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Balsam Gall Midge (*Paradiplosis tumiflex*)

Department of Agriculture, Conservation and Forestry

Maine Forest Service, Forest Health and Monitoring Division

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Balsam Gall Midge (*Paradiplosis tumiflex*)

Hosts: Balsam fir (*Abies balsamea*) and Fraser fir (*A. fraseri*)

General Information: Feeding by larvae of this tiny fly causes (small swellings) to grow around the larvae on new needles. Populations normally go unnoticed; however, this insect periodically experiences short-duration epidemics. During epidemics, balsam gall midge can be a serious pest of Christmas tree and wreath industries. Forest trees can be heavily defoliated when galled needles drop. However, high populations subside quickly, and trees suffer little permanent damage.

Life Cycle: Adult midges deposit eggs in the developing new shoots shortly after budbreak in mid- to late-May. Trees with late breaking buds are less susceptible to gall midge attack since buds unopened buds are protected when adult midges are ovipositing. Young larvae feeding at the base of developing needles cause needle tissue to grow around the tiny orange larvae. During heavy infestations, three or more galls on one needle are not uncommon. From mid-September to late-November the mature larvae leave the galls and drop to the ground to overwinter until pupating in May. Adult females emerge to mate and lay eggs in the new shoots to repeat the life cycle. Adults are small, orange flies, mosquito-like in appearance.



(Left) Balsam fir exhibiting galled current-year needles in and missing foliage from previous year's damage. (Right) Damaged needles turn brown and drop off in late-fall. For sanitation measures described in cultural practices remove and destroy infested material before significant needle drop (mid- to late-summer).

Symptoms and Signs: When first formed, the galls or swellings on the needles are green in color. Toward mid-summer galls turn yellow and eventually, by late autumn, the needles die and fall off leaving bare spots on the current season's twigs. Heavy infestations will result in loss of most of the current needles affected trees, making them unmerchantable for Christmas tree growers, and useless for making wreaths. Severely infested Christmas trees may not be marketable for 2-4 years, until the damage can be sheared off or new growth can mask the damage. Forest trees suffer little permanent damage.

Dissected galls will reveal small orange to pink larvae, more than one larva within a single gall indicates presence of a second midge species. This second midge prevents balsam gall midge from completing development and is an important natural control on the populations.

Management: Control of this insect is generally only warranted in Christmas tree and wreath brush production. In such operations, annual scouting activities should include monitoring for balsam gall midge. Adults are generally seen between 150 and 300 base 50 growing degree days and can be monitored with traps as outlined in the documents listed for further reading below, Galls become apparent around 550 base 50 growing degree days and remain on the tree through the

summer and early fall. There several on-line sources for determining growing degree days for the area of concern, <http://climatesmartfarming.org/tools/csf-growing-degree-day-calculator/> from Cornell Climate Smart Farming has clear instructions for use. When using these tools, be sure to use a base 50 degrees Fahrenheit for this insect.

Cultural practices:

Remove and burn heavily infested branches or trees between mid- and late-summer. Use later-flushing cultivars to avoid damage.

Chemical control*:

One suggested threshold for management is after at least 10 percent of the current shoots have galled needles (Swier 2016). Target egg-laying adults or newly hatched larvae as described below.

1) Infested trees can be treated with diazinon** or chlorpyrifos**. Spraying should be timed for after egg-hatch. The **new foliage must be elongated, and the current year's needles flared to get adequate pesticide coverage** (late May- early June in central and southern Maine). It is essential that the host be in this condition to achieve effective control. **NOTE:** Some formulations of emulsifiable concentrate pesticides, including diazinon (AG500) and chlorpyrifos (Lorsban 4E) have been observed to cause plant injury when applied with mist blower equipment after budbreak on developing foliage. Be cautious; risk of injury is lowered by careful attention to application timing, correct dilution of the spray mixture (use more water per acre) and selection of the proper application equipment. When in doubt, spray small areas in a trial basis before treating the entire field or planting.

2) Work in Vermont (Kelley 2009) has shown that bifenthrin (OnyxPro**) targeting adults just after budbreak can provide acceptable control.

Be sure to refer to the pesticide label for specific use instructions, dosages, timing, and precautions. The pesticide formulations you select must have specific use instructions for the intended site (i.e., "balsam fir"; "ornamentals" followed by "evergreens" or "conifers"; "conifer plantations", "Christmas trees", etc.).

***NOTE:** These recommendations are not a substitute for pesticide labeling. Read the label before applying any pesticide. Pesticide recommendations are contingent on continued EPA and Maine Board of Pesticides Control registration and are subject to change. You can confirm registration by contacting the Maine Board of Pesticides control or searching for registered products at www.thinkfirstspraylast.org.

**All or some formulations are restricted-use pesticides which may be purchased and used only by licensed pesticide applicators

Caution: For your own protection and that of the environment, apply the pesticide only in strict accordance with label directions and precautions

Further Reading:

Katovich, S., D. McCullough, M. Ostry, I. Munck, C. Sadof. 2014. Christmas Tree Pest Manual, 3rd Ed. USDA Forest Service. NA-FR-02-14. <https://www.srs.fs.usda.gov/pubs/14267>, Accessed 5/10/2021

Kelley, R. S. 2009. Management of the balsam gall midge in christmas tree plantations. Vermont Department of Forest Parks and Recreation. https://fpr.vermont.gov/sites/fpr/files/Forest_and_Forestry/Forest_Health/Library/balsam_gall_midge_2009.pdf, Accessed 5/10/2021

Swier, S.W. 2016. Balsam Gall Midge Pest Fact Sheet 49. UNH Cooperative Extension. https://extension.unh.edu/resources/files/Resource003953_Rep5605.pdf, Accessed 5/10/2021

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