

# BIOLOGY AND MANAGEMENT OF SPRUCE SPIDER MITES

By Mario Lanthier

Topics in Plant Health Care is a regular column, featuring information on pests, beneficials, and Plant Health Care practices. If you have a topic you'd like to see in the future or if you wish to submit something, contact Ian Wilson at iwilson@city.kelowna.bc.ca.

In 1993, *American Nurseryman* magazine asked ten nursery experts from across the United States to list the five worst pests of ornamental plants in their region. The pest mentioned most often was spruce spider mite, ahead of household names such as aphids, black vine weevils, and tree borers (Turner 1993).

Why such a problem? One possible reason is that the biology of this pest is subject to different opinions. For example, the Canadian Forest Service publication *Spruce Spider Mite in British Columbia* says, "Succeeding generations are produced during the summer and early fall" (Marshall 1986). However, the U.S. Forest Service tells nursery growers that spider mites "survive hot weather during the summer by remaining dormant in the egg stage" (Cordell et al. 1989). As it turns out, both publications are correct!

## BIOLOGY OF THE SPRUCE SPIDER MITE

The spruce spider mite (*Oligonychus ununguis*) is the most common spider mite of conifers and is found around the world on spruce, arborvitae, juniper, pine, fir, larch, yew, cypress, and incensecedar, and other conifers. Feeding by this pest causes yellowing of foliage and, in severe infestations, the needles turn brown and fall (Johnson and Lyon 1991).

Eggs, dark orange to brown in color, are usually found at the base of needles (Figure 1). They hatch into nymphs—pinkish at first, later turning green. Adults show a variation of colors from orange-red to dark green-black (Figure 2).

To better understand the life cycle of this pest, our company followed seven beds of container-grown cedar (*Thuja* spp.) cultivars



Figure 1. Adult spruce spider mites have eight legs and show a variation of colors from orange-red to dark green-black. The color pattern is different from two-spotted spider mites, which typically have two dark-colored dots on the back of the abdomen.



Figure 2. The eggs are dark orange to brown and usually found at the base of needles.

and one bed of field-grown spruce (*Picea* spp.) between 1994 and 1996. The study was conducted at a commercial nursery in the Okanagan Valley, an area of south-central British Columbia characterized by hot and dry summers. Every second week, a sample

of twenty 4-inch-long terminal twigs were collected from the inside foliage and cleaned with a mite-brushing machine, and the mite life stages present counted under a microscope.

Red eggs, the overwintering stage of spruce spider mites, were found on twigs in early spring and again in late fall. White eggs, the summer stage, were found on twigs between late May and late fall. During summer months, the white eggs were the only visible form of this mite.

Motile stages, both adults and nymphs, were found on the twigs during May and June, and again in September to November. Very few motiles were found in July and August, except on plants with a very high number of overwintering eggs in April.

Although the numbers varied, the seasonal cycle was similar in all beds and years.

Since 1996, the same seasonal cycle has been verified in other areas of the Okanagan Valley on *Thuja* and junipers grown in landscape situations.

Our field data indicate spruce spider mites are very active during spring and fall but almost completely inactive in winter and summer. Do the results contradict the findings of researchers with the

Canadian Forest Service? No. Their work was done in mountain areas of the country, where summer temperatures are mild. Our work was done in the Okanagan Valley, where summer temperatures routinely reach 86°F to 95°F.

### Topics in Plant Health Care (continued)

In 1983, John Boyne and Fred Hain, researchers at North Carolina State University, published the results of laboratory work with spruce spider mites on Fraser fir (*Abies fraseri*) (Boyne and Hain 1983). They found that adults had the highest reproductive rate at 63°F (23 offspring per female) and a much lower reproductive rate at 84°F (ten offspring per female). Also, winter eggs did not survive temperatures above 84°F.

Taking into account the survival rates of adults at different temperatures and the number of eggs laid per day, the authors concluded that "the greatest potential for population growth occurs at moderate temperatures (approximately 79°F)."

This technical information helps us understand the differing information on spruce spider mites. Publications and Web sites from regions with warm summers describe it as a summer pest, but publications and Web sites from regions with hot summers discuss it as a spring and fall problem.

## MANAGEMENT RECOMMENDATIONS

Plant damage results from sucking on the needles and typically occurs during warm, dry weather (Figure 3). Injury is less severe under continuous wet conditions or very hot temperatures.



Figure 3. A stippling pattern, white to bronze, is seen on the foliage where spruce spider mites have inserted their mouthparts to feed. Where mite population is extremely high, webbing can also be seen on branches.

Susceptible plants should be monitored when eggs are hatching into nymphs, during early May and early fall. Phenological indicators present at these times include magnolias in pink bud and hydrangea blossoms turning bronze, respectively. Monitoring can be done with beating trays or by visual inspection with a hand lens. Typically, landscape conifers require a treatment if monitoring reveals an average of more than ten mites per beat or ten mites per 4-inch twig (O'Brien and Hudler 1997) (Figure 4).

There are sporadic reports of predator insects feeding on spruce spider mites, including *Typhlodromus* predatory mites and *Stethorus* lady beetles (Wheeler et al. 1973). Predator regulation is likely more important than we believe in keeping many populations at low levels. During outbreak situations, however, reducing mite populations with biological tactics is not a viable option.

Spraying with water will reduce the motile population by only about 50 percent (Heller and Kellogg 1990). This approach works well in landscape situations where the plants can be thoroughly washed in early to mid-May to help reduce the emerging population of spruce spider mites.

Proper irrigation during summer months helps maintain plant appearance (foliage discoloration typically is noticed during dry spells, although the feeding damage occurred many weeks earlier).

A number of pesticides are registered in Canada and the United States for spruce spider mites. They include Superior dormant oil, insecticidal soap, fenbutatin-oxide (trade name Vendex WP), abamectin (trade name Avid), acephate (trade name Orthene), and others. When using pesticides, it is important to read the label for rate of application and safety instructions.

### References

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Figure 4. To monitor for spruce spider mites, gently tap an inside branch on a white piece of paper held on a clipboard. After a few seconds, mites will appear as minute, moving dots.

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