

INSECTS AND DISEASES OF THE URBAN FOREST IN THE MARITIMES

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Abstract. There are over 3500 insect species and over 400 diseases known to affect trees in the Maritimes. These add further stresses to trees already faced with existing environmental and urban challenges. Urban tree pests affect all parts of nearly all tree species. Insects and diseases affecting the various tree parts - foliage, shoots, twigs and branches, trunk and roots - are very briefly discussed and a few local examples are mentioned for hardwoods and conifers. Five references are cited for insect and disease identification in eastern Canada.

Beauty, tourism, environment, enjoyment of life, economics are but a few of the clichés or buzzwords that immediately come to mind when one thinks of the urban forest. Members of ISA need not be reminded either of the importance of trees or of the importance of factors that may prevent trees from fulfilling their intended purpose in our communities.

In forestry, factors affecting tree health - until recently - were thought important only in as far as wood production and wood quality are concerned. In urban forestry, we have always gone a step further. Trees not only had to be healthy, they also had to look good; the appearance of the urban tree has always been an important consideration.

Stresses on the Urban Tree

Stresses acting upon a tree in a forest or an urban setting, although similar, are also quite different, the urban tree having to cope with stresses a forest tree never encounters. Forest trees' roots do not get paved over; the grass above them is not regularly herbicided; the streets next to them are not salted in the winter; there are no roads widened or sewer lines dug; there is no reflected heat from nearby buildings; there are no lawnmowers or snow ploughs bumping into them, nor are there utility companies cutting off branches to make room for overhead wires. Forest trees, on the other hand, are generally spaced relatively close together; they do not live in the urban tree's fundamentally dried-out environment.

Certain insects and diseases bring stress to both kinds of trees. Even though these pests may be the same in both settings, they may have very different effects - partly because of the different set of other stresses and partly because of our expectations for the urban tree.

Just how many tree-attacking insect species and diseases are there in the urban forest? Some 3500 species of insects and over 400 species of fungi have been recorded in the forests in the Maritimes. It is safe to assume that this number is very low. It is also safe to assume that many, if not most, of these species are also present in the urban forest. Add to these a few pests specific to the city and you have plenty to worry about concerning the urban forest pest picture.

What tree species are affected by urban pests and diseases? The answer is simple, they all are. Hardwoods, which make up most of the urban forest, or conifers, which abound mostly in city parks, all have their own complement of pest problems. Name any tree species and an entomologist or pathologist will give a list long enough to scare anyone of insects and diseases that affect that particular species. Admittedly, not all species are equally vulnerable but they all have their known enemies, and probably unknown ones yet to be discovered.

What part of the tree is most likely to be affected? Again, all parts of all trees have their own problems. Obviously, as the most visible part of the tree is the foliage, defoliators, leaf miners, leaf spots, and other organisms or disorders that discolor foliage draw the most attention. However, other, less visible problems can have more important, and at times more devastating, effects: such as a decayed branch demolishing a car, causing property damage or even death. Urban foresters and other arborists need to be familiar with all the various types of problems in order to create and maintain

a healthy urban forest.

This familiarity will become ever more important in the future because, with restructuring at the senior levels of government, tree pest advisory services are likely to become less available. This 'cut in services' by the federal and provincial governments should provide an opportunity for private enterprise to fill the gap - and ISA members are in an ideal position to do this.

It is impossible even to attempt to cover everything in a brief presentation. Fortunately there is no need to do this, for two very good reasons:

1. ISA has an excellent on-going program to certify arborists, a program that includes the recognition of urban tree pests and diseases;
2. There is an excellent set of color booklets available to help identify most of the noteworthy insects in eastern Canada. A recent (1994) publication on tree diseases in eastern Canada completes the set on tree pests (see references). The Maritimes are well looked after in this respect. Similar books are available for other parts of North America dealing with local or regional tree pests and diseases.

Pests on the Various Parts of the Tree

Following are a few brief comments about the various major urban tree insects and diseases (with a few examples).

