ISBN 0-662-20054-3 Cat. No. Fo 29-6/63-1992E

63

FOREST Pest LEAFLET

Pacific Forestry Centre

Common Pests of Arbutus in British Columbia

R.S. Hunt, B. Callan and A. Funk

Arbutus (*Arbutus menziesii*), sometimes called madrone, is a broadleaf evergreen tree which is prominent and attractive in numerous coastal landscapes from British Columbia to Mexico. It grows on a wide range of soil types, provided they are well drained. Unlike rhododendrons, also in the Heath family, where an acid soil is crucial for healthy growth, it is vigorous over a wide range of pH. In the southern part of its range, arbutus is a shade-tolerant tree, but in British Columbia it has a very low shade tolerance and lower branches frequently die back. Survival of transplanted arbutus is poor, but best results are obtained on well-drained, nonshaded, yet protected planting sites. New leaves flush out in the spring before the old leaves fall. Old leaves may turn yellow, red or brown and may fall at any time during the summer. White flowers are produced in the spring in a large cluster at the ends of some branchlets. The fruit ripens into a red or orange berry. Clusters of dead fruit stalks at the ends of branches, which may persist for years (Fig. 1), are not a disease symptom, but are a natural occurrence following flowering. Under normal conditions, a new branchlet originates from a bud at the base of

Arbutus menziesii

Natural Resources Canada
Canadian Forest Service
Ressources naturelles Canada
Service canadien des forêts
Canada

Fig. 1. Arbutus dead fruit stalks are a natural phenomenon.

Fig. 2. Natural die-back of a main branch after flowering

the dead fruit stalks. Sometimes most of the branchlets on a large branch produce only flower buds, and after flowering, no new branchlets arise; this results in a dying back to the next large branch bearing vegetative buds (Fig. 2). This looks like a disease and fungi may be involved, but actually it is a common physiological response to abundant flower production. Trees under stress are particularly prone to this type of dieback.

Winter damage

Arbutus and wax-myrtle (*Myrica californica*) are the only evergreen broad-leaved native Canadian trees and they are also the least frost-resistant. In British Columbia during a severely cold winter or when frosts occur before Arbutus has hardened-off, foliage, branches and buds may be killed outright.

Strong, drying winter winds can remove water from leaves more quickly than it can be replaced by uptake from cool soils, and this causes desiccation. In the spring, desiccated leaves often have dried apices and margins (Fig. 3). Trees are damaged more on the exposed windward side and damage is proportionate to exposure. Damage is particularly severe from cold out-flow winter winds (easterlies). Winter-damaged tissue is unsightly and may be more susceptible to attack by other pests, but the tree will usually sustain little permanent injury from winter wind damage alone.

Control of winter damage

Choosing a planting site sheltered from out-flow winter wind can prevent much winter damage, especially to young plants. In new residential areas, a protective vegetation cover should be left around young trees. Winter-killed branchlets should be pruned and dead leaves should be removed in the late winter or early spring so they do not act as a reservoir for disease organisms. To avoid unnecessary pruning, buds should be examined before pruning to see if they are healthy. Transplants to climates colder than the native range cannot survive the winter.

Leaf spot diseases

Small circular leaf discolorations (Fig. 4) are caused by *Didymosporium arbuticola* and *Diplodia maculata.* These fungi produce only conidia

Fig. 3. Winter-damaged leaves of arbutus, showing typical margin necrosis

Fig. 4. Small circular leaf spots on arbutus leaves caused by asexually reproducing fungi

Fig. 5. Large tar spots on arbutus leaves caused by sexually reproducing fungi

(asexual spores) which are spread by rain splashes.

Large black "tar spots" (Fig. 5) are caused by *Coccomyces quadratus* and *Rhytisma arbuti.* These fungi produce ascospores (sexual spores) which are forcibly shot from the fruiting bodies during wet weather.

These four species of fungi attack only arbutus and are found throughout the range of the host; frequently two or more occur together. Sometimes they cause black lesions on the petioles and green branchlets. Other leaf spot fungi may also attack the leaves. New foliage remains relatively free of leaf spots until the fall. Spores infecting new foliage come from existing stem and leaf lesions on older foliage in the tree or on the ground. The dark structures on the infected leaves produce the spores. These diseases tend to intensify in the winter during wet periods. The rain helps to disseminate the spores and provides conditions that favor infection.

