# Broadleaf Tree and Shrub Disease, Disorder, Insect and Mite Treatment Options - 2026

South Dakota State University Extension

**John Ball** | Professor, SDSU Extension Forestry Specialist & South Dakota Department of Agriculture and Natural Resources Forest Health Specialist

Any management options, including those identifying specific active ingredients, are for the convenience of the reader. The active ingredients mentioned in this publication are those that are most commonly available in pesticides used in South Dakota for broadleaf trees and shrubs and the inclusion of an active ingredient shall not be taken as an endorsement or the exclusion of one labeled for use a criticism regarding effectiveness. Please read and follow all label instructions. The label is the final authority for a product's use on a pest or plant. Not all active ingredients listed are available throughout the state. Some may require a commercial pesticide license. It is the reader's responsibility to determine if they can legally apply any active ingredient or product identified in this publication.

| BROADLEAF DISEASES AND DISORDERS | | | |
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| **NAME** | **HOSTS** | **SYMPTOMS** | **MANAGEMENT** |
| **Ash, maple, oak**, and **walnut** anthracnose diseases are caused by related fungal species. **Ash** (*Plagiostoma*), **maple** (*Aureobasidium, Discula*), **oak** (*Apiognomonia*), and **walnut** (*Ophiognomonia*). | Ash anthracnose: green and white ash.<br><br>Maple anthracnose: silver and sugar maple.<br><br>Oak anthracnose: bur and swamp white oak.<br><br>Walnut anthracnose: black walnut.<br><br>Anthracnose diseases are found statewide but more common in the humid southeast quarter of the state. | Large, irregular, tan to brown lesions form on leaves, especially along the leaf margins. Infected leaves may curl and become distorted. The pathogen survives the winters in branch cankers and fallen leaves. | No treatment is required unless the tree experienced more than 25% defoliation the previous year. Chlorothalonil or copper may be used with the first treatment at bud swell and two more treatments spaced 7 to 14 days apart. |
| **Sycamore anthracnose** (*Apiognomonia*) occurs wherever this tree is found. | Statewide, but prevalent in the more humid southeast quarter of the state. | Sycamore anthracnose can result in twig blight and branch dieback after several years of defoliation. | Sycamore can be treated with a trunk injection of propiconazole or thiabendazole. |

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| **Apple scab** - Venturia *inaequalis*, a fungus. | Apple and crabapple.<br><br>Occurs statewide. | Dull, olive-green, velvety spots on leaves, that become irregular brown blotches during the growing season. Infected leaves may begin to fall in late summer.<br><br>Symptoms may also appear on petals and fruit. | Treat with an application of captan, chlorothalonil, myclobutanil, propiconazole or trifloxystrobin every 7 to 14 days beginning as the buds swell and continuing until three weeks after the petals fall or dry weather prevails (about five applications).<br><br>If using a myclobutanil fungicide, alternate with captan to delay occurrence of resistant variants of apple scab.<br><br>Note: these treatment options are for crab apples that will not be used for fruit production. |
| **Bacterial blight of lilac** – *Pseudomonas syringae* pv *syringae*, a bacterium. | Occurs on common lilac and Japanese tree lilac cultivars with white flowers. | The disease begins as brown spots on the developing leaves and shoots in the spring. A yellow halo may appear around these spots. The leaf spots gradually enlarge and turn black. Infected shoots will turn black and the tips curl. Appearance is like fire blight. | Prune out dead shoots during the winter.<br><br>Infected plants can be treated with copper or mancozeb as these have some effectiveness against bacteria.<br><br>Apply just before buds open. |
| **Black knot** - *Apdiosporina morbosum* - a fungus. | Plums and cherries. The disease is most common on the purple leaf cultivars of common chokecherry and the European Mayday tree.<br><br>Occurs statewide. | First year symptoms are faint light green swellings on shoots. The following spring these enlarge and turned into large velvety black galls, referred to as knots. | Remove all knots by April and burn them. However, this will only remove the second-year knots.<br><br>The first-year infections appear as slight swellings on the shoots and are easily missed.<br><br>Treat with chlorothalonil as fruit begins to shed the papery shuck. |

