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Needle Dieback In Evergreens

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Evergreens are grown in all areas in North Dakota. The primary uses of evergreens are in farmstead shelterbelts and around the home for landscape purposes. Growing of Christmas trees is becoming an important industry in North Dakota, but at this time involves relatively few acres.

In areas where there are no large concentrations of evergreens, damage done by infectious diseases is usually minimal. A majority of the damage is caused by non-infectious conditions such as winter injury, crown dieback, sunscald and animal injury. Infectious needle diseases of spruce, juniper, and pine also cause needle dying. *Cytospora* canker of spruce affects limbs and causes needles to die.

WINTER INJURY (winter kill)

Winter injury occurs in late winter and early spring. Heavy coatings of ice and snow allowed to remain on trees and shrubs cause serious injury or even death of branches. Alternate freezing and thawing of the soil resulting in damage or death to the roots will also cause injury.

44.3 Control:

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For trees around the home, grow them in a location protected from build-ups of snow and ice or remove the build-ups as they occur. Injury often occurs in shelterbelts, where little can be done to prevent it. To protect against root killing, water the trees deeply in late fall and during summer dry periods. The use of a mulch during winter months is important to conserve root moisture, prevent deep freezing, and prevent alternate freezing and thawing

of the soil. Popular mulches used are straw (flax straw is best), leaf mold, or well-rotted manure. They are usually left on over winter and either removed or worked into the soil in the spring.

CROWN DIEBACK

When this condition is prevalent, tops of large trees (spruce, pine, etc.) yellow and die back from the top because of poor growing conditions. Foliage on the trees begins to thin out. Leader growth and needle growth are stunted.

Control:

For trees around the home, water and fertilize them to maintain good vigor. Also, mulch and water in late fall. Plant the trees in well drained, fertile soil and plant adapted species and varieties. Control insects (see summary).

Before attempting to water trees, make sure that the water used is not so high in sodium or other salts that the water will do more harm than good. Water quality can be a serious problem in many parts of the state.

SUNSCORCH (drought)

Foliage on the trees appears to be scorched as if by flame. The needles dry and turn brown from the tip down (Fig. 1). Tips of the branches begin to die back. Injury follows periods of very hot, dry, windy weather. Severe winter weather and mite injury cause similar symptoms. This condition is quite prevalent in North Dakota among pine and spruce trees growing on exposed sites.

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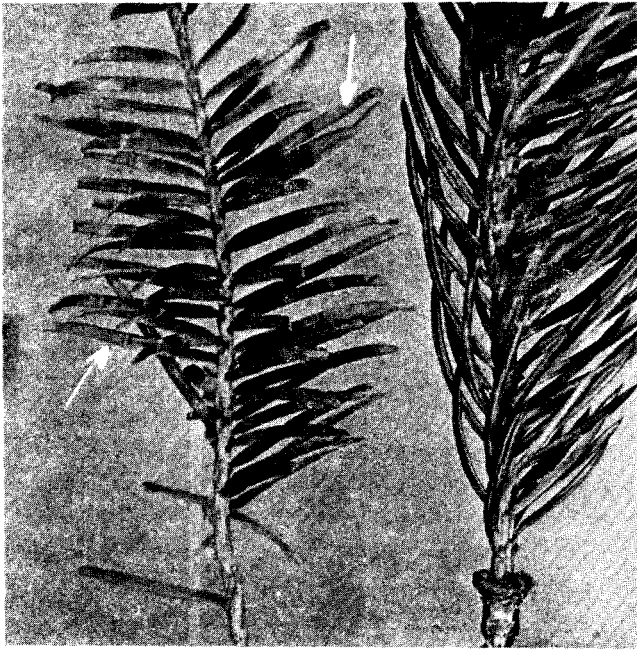


Fig. 1 Sunscorch

Control:

Keep them, where possible, well watered during hot, dry periods. Control mites (see summary).