Control of leaf spots

Trees may occasionally be heavily damaged in the early spring, but the blighted leaves are last year's leaves and these will normally fall from the tree during the summer. Such damaged leaves cannot be revitalized, but they will be replaced by new

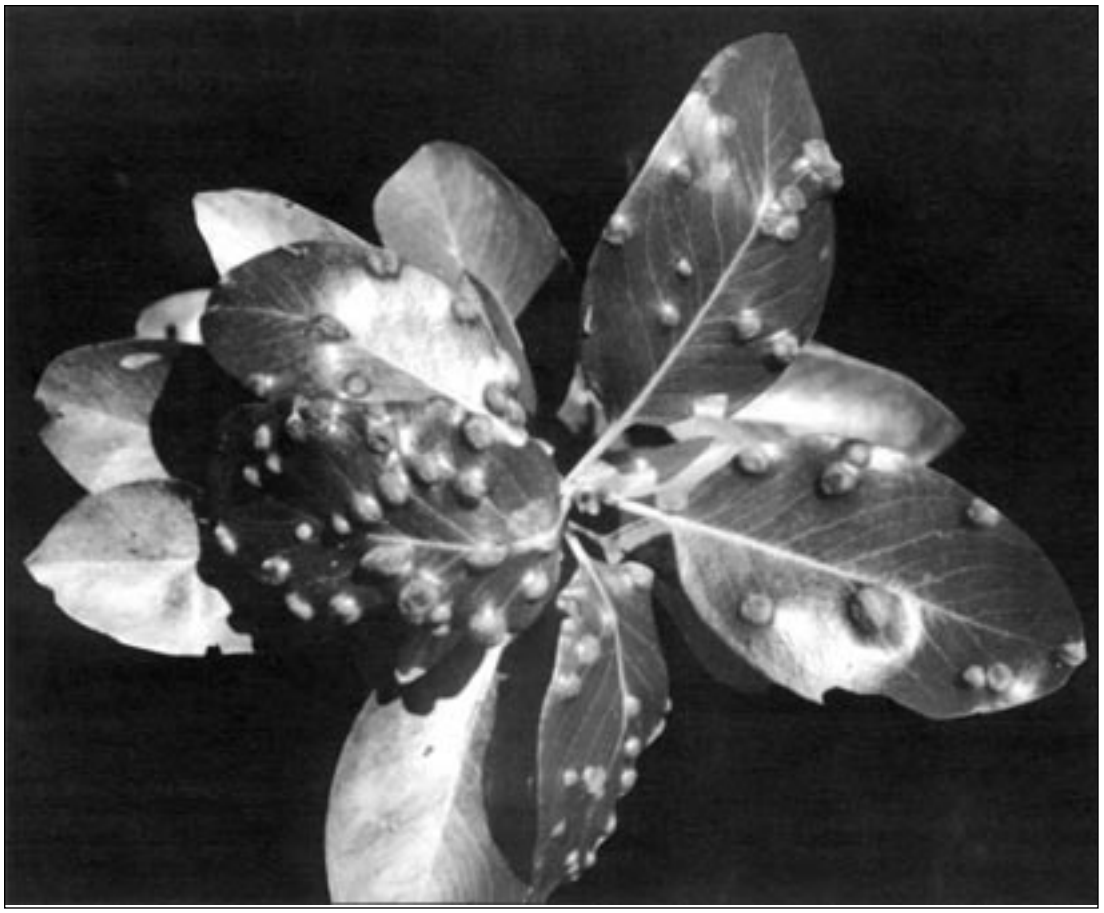

Fig. 6. Blister blight: blisters on leaves

Fig. 7. Blister blight: swollen berries

Fig. 8. Severe cankering of arbutus caused by the fungus *Nattrassia mangiferae*

spring leaves. These new leaves should be protected from infection.

Sanitation will probably control leaf spots. Dead branchlets should be removed from trees as soon as they are discovered. Fallen leaves should be gathered in the late summer or early fall before the rains splash the spores to the new foliage. When watering arbutus or nearby plants, try not to repeatedly sprinkle the foliage as this may spread the leaf spot fungi.

