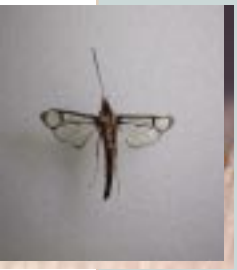
Stand Management Cooperative

SMC Fact Sheet, Volume 5

Can the Douglas-fir Pitch Moth, *Synanthedon novaroensis*, (Hy. Edwards) Ruin Pruning Investments?

The SMC is a cooperative effort of landowners, processors, research agencies, and universities. The cooperative was formed to create a pool of funding, scientific talent, and long-term continuity necessary to achieve our mission.

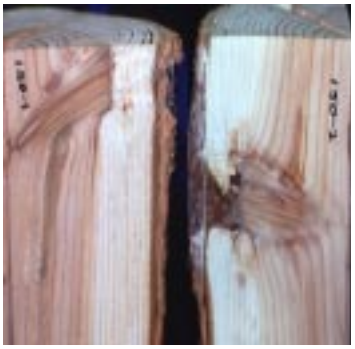
David Briggs, SMC Director



Douglas-fir Pitch Moth

What is the Concern?

Two pruned branches from the same young Douglas-fir tree are shown. The left branch was not attacked by the DFPM and completely occluded within 5 years. The right branch was attacked and the pitch and bark pocket has not occluded 10 years after pruning. These pockets are defects that preclude achieving high value clear products. Increased pruning and earlier, more frequent thinning in Douglas-fir stands raises a concern that attack by the DFPM may also increase and reduce value.



Pruned branches from the same tree: left not attacked by DFPM, right attacked

Life Cycle and Range of the DFPM

Female DFPM's are active June through August and lay eggs at wounds exuding oleoresin on Douglas-fir trees. The larva feeds on the inner bark which stimulates further production of resin that is mixed with excreta and formed into a pitch nodule. The larva maintains a gallery in the nodule where it usually pupates. Adults are active during the day and look more like a hornet than the typical moth. The period of development is commonly 2 years but ranges from 1 to 3 years. Attack by the DFPM may occur where pruning has cut live branches, pruning equipment has scarred the bole, felling and skidding during thinning has damaged the bole, etc. The DFPM ranges from Alaska to northern California and from the Pacific coast to Montana. It also attacks lodgepole pine, western white pine, Sitka spruce and Engelmann spruce.

DFPM and Pruning

To better understand potential damage to pruned trees by the DFPM, experiments were conducted at four locations in Western Washington on trees with breast height age from 12 to 19 years.

1. Does the DFPM attack branch wounds in preference to bole wounds?

Experiment: In Spring, 100 trees had 8 branches pruned near breast height with cuts just outside the branch collar. Eight artificial bole wounds, similar in size to the pruned branch diameter, were made near breast height on another 100 trees. Another 100 trees served unpruned controls. The number of ovipositions was counted over 2 years. ***Result:*** None of the control trees were attacked, 8% of trees pruned outside the branch collar were attacked, and 14% of bole wounded trees were attacked.

2. Does pruning through the branch collar alter the risk of attack?

Experiment: In Spring, 200 trees were pruned to 9 feet with cuts just outside the branch collar and 200 trees were pruned to 9 feet with all cuts through the branch collar. Total number of ovipositions measured at the end of the year. ***Result:***116 (58%) of trees pruned through the branch collar were attacked, 2.4 times greater than attacks on trees pruned outside the branch collar (48 trees, 24%). Pruning through the branch collar also increased the number of ovipositions per tree; the 116 that were attacked with cuts through the collar had 291 ovipositions or 2.5 per tree while the 48 attacked trees with cuts outside the collar had 73 ovipositions or

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1.5 per tree. ***Comment:*** This suggests that if Experiment 1 trees had been pruned through the branch collar, the incidence of attack may have been closer to 20% than 8%. Also note in Experiment 1 only 8 branches near breast height were pruned whereas in Experiment 2 all branches up to 9 feet were pruned.

3. Is risk of attack affected by season when trees are pruned?

Experiment: 100 trees in fall 1995, winter 1995/ 1996, spring 1996, and 100 summer 1996 were pruned to 9 feet with cuts just outside the branch collar. Ovipositions were recorded in Fall 1996.

Result: Percentage of trees attacked was 5% if fall-pruned, 1% if winter-pruned, 13% if spring-pruned, and 2 % if summer-pruned. Spring-pruned trees had significantly higher attack and winter-pruned trees had significantly lower attack than would be expected. ***Comment:*** Experiment 3 suggests that the results from experiments 1 and 2, where trees were pruned in the spring, may reflect worst case scenarios.

4. If a tree is attacked, is it more likely to be re-attacked?

Experiment: In 1961, 600 trees were pruned to 10 feet. After 4 years, 118 had been attacked by the DFPM. These, along with another 118 that had not been attacked, received a second pruning lift to 18 feet in May 1995. After a thinning in spring 1996, 84 and 75 trees respectively remained from these groups. The number of trees that had the second lift attacked was recorded after 2 years. ***Result:*** 10.7% of trees attacked after the first lift were attacked again after the second lift whereas only 3.9% of trees not attacked after the first lift re-attacked after the second lift.

5. Is there a genetic preference?

Experiment: Five trees from each of 6 clones that had been wounded in February 1996 to stimulate bud production had number of ovipositions recorded at the end of the growing season. ***Result:*** There was a significant difference in number of attacks between clones ranging from 15 attacks (3 per tree) to 2 attacks (0.4 per tree). ***Comment:*** Experiments 4 and 5 suggest that there are differences in attractiveness of individual trees and clones to the DFPM. This may reflect differences in resin quality that influences selection behavior. Resin quantity and quality may also be involved in the seasonal risk of attack.

Recommendations

1. Avoid pruning through the branch collar.
2. Avoid scarring the bole while pruning.
3. Avoid pruning in spring.
4. Prune trees as early in the rotation as possible. In addition to reducing the size of the defect core, young trees have smaller branches, thinner bark and relatively fast growth rates which lead to much faster occlusion of pruned branches (see SMC Fact Sheet 2).
5. Try to identify and use clones less susceptible.

References

Johnson, J.M. 1998. Host Selection Behavior of the Douglas-fir Pitch Moth, *Synanthedon novaroensis* (Hy. Edwards) (Lepidopetera: Sesiidae), Related to Intermediate Silvicultural Activities. PhD Dissertation. College of Forest Resources, University of Washington, Seattle, WA.

Johnson, J.M., M.D. Petruncio, and R.I. Gara. 1995. Impact of Forest Pest Problems on Intensive Management Practices Such as Pruning. In. Forest Pruning and Wood Quality. pp: 245-251. Eds. Hanley, D.P. et.al. Institute of Forest Resources. Contrib. 77. College of Forest Resources, University of Washington. Seattle, WA 98195. 404p.

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