

Spruce Budworm Management

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Current Situation

Spruce budworm (*Choristoneura fumiferana*) is a native insect that feeds primarily on spruce and balsam fir trees. Outbreaks occur every 30-50 years and last 10 years on average. The last outbreak in Wisconsin occurred from 1970-1980. A new outbreak started in far northern Wisconsin in 2012 with damage observed from Ashland County east to Marinette County. Damage has become more widespread and severe and over time is expected to increase as the outbreak intensifies in coming years.

Biology

- Spruce budworm is an early season defoliator native to the Great Lake States. Outbreaks occur on a 30-50 year cycle and typically last 10-15 years.
- Caterpillars are pale yellow to dark brown with cream-colored spots and a shiny black head.
- Caterpillars begin feeding on new needles in May or early June. Full-grown caterpillars are approximately 1 inch long by mid-June. Pupation occurs in mid- to late- June. Spruce budworm moths emerge around mid-July, mate, and lay eggs. Tiny caterpillars hatch within 1-2 weeks and overwinter in cocoon-like structures on twigs of balsam fir or spruce.
- Defoliated trees appear dull brown from a distance. When examined close up, partially consumed needles and/or webbed clusters of clipped-off needles entangled in silk are visible. By August, rain and wind may wash off web-entangled needles causing trees to appear greener.
- Repeated defoliation can cause top mortality of the tree and eventually whole-tree mortality.
- Susceptible tree species: In Wisconsin, mature and over-mature balsam fir and white spruce are the preferred hosts of spruce budworm. Black spruce, tamarack, hemlock, and pine species are occasionally defoliated if intermixed in stands dominated by balsam fir and white spruce.



Spruce budworm caterpillar feeding on balsam fir needles.



Spruce budworm adult moths, showing both the rusty color phase, and the grey color phase.



Defoliation of current year needles, showing how caterpillars web together needles that were clipped off during feeding.

Management Options – forests and plantations

Monitor: Spruce and balsam fir should be monitored for defoliation and top mortality during spruce budworm outbreaks to determine when salvage should occur. Mature balsam fir (60+ years old) and spruce (70+ years old) are at risk of top mortality after 3 consecutive years of defoliation. Off-site plantations, unthinned plantations, stands that are otherwise stressed, and stands with higher balsam fir components may be particularly susceptible.

Salvage: If top mortality is observed, or if more than 75% of the current-year foliage is missing, the stand should be salvaged. Contact a forester for recommendations on salvage harvests. Do not leave spruce or balsam fir as residual trees in salvaged stands, since they maintain the spruce budworm population and allow defoliation of spruce and fir regeneration. Spruce and balsam fir can be regenerated on appropriate sites. Consider delaying regeneration until the outbreak is approaching the end.

Spraying: Spruce budworm outbreaks can be active for 10 years or more. It generally does not make economic sense to spray forest stands of spruce and balsam fir to prevent defoliation, as it is expensive and most affected stands can be salvaged. Spraying may be an appropriate option when it is necessary to delay salvage harvests for 2-5 years. Christmas tree plantations can be protected by spraying Btk or other appropriate insecticides.



Severe defoliation by spruce budworm can occur wherever spruce and balsam fir are present, in both plantations and mixed stands.

Management Options – homeowners / yard trees

Removal: Trees that have lost more than 75% of their foliage will not recover well, and may be attacked by bark beetles or armillaria root disease. Trees with top mortality, or that have lost more than 75% of their foliage and continue to decline, should be removed. Hazard trees should be removed by qualified (e.g., professional and/or certified) tree removal companies. Contact the appropriate service provider about removal of trees under or near power lines.

Spraying: Private property owners interested in protecting older spruce and balsam fir for aesthetic purposes may choose to spray Btk, either aurally or from the ground, early in the spring. Btk is a caterpillar-specific insecticide and only one application is necessary. The spray should occur when shoots have elongated ½ - ¾ inch (about the time the bud caps fall off) and small spruce budworm larvae are present.

Note: if you are spraying a small acreage surrounded by non-sprayed balsam fir and spruce stands, the effects of your spray may be reduced as caterpillars can migrate in from surrounding stands.



Severe spruce budworm defoliation on spruce within a plantation. Nearby young red pine remain unaffected.

Additional information

For more detailed information about spruce budworm: <http://na.fs.fed.us/spfo/pubs/fidls/sbw/budworm.htm>