Sometimes, foliage can be protected by spraying Bordeaux mixture. Spraying should be started in the fall and continued until the spring. Since the rain may wash the commercial fungicide off the leaves, the trees will have to be sprayed frequently. Home-made Bordeaux mixture (10-15-100), when applied on a dry fall day, may protect the tree throughout the winter.

Please remember that when applying any fungicide for control of arbutus diseases, the application is made entirely at one's own risk.

Blister blight

Blister blight, caused by the fungus *Exobasidium* sp., has been sporadically reported over the years. The summer of 1992, which was preceded by a mild winter, was an especially heavy year for infection on Vancouver Island and the Gulf Islands.

This disease manifests its symptoms on current-season leaves (Fig. 6) and developing berries (Fig. 7). Leaf symptoms become obvious in late spring and early summer, in the form of large (one to several cm in diameter) convex blisters which are at first all one color, but later turn pale pinkish on the concave underside, finally browning. When several blisters occur on the same leaf, the leaf becomes twisted and distorted. Developing berries also turn prematurely reddish and swell to several times their natural size. The infected tissue on the surface of the berries and the undersides of the leaf blisters is covered with a thin layer of fungal tissue bearing a palisade of basidia. The basidia in turn produce basidiospores that are forcibly ejected and airborne during moist weather conditions.

Control of blister blight

There is no chemical control registered for blister blight on arbutus, although copper-based fungicides are recommended for the control of *Exobasidium* on other ericaceous plants. As with leaf spots, avoid watering the foliage to minimize the symptoms.

Arbutus canker

Canker diseases begin as localized lesions in the bark. Continued callusing will cause unsightly deformations. Smaller branches may be killed by girdling. Arbutus canker is caused by the fungus *Nattrassia mangiferae*, formerly known as *Hendersonula toruloidea*. This fungus occurs all over the world on a large number of broadleaved plants, but in British Columbia it has only been found on arbutus.

The first symptoms on arbutus are dark areas of bark discoloration. This is followed by the formation of sunken areas. The dead bark sloughs off the infected area, longitudinal cracks develop, and a perennial canker is formed. Older cankers form callus tissue over the dead areas, consisting of swollen, irregular masses of tissue (Fig. 8). Weakened or stressed trees especially those growing close to the ocean, are probably more susceptible to this disease.

Infection may take place through tissue damaged by winter injury, sunscald, or wounds. The fungus produces only asexual spores and these are present all year in the killed bark of the canker. The spores can be carried by wind to new infection sites. At present, this disease is not widespread, but trees may be severely cankered in some coastal areas.

Control of cankers

Since the causal fungus can enter trees through wounds, prevention and treatment of wounds minimizes infection. Pruning and other wounds may be treated with wound dressing. Cracks, which develop in old wound dressings, are prone to decay; therefore, wound dressings should be re-applied about every 6 months until the wound is completely callused over. When clearing away other trees, arbutus trunks should not be suddenly exposed to the sun; this can cause sunscald which may facilitate infection by the canker fungus. Sunscald may be prevented by leaving some protective vegetative cover in such situations. On walnut trees, several preventive measures have been found to be effective: (a) painting the trunks with whitewash to prevent sunscald, (b) applying

Fig. 9. Sinuous mine made by *Marmara arbutiella*

nitrogen fertilizer, and (c) watering the trees during the growing season. These measures might also prove to be effective on arbutus.

Cankers, which are unsightly and threaten tree survival, may be removed by cutting well beyond the margin of the canker and then applying a wound dressing. Again, in order to minimize decay, wound dressing should be applied generously every 6 months until the wound is covered by callus tissue.

Root and butt disease

In Washington state, the fungus *Phytophthora cactorum* causes butt cankers and death of arbutus. In British Columbia, this fungus is known to attack and kill dogwood (*Cornus nuttallii*) and certain orchard trees. Cambial red-brown discoloration at the ground-line, which is symptomatic of Phytophthora root disease, occurs in some dying arbutus in B.C. This is likely Phytophthora root disease, but this has not been confirmed.