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| **Bur oak blight** - *Tubakia iowensis*, a fungus. | Occurs only on bur oak and is most common on established trees of a single subspecies of bur oak, *Quercus macrocarpa var oliviformis*, which is only found east of Hwy 281 in South Dakota. | Symptoms begin in late summer with infected leaves developing purple-brown lesions along the midvein.<br><br>Wedge-shaped areas of chlorosis develop on these leaves by early fall. Infected leaves dry but may remain attached until spring.<br><br>The disease intensifies each year. Trees may die after several years of infection.<br><br>Disease symptoms are more common during years with wet springs and summers. | Propiconazole as root flare injections can be performed on trees in late spring after the leaves fully open but before symptoms appear.<br><br>Injections may provide two years of protection.<br><br>Use as a therapeutic treatment, not as a preventative, as not all bur oaks are susceptible. |
| **Cedar-apple rust** - *Gymnosporangium juniperi-virginianae*, a fungus. | Apple and crabapple, a closely related disease infects hawthorns.<br><br>Occurs statewide. | Yellow to orange spots appear on leaves in late spring. On the upper leaf surface tiny pustules form in the spot while on the lower surface small lesions with ribbon-like strands develop. Infected leaves may drop by late summer.<br><br>The most common alternate hosts are the eastern redcedar and Rocky Mountain juniper. | Chlorothalonil, mancozeb, myclobutanil, or trifloxystrobin can be applied as flower buds are opening and repeat at 7 to 10 days intervals until two weeks after petals fall.<br><br>Captan, a common fungicide used for apple scab, is not effective against cedar-apple rust. |
| **Dutch elm disease** (DED) - *Ophistoma novo-ulmi*, a fungus. | American elm, red (slippery) elm, and Scotch elm are the most susceptible.<br><br>Occurs statewide.<br><br>The Asian hybrid elms have resistance to this disease. | Leaves wilt, turn yellow, and then wilt and turn brown. Affected leaves may remain on branches for a brief time before falling. The disease may be confused with black spot, a leaf disease, or verticillium wilt, a vascular disease.<br><br>Always confirm DED by checking a symptomatic twig for the characteristic discoloration and streaking beneath the bark.<br><br>The pathogen is carried by three species of elm bark beetles. | Propiconazole or thiabendazole as root flare injections may be used for American elms during the summer, after July 1.<br><br>These treatments will only protect trees from beetle vectored infection, not infections spread by root graft.<br><br>Infected trees should be promptly removed and a trench cut between the infected trees and any healthy elm within 40 to 50 feet of the infected tree. |

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| **Fire blight** - *Erwinia amylovora*, a bacterium. | Primarily apples, crabapple,<br><br>Mountain-ash and pear. Hedge cotoneaster is also susceptible.<br><br>Occurs statewide. | Infected flowers appear water-soaked, droop and eventually turn black.<br><br>The disease moves from the flower spurs into the shoots. Leaves quickly wilt and turn black but remain attached to infected twigs.<br><br>Infected shoots shrivel and curl at their tips, a symptom referred to as a Shepherd's crook. | Infected wood should be pruned at least one foot below visible dead wood during the winter.<br><br>Copper fungicides or mancozeb may be applied as the buds begin to open.<br><br>Note: copper may injure foliage if applied after the leaves appear.<br><br>Oxytetracycline can be trunk injected in early spring as buds open. This cannot be used on trees when the fruit is harvested for food. |
| **Marssonina leaf spot and blight** – *Marssonina*. a fungus | Cottonwood is the most common host but may also occur on balsam poplar and quaking aspen.<br><br>Occurs statewide. | Dark brown flecks with yellow halos appear on the infected leaves in late spring. The flecks enlarge and coalesce to form angular gray to black blotches. The infected leaves turn bronze before dropping prematurely. The disease progresses from the lower to the upper canopy. | Chlorothalonil or thiophanate-methyl may be used as the buds open and repeated two more times about two weeks apart.<br><br>Treatment is not necessary unless the tree has experienced more than 25% defoliation during the previous two years. |
| **Plum pockets** – *Taphrina communis*, a fungus. | American plums.<br><br>Occurs statewide. | The disease affects the fruit. The disease begins as a blister on the developing fruit. Eventually the infected fruit becomes swollen, spongy, and hollow. | Copper as a single application just before the buds open. This will reduce but not eliminate diseased fruit. |
| **Tar spot** – *Rhytisma acerinum*. - a fungus. | Freeman, red and silver maples.<br><br>Occurs mostly in eastern South Dakota. | Yellowish spots appear after the leaves attain full size. These spots become raised, black, and tarlike by midseason. | Treatment is not usually necessary. However, mancozeb applied at bud-break and repeated two more times about three weeks apart may reduce damage. |
| **Venturia leaf and shoot blight** – *Venturia macularis*, a fungus. | Quaking aspen but can infect other poplars.<br><br>Most common in the Black Hills but occurs statewide. | Infected leaves develop irregular brown and black irregular spots. Infected shoots become black and brittle.<br><br>These shoots curl at the tips forming a Shepherd's crook. | No fungicides are currently labelled for control of the disease.<br><br>The disease is not fatal and is usually limited to trees less than 15 feet tall. |

