integrated management of forest pests addressing climate trends

Pest profile – Green Spruce Aphid

Scientific name: *Elatobium abietinum (Walker)*
Taxonomic position: Hemiptera Aphididae
Common name: Green Spruce Aphid

Hosts:

The green spruce aphid, *Elatobium abietinum (Walker)* defoliates Sitka Spruce in the UK. It spends all year on *Picea* spp., especially Sitka spruce (*Picea sitchensis*) and also on Norway spruce (*P. abies*) and Blue spruce (*P. pumgens*), but less commonly on Firs (*Abies* spp.).

Threats: The green spruce aphid is a widespread pest of Sitka and other spruces in North-West Europe. In the UK it overwinters in the adult stages, and during mild winters it will continue to feed and reproduce. The greatest damage to spruce occurs after a mild winter when it can kill off the needles by sucking the trees sap. It can cause severe damage to mature trees and saplings. Under the right weather conditions it is capable of an explosive increase, but fluctuates according to the weather conditions. In Christmas tree plantations any discolouration and loss of foliage is unacceptable and would render the trees unsaleable thus it is an economic pest.

Serious loss of older spruce needles and damage to breaking buds.

Distribution and spread

Throughout UK wherever host species plantations of spruce are present. The geographical origin is unknown but it is native to Western Europe, and well established in western North America throughout the range of Sitka spruce from Alaska to California. Once established the Green Spruce Aphid will eventually spread throughout the forested area to the limits of its climatic tolerances. With the potential for rapid population increase once a stand has been colonised, it means that all trees in the stand must be considered likely to be attacked at some point during their life. Trees in the U.K. are rarely killed by *the* Green Spruce Aphid while in south-western USA it can cause 24 - 41% mortality.

Climate change

With an increase in milder winters it will become a greater problem.

Control

The Green Spruce Aphid reproduction tracks the seasonal processes in the host-plant which can produce overcompensating density dependent aphid mortality in mid-summer, which results in what is classed as the “see-saw” effect. This means that a high aphid population in one year is usually followed by an unusually low population in the next, whether or not the winter temperature has been severe. Spraying is not a practical proposition because of environmental concerns so a biological form of control is needed. A pathogenic fungus such as Entomophthorales infections kills off many aphids and several insect predators have been identified as also having a decisive effect on aphid populations’ i.e. Brown lacewing larvae (*Hemerobius* spp *[Stephens])*; Ladybird larvae (*Aphidecta obliterata [Linnaeus 1758]*) and Soldier Beetles (*Rhagonycha lignosa [Muller 1764]*) are effective predators.

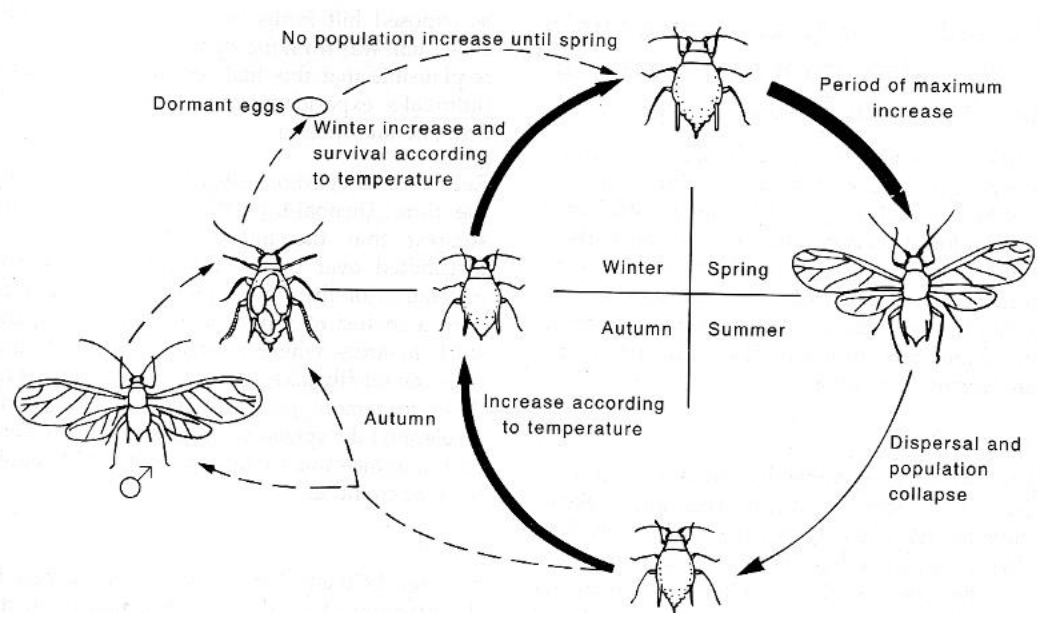
Monitoring:

The practicality of using sticky traps to monitor populations of green spruce aphid, in plantations of Sitka spruce has been assessed.
The highest numbers were caught on sticky traps placed in the upper third of the live canopy at 9-17 m above the ground, whereas low numbers of aphids were caught just below the live canopy or at 2 m above the ground. It is interesting to note that sticky traps of different colours provided different capture results. In 2005 more were caught on yellow, red, and green sticky traps than on white, blue, and black traps. A repeat trial in 2007 resulted in significantly more being caught on red sticky traps than on traps of any other colour except for green.

Biology

- This Green Spruce Aphid differs from most other aphids by being active from autumn (October) to spring (March), instead of in the spring and summer.
- The summer is spent as non-feeding immature nymphs.
- This pest is particularly damaging in mild winters, which enable it to breed more rapidly.

Life Cycle



The Adult

The form of reproduction in aphids is to breed viviparously (giving birth to living offspring that developed within the mother's body) and parthenogenetically (asexual reproduction) in which an unfertilised egg develops into a new individual which is born as a larva, with males being rare.

Nymphs or adult aphids are found on the lower surface of needles where they suck the sap. Old needles are preferred over current growth. Nymphs are wingless, oval, and green, and approximately 0.1 cm long. Adults may be winged or wingless (apterous), and are 0.2 cm long, but are otherwise similar in body shape and colour to nymphs. Adults have a yellow-green head and dull red eyes.

The IMPACT project, with partners Forest Research in Wales, Swansea University and the National University of Ireland, Maynooth is looking at improved pest control measures. Top of the agenda for the *Integrated Management of forest Pests Addressing Climate Trends (IMPACT)* team is assessing how changing climate will influence the damage caused by pests and pathogens. The project is part funded by the European Regional Development Fund through the Ireland – Wales Programme (INTERREG IVA) and Forestry Commission Wales. For more information log on to:

www.impactproject.eu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