SUNSCALD (bark scorch, winter drying)

Two types of sun injury, winter and summer, are found in North Dakota. Winter sunscald is caused by a combination of high and low temperatures during the late winter or early spring. Temperatures on exposed surfaces of the shrubs or trees increase sufficiently to allow respiration of normally dormant cells. As the cells become active, water is given off. Because the soil is still frozen and roots are inactive, moisture in the active cells cannot be replaced. The result is drying of the tissue. The incidence of injury is usually much higher following a late snowfall. Injuries localized on sun-exposed surfaces are classed as "winter sunscald"; this distinguishes the injury from "sunscorch" which is due to the drying effect of high summer temperatures. Winter injury is probably a much more common cause of leaf drying and limb cankers than summer injury in the northern regions.

Early stages of winter sunscald are frequently not observed. Following the period when injury occurs, affected tissues appear dull or discolored, and there may be some shrinkage due to drying. Foliage eventually turns brown (Fig. 2) and drops. The bark loosens from the wood and the brown, dead portions can be readily peeled from the underlying wood. This wood may also be discolored. With severe injuries, the bark soon splits and cracks. The final result is weathering and peeling of the bark to produce an open wound. Moderate types of

winter sunscald are confined to small upper branches on the southwest face of the plant. The very severely injured trees or shrubs may die later in the season; those less severely injured will heal and survive.

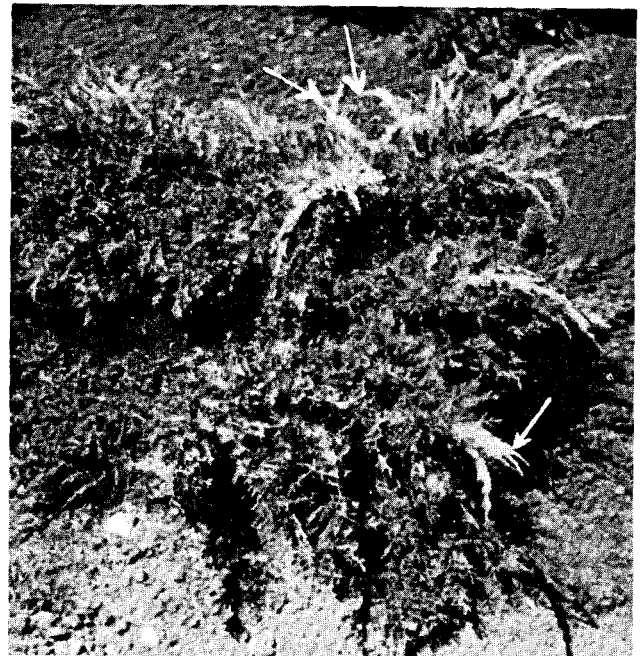


Fig. 2 Sunscald

The combination of summer drought plus winter drying causes needles of spruces, especially Colorado Blue spruce, to turn purplish in late winter and spring. This symptom has been called 'Purple Needle'. It was especially common in the spring of 1977.

Control:

When sunscald occurs frequently follow practices, in home plantings, which prevent excessive overheating of the sun-exposed surfaces. Accomplish this (1) by shading to protect the bark from the direct sun, or (2) by modifying the surroundings to avoid reflection of sun's rays. Build board, lath or burlap screens to shade exposed surfaces. A darkly painted house does not reflect sun's rays as readily as light colored siding. Remove all dead branches after growth starts in the spring. Control mites with a recommended miticide (see summary). Fertilize trees in the spring to stimulate growth. Keep trees well watered during summer and fall dry periods. Apply a tree wound dressing to dried bark or cracks to prevent wood rotting fungi from entry (see also *Cytospora* canker).

For shelterbelts, maintain vigorous growth of trees and control insects or mites. Larger trees do not require cultivation; avoid cultivation which can damage roots or branches.