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| **Verticillium wilt** - *Verticillium dahliae*, a fungus | Ash, catalpa, elm, maple, and smokebush.<br><br>Occurs statewide. | Foliage on one side of the canopy becomes light green to chlorotic and yellow by midsummer. Yellow leaves fall by late summer. The sapwood is streaked light green to black except in ash. | Maintain soil fertility and moisture. Prune out infected branches but this will not eliminate the infection as it is soil-borne. |
| **Wetwood** - a diverse group of bacteria that includes *Methanobacter, Enterobacter* and *Klebisiella* | Elms and cottonwood.<br><br>Occurs statewide. | Light streaks running down the bark, originating with pruning wounds. Infected branches may emit a fetid odor and liquid when cut. | Wetwood does little injury to the tree; the alkaline condition retards decay. Inserting a pipe to drain the liquid causes more injury than the disease. |

| BROADLEAF INSECTS AND MITES | | | |
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| **Ash/lilac borer** - *Podosesia syringae* | Ash and lilac.<br><br>Occurs statewide. | Early symptoms are yellowing foliage, wilting of terminal twigs and branch dieback. Infested trees have pencil-size holes on lower trunk with sawdust at the base of the trunk.<br><br>Larvae are creamy white, about one inch long. They have 3 pairs of thoracic legs and 3 pairs of small prolegs. | Bifenthrin, chlorantraniliprole, or permethrin applied to the trunk ten days after the first sustained male catch in traps or ten days after Vanhoutte spireas are in full bloom (mid-May). |
| **Ash flower gall mite** - *Eriophyes fraxiniflora*, a mite | Seedless black and green ash cultivars.<br><br>Occurs statewide. | Infested staminate flower clusters become branched and turn black as they dry. | No treatments are necessary as the mites do not harm the tree, however, dormant oil bark spray just before bud break may provide some control. |
| **Bronze birch borer** - *Agrilus anxius* | European and Japanese white birch are susceptible. Paper birches are infested if stressed. River birch not attacked.<br><br>Occurs statewide. | Dieback begins at the top of the tree. Dying branches may have bumps and D-shaped holes. Trees that have more than 25% crown dieback are beyond treating.<br><br>The larvae are legless, divided into rectangular segments, and white. Similar in appearance to emerald ash borer larvae. | Treat trunks with bifenthrin or permethrin when buckeyes begin to bloom (early June).<br><br>Emamectin benzoate may be injected into the root flare during spring. Imidacloprid can also be used as a soil drench in the fall to kill the newly hatched larvae the following year. |
| **Cankerworms - Spring**, *Paleacrita vernata* and Fall, *Alsophila pometaria* | Preferred hosts include crabapple, elm, and hackberry.<br><br>Occurs statewide. | The caterpillars feed during the spring for both the spring and fall cankerworm. They feed on the softer tissue of the leaf blades while leaving the main veins intact.<br><br>Fall cankerworm adult flies and lay eggs in the fall. Spring cankerworm adults fly and lay eggs in the spring. The eggs of both cankerworms hatch just as the leaves have fully opened.<br><br>Caterpillars are loopers that are light green to brown with white to black stripes. About one inch long at maturity. | Use sticky bands on tree trunk in April-May (Spring cankerworm) or October (Fall cankerworm) to keep female adults – which are wingless - from crawling up trunk to lay eggs.<br><br>Treat with chlorantraniliprole, permethrin or spinosad when leaves have fully expanded, and the caterpillars are beginning to feed.<br><br>Acephate may be used as soil drench as the leaves open. |

