Background

In North America, the balsam twig aphid occurs throughout the range of balsam fir, from the Atlantic to the Pacific Ocean. This insect is a secondary pest in natural stands and infestations are short-lived, lasting two to three years.

However, in Christmas tree plantations, balsam twig aphids can have a major economic impact because they reduce the aesthetic quality of the trees. Balsam twig aphid colonies develop on new shoots during elongation, causing needle curling and shoot stunting.

This document is intended as a tool for Christmas tree producers: it describes an integrated management approach that can help to protect the environment and reduce the costs associated with pesticide use.

Predators

Lady beetles, soldier beetles and syrphid flies are effective predators of balsam twig aphids. Integrated management of Christmas tree plantations allows these natural enemies to become established and increase their numbers in the plantation, thus keeping aphid infestations in check and reducing the need for chemical control.

Syrphid fly larva

Adult syrphid fly

Adult soldier beetle
(Podabrus rugosulus)

Lady beetle larva
(Harmonia axyridis)

Adult lady beetle
(Harmonia axyridis)

Scouting: a decision support tool

The scouting protocol is based on the accumulation of degree-days over a threshold temperature of 2°C. Scouting begins when 150 degree-days have accumulated, at the peak of the fundatrices' second stage. First-stage fundatrices are very small and therefore difficult to detect.

or exceeds the economic action threshold, the decision to intervene may be made. The trees must be treated before 250 degree-days have accumulated, i.e. before reproduction begins. After this period, treatment will no longer be effective in preventing damage to the trees.

The economic action threshold is reached when 9% of shoots are found to bear at least one fundatrix. It is important not to intervene under this threshold in order to promote control by natural predators. If the infestation reaches or exceeds the economic action threshold, the decision to intervene may be made. The trees must be treated before 250 degree-days have accumulated, i.e. before reproduction begins. After this period, treatment will no longer be effective in preventing damage to the trees.

Scouters typically examine about 400 shoots, or some 100 trees (4 shoots/tree), over an area of approximately five hectares. Scouters must check all areas, from the margins to the centre of the plantation.

Fundatrices are the first form of this insect to emerge in early spring. They consist solely of females. Fundatrices and their offspring establish colonies that feed on young shoots, causing the damage characteristic of this pest.

Plantation age

A plantation does not need to be treated until the trees are two or three years from harvest. Because of the rapid growth rate and annual pruning of young fir trees, the aesthetic damage caused by balsam twig aphids is no longer visible after a few years.

Tree selection

Plantations composed of trees characterized by late bud break are less susceptible to attack by balsam twig aphids.

References

The balsam twig aphid
Berthiaume, R., C. Hébert and C. Cloutier. 2001. Natural Resources Canada, Canadian Forest Service Laurentian Forestry Centre, Sainte-Foy, Quebec. Information leaflet LFC-29. 17 p.

Méthode d'évaluation et grille pour le dépistage du puceron des pousses du sapin
Pettigrew, A. Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec, Sherbrooke, Quebec. 2 p. www.agrireseau.qc.ca/horticulturearbresdenoel/documents/Grille.pdf

Useful links

Agri-Réseau (in French only)
www.agrireseau.qc.ca

Association des producteurs d'arbres de Noël du Québec
www.apanq.qc.ca

Canadian Christmas Tree Growers Association
www.christmastree.net

Canadian Forest Service
cfs.nrcan.gc.ca

Réseau d'avertissements phytosanitaires (in French only)
www.mapaq.gouv.qc.ca/Fr/Productions/Protectiondescultures/reseau

Credits

The information presented here is largely drawn from Information leaflet LFC-29, *The balsam twig aphid*, published by the Canadian Forest Service (CFS) of Natural Resources Canada. The leaflet sets forth the results of research carried out by Christian Hébert, of the CFS, and by Richard Berthiaume and Conrad Cloutier, of Université Laval. The description of the scouting method comes from information provided by André Pettigrew, agronomist with the Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec (MAPAQ), in collaboration with the Club agroenvironnemental de l'Estrie.

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Balsam twig aphid

An integrated **management** approach

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Balsam twig aphid

An integrated **management** approach

Stage I
Sticky bud covered with a membrane

Stage II
Swollen bud with exposed tip

April

Eggs deposited on shoots

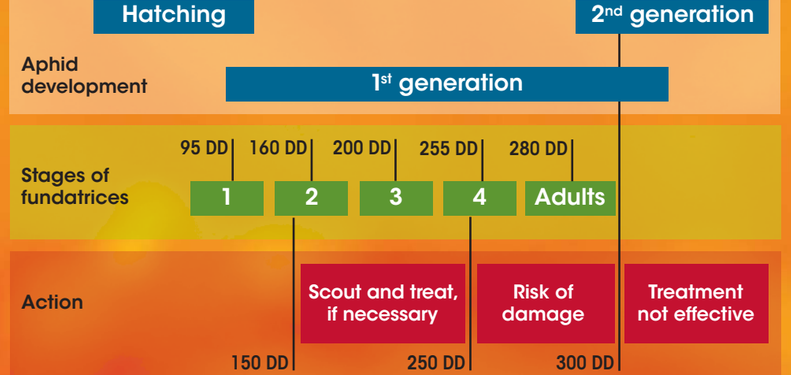
Start

May

Start of scouting:
150 degree-days

Adult fundatrix

Damage caused by colonies

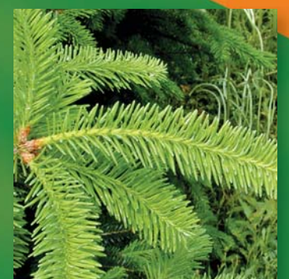


DD: degree-days

The fundatrices' four immature forms

Stage III
Exposed, unspreaded needles

Stage IV
Spreaded needles



Stage V
Shoot elongation

Beginning of june

10%

Wingless viviparae

End of june

90%

Winged viviparae (aerial dispersal)

July

Wingless sexual adult

Winter

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