs or other root problems.

 **March/April:** In March and April, pests become active. Twig aphids start to hatch by mid-March. Depending on the weather, rust mites and spider mites also start to hatch. The balsam woolly adelgid molts from the overwintering nymph to the adult and may start to lay eggs. During this timeframe, it is important to determine the presence and activity of twig aphids and mites to determine if controls are required before budbreak.

**May:** The time right up until budbreak and right after budbreak is important to further monitor twig aphids, scale crawlers, and mites.

**June/July**: During June and July, spider mites may flare up if it is dry. The elongate hemlock scale males mature and produce the protective white fuzz that can be easily seen on foliage.

**August through October**: Once tree tops straighten, balsam woolly adelgid can be scouted for by examining trees with crooked tops for the insect. The elongate hemlock scale will have another flush of growth that can be monitored. Rosette buds are clearly formed and the presence and prevalence of this pest can be followed. If it is dry, spider mites can become a problem again. Also be on the look-out for Cinara aphids in trees to be harvested. Early fall is also the time to dig in the soil looking for white grubs.

**Many, but not all, insecticides approved for use in Christmas trees in Minnesota**

BTA = balsam twig aphid, BWA = balsam woolly adelgid; EHS = elongate hemlock scale; RBM = rosette bud mite; SSM = spruce spider mite; RBM = rosette bud mite, HRM =- hemlock rust mite

**Provado Systemic protectant**

* **Type:** Insecticide
* **Uses:** Control of white grubs, weevils, and borers and most sucking insects except armored scales
* **Active Ingredient:** Imidacloprid
* **Chemical Family:** Neonicotinoid

**AKARI 5SC**

* **Type:** Contact miticide
* **Uses:** Control of all mite stages of SSM and HRM
* **Active Ingredient:** Fenpyroximate
* **Chemical Family:** Phenoxypyrazole

**APOLLO SC**

* **Type:** Ovicide/miticide
* **Uses:** Control of all mites, but mature SSM
* **Active Ingredient:** Clofentezine
* **Chemical Family:** Unknown mite growth inhibitors

**ASANA**

* **Type:** Insecticide
* **Uses:** Control of BWA. Also controls BTA and partial control of EHS
* **Active Ingredient:** Esfenvalerate
* **Chemical Family:** Synthetic pyrethroid

**AVID 0.15 EC**

* **Type:** Insecticide
* **Uses:** Suppression of aphids and mites; young immatures must be contacted by the spray
* **Active Ingredient:** Abamectin
* **Chemical Family:** Avermectins

**CONSERVE SC**

* **Type:** Insecticide
* **Uses:** Control of caterpillars
* **Active Ingredient:** Spinosad
* **Chemical Family:** Spinosyns

**DIMETHOATE**

* **Type:** Insecticide
* **Uses:** Control of BTA and RBM among other pests. Also partial control of EHS. Control of living SSM and HRM but not the eggs.
* **Active Ingredient:** Dimethoate
* **Chemical Family:** Organophosphate

**DIMILIN 25W**

* **Type:** Insect growth regulator
* **Uses:** Control of caterpillars, HRM
* **Active Ingredient:** Diflubenzuron
* **Chemical Family:** Benzoylureas

**DI-SYSTON 15G**

* **Type:** Insecticide
* **Uses:** Control of BTA and SSM.
* **Active Ingredient:** Disulfoton
* **Chemical Family:** Organophosphate

**ENDEAVOR**

* **Type:** Insecticide
* **Uses:** Control of BTA and most sucking insect pests
* **Active Ingredient:** Pymetrozine
* **Chemical Family:** Unknown feeding blockers

**ENVIDOR 2SC**

* **Type:** Miticide
* **Uses:** Control of all stages, including eggs of SSM and HRM
* **Active Ingredient:** Spirodiclofen
* **Chemical Family:** Tetronic acid derivative

**FLAGSHIP 25 WG or 0.22 G**

* **Type:** Insecticide
* **Uses:** Systemic control of aphids (not tested in Christmas trees), white grub control
* **Active Ingredient:** Thiamethoxam
* **Chemical Family:** Neonicotinoid

**FLORAMITE SC**

* **Type:** Miticide
* **Uses:** Control of SSM
* **Active Ingredient:** Bifenazate
* **Chemical Family:** Carbazate

**HORTICULTURAL OIL**

* **Type:** Broad-spectrum Insecticide
* **Uses:** Some control of all Christmas tree pests
* **Active Ingredient:** Refined petroleum distillate
* **Chemical Family:** ---

**IMIDAN 70-W**

* **Type:** Insecticide
* **Uses:** Control of European pine shoot moth, gypsy moth, Nantucket pine tip moth, pitch eating weevil, Pales weevil, adult root collar weevil and sawfly
* **Active Ingredient:** Phosmet
* **Chemical Family:** Organophosphate

**LORSBAN 4E**

* **Type:** Insecticide
* **Uses:** Specifically for BTA, winter control of BWA and white grubs
* **Active Ingredient:** Chlorpyrifos
* **Chemical Family:** Organophosphate, weevils, borers

**NATURALIS L**

* **Type:** Biological Product
* **Uses:** Control of insects
* **Active Ingredient:** *Beauveria bassiana* ATCC 74040
* **Chemical Family:** Biological agent

**ONYXPRO**

* **Type:** Insecticide
* **Uses:** Control of BWA, BTA, SSM, Cinara aphids and vaious other pests
* **Active ingredient:** bifenthrin
* **Chemical Family:** synthetic pyrethroid

**SAFARI 20 SG**

* **Type:** Systemic Insecticide
* **Uses:** Most pests
* **Active Ingredient:** dinotefuran
* **Chemical Family:** neonicotinoid

**Safer’s INSECTICIDAL SOAP**

* **Type:** Broad-spectrum Contact Insecticide
* **Uses:** Most small immature stages of sucking insects and mites
* **Active Ingredient:** Potassium salts of fatty acids
* **Chemical Family:** ---

**SAVEY 50 DF**

* **Type:** Miticide
* **Uses:** Control of eggs and immatures of SSM
* **Active Ingredient:** Hexythiazox
* **Chemical Family:** Hexythiazox

**Sevin 4F**

* **Type:** Insecticide
* **Uses:** Most pests, not borers
* **Active Ingredient:** Carbaryl
* **Chemical Family:** Carbamate

**TALSTAR SELECT**

* **Type:** Insecticide
* **Uses:** Control of BTA, BWA and SSM as well as other pests
* **Active Ingredient:** Bifenthrin
* **Chemical Family:** Synthetic pyrethroid

**TALUS 70 DF or 40SC**

* **Type:** Insect Growth Regulator
* **Uses:** Control of scales
* **Active Ingredient:** Buprofezin
* **Chemical Family:** Buprofezin

ALWAYS READ THE PRODUCT LABEL. THE LABEL IS THE LAW. CONSULT THE LABEL TO TARGET THE MOST APPROPRIATE LIFE STAGE OF THE PEST AND TO MAKE SURE THE SITE, CHRISTMAS TREES NURSERY, IS ON THE LABEL. The information given in this article is for educational purposes only. References to commercial products or trade names are made with the understanding that no discrimination is intended and no product endorsement by the University of Minnesota Extension is implied. Pesticide products should always be used in accordance with all label directions. Pesticide label directions can and do change over time. Therefore, when a pesticide product is purchased, it is the responsibility of the user to read and follow the label directions attached to the product container. The plant or site of the intended application must be listed on the label. Any use inconsistent with the label is a violation of Federal law.