ANIMAL INJURY (urine damage)

Dead, oily foliage is seen near the base of the tree. The foliage is dark brown to black in color. This condition appears most often during winter months when snow covers the tree trunks and urine is deposited on the foliage. Low and medium shrubs such as Andorra, Pfitzer, Hetz and Savin junipers and arborvitae are most often damaged.

Control:

Try one or more commercial "dog off" sprays or pet repellents. Also protect shrubs with fencing or by covering with snow or some other type of cover. Confinement of male animals, when possible, eliminates the problem.

JUNIPER BLIGHT (Phomopsis blight, needle blight, dieback) - *Phomopsis juniperovora*

Needles, twigs, and smaller branches of shrubs (junipers, cedars, arborvitae) turn light brown to reddish brown, later dead branches turn silvery gray. Old and new needles or twigs may be affected. Phomopsis blight is quite serious on seedlings and young trees in wet seasons when entire branches or complete trees may die. Tiny black dots (fungus fruiting bodies) appear later on infected, dried parts. Phomopsis blight is often confused with normal fall browning of inner leaves, sunscald, magnesium deficiency, spider mite damage, etc. This disease is quite widespread and serious, especially in areas where substantial numbers of evergreens are grown.

Control:

Keep the trees growing steadily. Prune and dispose of all blighted parts when the plants are dry. Under nursery conditions, destroy infected plants. Avoid wounding when transplanting or cultivating. Benomyl fungicide can be applied at about one- or two-week intervals during wet periods of spring and fall according to label directions. Benomyl has given somewhat erratic control; the reason for this is not known. Space the plants for good air circulation. Under nursery conditions, avoid overhead sprinkling.

The following hardy juniper cultivars have been reported resistant to *Phomopsis* blight: *Juniperus chinensis* cvs. Iowa, Pfitzeriana Aurea; *J. communis* cvs. Aureo-spica, Repanda, var. *depressa*; *J. horizontalis* cvs. Depressa Aurea, Procumbens; *J. sabina*, all cultivars; *J. scopulorum* cv. Silver King. Other cultivars and species also show resistance but are not reliably hardy in North Dakota.

PINE NEEDLE BLIGHTS (Red band - *Dothistroma* Needle Blight, Brown Spot - *Scirrhia acicola*, *Lophodermium* needlecast, *Nemacycclus* needlecast)

Several diseases may cause spotting, browning, and premature casting of needles of hard (2- and 3-needle) pines including Ponderosa Pine, Red or Norway Pine, and Scots Pine in North Dakota.

Yellow-to-brown spotting of pine needles may be a symptom of needle blight infection but may also occur in response to insect or mite injury or air pollution. Red-to-brown bands may develop on needles in response to injuries or drought stress as well as to disease. Red-brown banding of older needles is common as they gradually age.

Correct determination of the cause of needle spotting, banding or browning requires finding fruiting structures of the particular fungi if the symptoms are of a needle blight disease. Frequently these are difficult to find or only appear at certain times of the year, and laboratory diagnosis is often needed.

Control:

Cultural controls are usually sufficient to prevent serious damage by needlecast diseases. These include maintaining tree vigor, preventing crowding and promoting good air circulation around trees. Crowded, dense plantings create environmental conditions favorable for needle blight diseases. The needle blight fungi are regular inhabitants of dying older needles where they cause no problem but are part of the natural breakdown of dead material. Only when they infect first or second year needles is there cause for concern.

Chemical controls may be needed in nurseries, Christmas tree plantations, or other intensive plantings. Spray materials and schedules have been developed for these uses but correct identification of the particular needle blight disease involved is necessary for proper timing of protective sprays.

Two potentially very serious pine shoot blights have been found in Minnesota, South Dakota and Montana. These are Diplodia Tip Blight and Sirococcus Shoot Blight. The symptoms of these diseases are dying of new shoots and needles especially in the spring. Report any suspected occurrence of these symptoms to the Extension Plant Pathologist at North Dakota State University, to your district forester, or to your county extension agent.