Control of root and butt disease

Watering and fertilizing infected trees may increase vigor and prolong the life of affected trees. Application of a fungicide would be difficult and probably ineffective. If trees infected with root disease are removed, the stump should also be removed; this will remove the disease threat to replacement or adjacent healthy trees.

Insect damage

The most commonly observed insect damage on arbutus is the sinuous mine made by the larvae of a leaf and twig mining moth *Marmara arbutiella* (Fig. 9).

Another leafminer, the madrone shield bearer, *Coptodisca arbutiella,* mines elliptical pupal cells which later drop out leaving numerous “shot holes” (Fig. 10). An arbutus skeletonizer, *Epinotia terracoctana*, causes widespread skeletonization and scorching of arbutus foliage in some years. The larvae form long sinuous frass-covered feeding shelters on the lower surface of the leaf.

Control of insects

Usually, these leaf and twig insects will not seriously affect the health of arbutus trees. When trees are stressed, by drought for example, or if insect attack is unusually severe, use of a systemic insecticide may be desirable. Insecticides are usually applied in the spring. Advice of pesticide or horticultural authorities should be obtained before using a pesticide. Follow the directions on the label carefully, particularly those concerning weather and the surrounding conditions during application.

Fig. 10. Shot holes made by *Coptodisca arbutiella*

Selected References

Dawson, A.D. 1972. Factors affecting development of madrona canker. Plant Dis. Rep. 56: 50-52.

Foster, W.R.; Moisey, J.A. 1964. Bacterial and fungus diseases of fruit trees. B.C. Dept. Agric. Plant Pathol. Circ. No. 12.

Fowells, H.A. 1965. Silvics of forest trees of the United States. U.S. Dept. Agric. Handbk. 271, pp. 90-91.

Krajina, V.J. 1969. Ecology of forest trees in British Columbia. Ecol. West. N. Am. 2: 141-142.

Punithalingam, E.; Waterston, J.M. 1970. *Hendersonula toruloidea*. Commonwealth Mycol. Instit. Descriptions of pathogenic fungi and bacteria No. 274, 2 p.

Stuntz, D.E.; Seliskar, C.E. 1943. A stem canker of dogwood and madrona. Mycologia 35:207-221.

Sutton, B.C.; Dyko, B.J. 1989. Revision of *Hendersonula*. Mycol. Res. 93:466-488.

Preparation of home-made Bordeaux mixture

Bordeaux mixture has been used by farmers, home-owners and pest control operators for over 100 years. This mixture of copper sulphate ($CuSO_4 \bullet 5H_20$), hydrated (slaked) lime [$Ca(OH)_2$], and water has been used effectively for the control of leaf spot diseases, blights and anthracnose. With care, home-made Bordeaux mixture can be prepared from the three ingredients.

Small quantities of Bordeaux mixture for treatment of a few small ornamental trees can be prepared as follows:

Let 50 grams copper sulphate dissolve in 1 litre of water (overnight). Then, stir 80 grams of hydrated lime into 4 litres of water, and sieve this second mix through a fine screen. Finally, stir the copper sulphate solution into the hydrated lime solution. The Bordeaux mixture is now ready for use.

The relative amounts of these ingredients vary with different preparations. Consult your local pesticide official, licenced supplier, on licenced pest control operator for more details about Bordeaux mixture and the ratios of the ingredients.

Remember to protect your eyes, hands and exposed areas of your body during preparation and application of this fungicide. Use your supply of mixture promptly as Bordeaux mixture does not keep well. Bordeaux mixture may cause burning of leaves and may injure the fruit of some plants. For example, copper-containing sprays (such as Bordeaux) will damage Seibel varieties of grapes. Prepare and use this mixture at your own risk; use it sparingly and carefully.

Additional Information

Additional copies of this and other leaflets in this Forest Pest Leaflets series, as well as additional scientific details and information about identification services, are available by writing to:

Natural Resources Canada
Canadian Forest Service
Pacific Forestry Centre
506 West Burnside Road
Victoria, B.C. V8Z 1M5
http://www.pfc.forestry.ca
Phone (250) 363-0600

© Her Majesty the Queen
in Right of Canada,
Revised June 1992

PDF version December 2000

Natural Resources Canada
Canadian Forest Service

Ressources naturelles Canada
Service canadien des forêts