Foliage. *Insects affecting foliage* remove or destroy chlorophyll, the kitchen of the tree, making the trees look unsightly - either bare or some shade of brown. Besides affecting the aesthetic appearance, chlorophyll removal also stresses the tree through partial starvation, making it more vulnerable to attack by other insects or by diseases. Defoliators, leaf miners, leaf rollers, leaf skeletonizers, and sucking insects all have the same basic life cycle. They come from eggs, have various types of larval stages or live as nymphs, pupate, emerge as adults, mate, then produce eggs to complete the cycle. In most cases, it is the immature or larval stage that feeds and causes the damage. This is also the stage that causes most trouble for the taxpayers, homeowners or tourists. These troubles are often related - in addition to the amount of damage the insect inflicts on the tree - to the numbers and size of

caterpillars, or to the location of over-hanging branches relative to the patio or the deck. Some examples, not necessarily the most important ones, on hardwoods are: defoliators - forest tent caterpillar, gypsy moth; leaf miners - birch leafminer, elm leafminer; leaf roller - maple leaf roller; skeletonizers - elm leaf beetle, birch skeletonizer; sucking 'insects' - aphids. On conifers some examples are: defoliators - spruce budworm, spruce sawflies; leaf miner - larch needle miner; sucking 'insects' - spruce spider mite, aphids.

Diseases affecting foliage also destroy chlorophyll and create various degrees of unsightly appearance. They are caused by fungi that spread by spores, either intensifying the disease on the same tree or spreading it to other trees. Some fungi have very complicated life cycles and require two hosts to complete the cycle. Examples of foliage diseases on hardwoods include anthracnose, horse-chestnut leaf blotch, leaf spots, ash rust; on conifers, needle rusts, needle casts.

Shoots. *Insects affecting shoots* often appear as a foliage problem because the foliage on the affected shoot is also affected. The adult lays its eggs under the bark, the larvae tunnel and feed inside the shoot and eventually kill it. Examples include the European pine shoot moth, the white pine weevil, and the balsam twig aphid.

Diseases affecting shoots usually attack the tree when the shoots are still young and succulent, allowing the germinating spores of the fungus to easily penetrate the outer layers. The fungus cuts off the water supply, kills the cambium and the shoot (and the leaves on it) dies. Examples on hardwoods include willow blight, twig blight of poplar; on conifers, Sirococcus shoot blight, Scleroderris canker.

Branches. *Insects affecting branches* are rarely important as long as a tree is in good health and vigorous condition. Most fungi that cause twig and small-branch mortality, resulting in a dieback condition, are weakly parasitic, and successfully attack only trees under stress. There are a great many fungi in this group. An exception on hardwoods is the black knot of cherry, a disease that often attacks crab apple, causing ugly, unattractive canker-like growth, and that may kill the tree. On conifers, one of the most commonly seen

diseases in this group is the *Cytospora* canker. The fungus usually attacks individual branches of Colorado blue spruce, ruining the appearance of the tree.

Trunks. *Insects affecting tree trunks* consist mainly of wood borers and bark beetles, the larvae of which at certain times in their development mine the inner bark and the sapwood, interfering with water conduction. Examples include the bronze birch borer, the apple tree borer, and a variety of bark beetles.

Diseases affecting tree trunks are among the urban pests that, apart from the defoliators and their effect on aesthetic appearance, are, or should be, the major concern for arborists and urban foresters. There are many groups of stem fungi. Some cause cankers, deforming, disfiguring or girdling the trunk, such as beech bark disease, *Nectria* canker, *Hypoxylon* canker on hardwoods, white pine blister rust on conifers. Some affect the vascular system of the tree, plugging up the water-conducting elements and killing the tree, such as Dutch elm disease (a bark beetle-transmitted disease that could have easily fit into several other of the above categories of diseases or even of insects). Many fungi get into the tree through "infection courts", which are openings of various kinds (wounds, broken branches, cankers), and cause decay. Whatever their action, they destroy wood and weaken its physical strength, which can lead to breakage with all of its potentially serious consequences. Most of the action of wood-decaying fungi is hidden from sight. By the time fruiting bodies (conks or mushrooms) appear on the trunk or a huge branch breaks off or a tree topples during a wind-storm, the damage to the tree has occurred.

Roots. *Diseases affecting roots* of trees are most often undetectable during casual observation. However, they are extremely important factors affecting tree health, the roots being a vital part of the tree both for water and nutrient uptake and for anchoring the tree to the ground. Roots are also one of the tree's most abused parts in the urban environment, suffering most of the stresses mentioned earlier.

Tree roots weakened by these stresses, or by the various insects and diseases attacking above-

ground tree parts, are vulnerable to attack by a number of root-rotting fungi. The fungus moves into the root and spreads to other roots or up to the root collar, further weakening or killing the tree. The best known and probably most widespread among these fungi is the shoe-string root rot (*Armillaria mellea*).