SPRUCE CYTOSPORA CANKER

The fungus, *Cytospora kunzei*, attacks spruce. Cankers cause the bark to decay as the fungus invades the limbs. The result is dead foliage and limbs, particularly near the base of the tree. A flow of bluish resin from the diseased branches is the earliest symptom (Fig. 3). When the outer bark is carefully pared off, the circular black fruiting bodies of the fungus can be seen in the inner bark (Fig. 4).

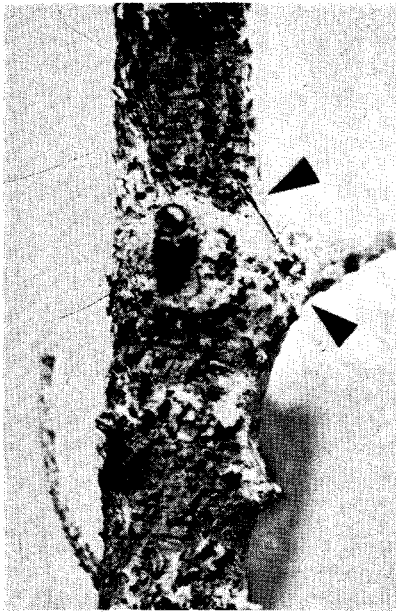


Fig. 3 *Cytospora* canker - resin flow

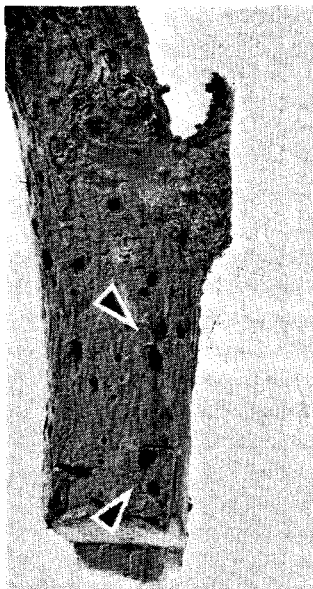


Fig. 4 *Cytospora* canker - fruiting bodies in bark (outer portion removed)



Fig. 5 *Cytospora* canker - dead and dying branches

Cytospora is spread to healthy limbs by rain and to healthy trees by contaminated pruning tools. Measures used to prevent sunscald also aid to prevent *Cytospora* because the fungus enters through wounds such as those resulting from sunscald.

Control:

The most effective control measure for *Cytospora* canker is removal of infected branches in winter. At this time infected branches that are already dead will be brown, while dying branches will show a grayish-green or dull color (Fig. 5). Infected branches **never** recover. Do not leave them in place hoping they will revive. Prune out all diseased branches before the first spring rain to prevent spores of *Cytospora*, which mature during the winter, from splashing to new infection sites on healthy branches. Dispose of all pruned-out branches away from spruce plantings.

The *Cytospora* canker fungus most readily attacks weak or shaded branches and trees. Therefore, remove weak branches and avoid crowding in plantings. When trees get too large and are crowded together consider thinning out some trees.

Disinfect all pruning tools such as knives and saws by wiping them with rubbing alcohol. Treat pruning and other wounds with a wound dressing such as asphaltum tree or Kolofog sulfur dressings.

Cytospora is most easily controlled by prevention. Keep trees well watered and fertilized. Maintain good drainage and air circulation. Avoid wounding trees. Prune during dry periods in summer and during winter. Do not bring or dispose of spruce Christmas trees or branches near healthy spruce plantings. Black Hills Spruce seems less prone to *Cytospora* canker than Colorado Blue Spruce.

SUMMARY

Nearly all of the conditions or diseases discussed can be confused with natural browning and shedding of the needles. Older needles turn yellow and die on the inside of the trees. This is a normal shedding of the leaves in conifers.

For further information concerning fertilization of trees and control of insects in evergreens, ask your local County Extension Agent for Circular H-362, "Fertilization of Trees", and Circular E-297, "Insect Pests of Evergreens".