Conclusion

Most insect and disease problems can be prevented or controlled. For some we do not yet have the answer. These we have to manage in ways that minimize losses - and work hard to find solutions.

It is a wonder, and a testimonial to the resilience and tolerance of the urban shade tree that, in spite of all the hardship, all the dangers and enemies, so many trees not only survive but also flourish to provide us with those values that we expect from them, regarding beauty, tourism, environment, enjoyment of life and other economic benefits. It behoves us, we who are responsible for caring for them, to protect them and provide the conditions necessary for their well being - and for our benefit. An arborist's job is a challenging one.

References

1. Anonymous. 1979. Les principaux insectes défoliateurs des arbres du Québec. Service d'entomologie et de pathologie, Ministère de l'Énergie et des Ressources, Gouvernement du Québec ER1-3294-8 ISBN 2-551-03428-0; 188 pages; 252 color photos. Address: 200b chemin Ste-Foy, Québec.
2. Myren, D.T. (editor). 1994. Tree diseases of eastern Canada. Canadian Forest Service, Ottawa, Ont. Catalogue No. Fo42-186 1994 ISBN 0-660-14936-2; 172 pages; 277 color photos. Address: bookstores, Canadian Communicaton Group - Publishing, Ottawa, Canada K1A OS9, Canada \$39.95 - Other: US\$ 51.95
3. Rose, A.H., and Lindquist, O.H. 1973. Insects of eastern pines. Publ. No. 1313, Dept of Environment, Canadian Forestry Service, Great Lakes Forestry Centre, Sault Ste. Marie, Ont. Catalogue No. Fs00-1973/2; 127 pages; 178 color photos.
4. Rose, A.H., and Lindquist, O.H. 1980. Insects of eastern larch, cedar and juniper. Forestry Technical Report 28. Dept. of Environment, Canadian Forestry Service, Ottawa, Ont. Catalogue No. Fo64-28-1992 ISBN 0-660-14172-8; 99 pages; 146 color photos. Address: bookstores, Canadian Communicaton Group - Publishing, Ottawa, Canada K1A OS9, Canada \$17.95 - Other: US\$ 23.35
5. Rose, A.H., and Lindquist, O.H. 1982. Insects of eastern hardwood trees. Forestry Technical Report 29. Dept. of

Environment, Canadian Forestry Service, Ottawa, Ont. Catalogue No. Fo64-28/182E ISBN 0-660-11205-1; 304 pages; 502 color photos. Address: bookstores, Canadian Communicaton Group - Publishing, Ottawa, Canada K1A OS9, Canada \$14.95 - Other: US\$ 17.95

6. Rose, A.H., and Lindquist, O.H. 1994. Insects of eastern spruces, fir and hemlock. Canadian Forest Service, Ottawa, Ont. (Revised by P. Syme) Catalogue No. Fo64-23-199 ISBN 0-660-15112-X; 159 pages; 202 color photos. Address: bookstores, Canadian Communicaton Group - Publishing, Ottawa, Canada K1A OS9

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Résumé. Il y a plus de 3500 espèces d'insectes et plus de 400 maladies différentes dans les Maritimes (Canada) qui comptent parmi les stress et les défis existants de l'environnement urbain. Les parasites des arbres en milieu urbain affectent toutes les parties de toutes les espèces d'arbres. Les insectes et les maladies affectant les diverses parties de l'arbre (feuilles, bourgeons, rameaux, branches, troncs) sont brièvement décrits et des exemples sont donnés pour les feuillus et les conifères. Une liste de références est fournie pour l'identification des insectes et des maladies de l'Est du Canada.

Zusammenfassung. Es gibt über 3500 Insektenarten und über 400 Krankheiten in den Maritimes (Canada), die zu den existierenden umweltbedingten und urbanen Anforderungen noch Streß hinzufügen. Stadtbaumschädlinge befallen alle Teile von allen Baumarten. Insekten und Krankheiten, die die unterschiedlichsten Baumteile (Blätter, Zweige und Äste, Stamm) befallen, sind kurz vorgestellt und Beispiele erwähnt für Laubbäume und Koniferen. Eine Referenzliste für das östliche Kanada hilft bei der Identifikation von Insekten und Krankheiten.