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| **Cottony maple scale** -*Pulvinaria innumerabilis*, a soft scale. | Maples and lindens are most common hosts.<br><br>Occurs throughout the state. | The scale overwinters as immature females on twigs. The female adult scales are about 1/4-inch in diameter, oval and brown. Eggs are laid in the spring beneath the adult scale. These appear as a cotton-like sac on the side of the scale. After the eggs hatch the young crawlers migrate to the leaves and begin feeding. | Dormant oil can be used just before bud break to kill the overwintering females (note: oils may be phytotoxic if applied incorrectly).<br><br>Treat with dinotefuran as soil or trunk injection in mid-June. Do not use on lindens as it may affect pollinators.<br><br>Insecticidal soap when littleleaf linden is in full bloom (mid-June) and 10 days later. |
| **Cottonwood leaf beetle** - *Chrysomela scripta* | Cottonwood.<br><br>Occurs statewide. | The mature larvae (blackish with two white spots) skeletonize the leaves and may be found along with the adults during the summer. | Treat canopy with azadirachtin or carbaryl if high populations of adults and larvae are found on leaves. |
| **Cottonwood petiole gall aphids** - *Pemphigus* | Cottonwood.<br><br>Occurs statewide. | Galls form on the petioles, leaves drop prematurely. The inside of the galls contain clusters of small, light-colored aphids. | Treat with a horticultural oil just before buds open, however treatment is usually not necessary. |
| **Eastern tent caterpillar** - *Malacosoma americanum*,<br><br>**Forest tent caterpillar** – *Malacosoma disstria*<br><br>**Western (Prairie) tent caterpillar** – *Malacosoma californicum* | Chokecherry, ash, and many other species. Eastern and Forest tent caterpillars occur in eastern South Dakota while Western tent caterpillars are found in central and western South Dakota | Eastern tent caterpillar is pale blue with continuous white markings along the side of the body, while western tent caterpillar is also pale blue but with interrupted white lines. The forest tent caterpillar is pale blue and has keyhole shaped markings on the back. All three make nests at the union of branches in early summer. | When nests first appear treat canopy with azadirachtin, carbaryl, malathion, permethrin, or spinosad. Do not spray chokecherry tree in bloom as this will kill pollinators.<br><br>Acephate may be applied in the spring as a soil drench after the leaves open. |

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| **NAME** | **HOSTS** | **SYMPTOMS** | **MANAGEMENT** |
| **Emerald ash borer** - *Agrilus plannipennis* | This is a fatal threat to all ash in our state. The insect only attacks ash and will NOT attack mountain-ash or ash-leaf maple (Boxelder).<br><br>Currently (2026), the insect has been confirmed in Brookings, Codington, Grant, Lincoln, Minnehaha, and Union Counties. | The symptoms of infestation are 1) a general decline and thinning of the canopy, 2) extensive woodpecker blonding and drill holes on the upper branches, 3) excessive watersprouts and suckers on the tree and 4) vertical splits on the bark of small diameter (less than six inches) trees.<br><br>Larve are flat, legless and divided into bell-shaped segments. There are two small pinchers at the rear. Mature larvae are about 1 inch long. | Treatment is not recommended until the insect has been detected within fifteen miles.<br><br>The most effective treatments are injections with emamectin benzoate for two years of control.<br><br>Trunks on trees that are less than 10 to 16-inch in diameter may be annually treated with dinotefuran as a lower trunk application.<br><br>Imidacloprid may be applied as a soil injection or drench in the spring as an annual treatment. |
| **Elm flea weevil** – *Orchestes steppensis* | Elms, particularly Siberian elms, and hybrid elms that have Siberian elms as one of their parents.<br><br>Occurs statewide. | The adult weevils are about 1/16-inch long with a long snout. They are reddish brown with black spots on their wing covers. They chew holes in the leaves in early summer. Eggs are laid at the leaf tip and the larvae mine the foliage results in blotches. | Spray the foliage with acephate or carbaryl in late May as the adults begin to feed. This can be repeated in late June to kill the female adults as they are laying eggs.<br><br>Acephate, dinotefuran, or imidacloprid as a soil drench applied in early spring is also effective. |
| **Fall webworm** - *Hyphantria cunea* | Elms, walnuts, chokecherry among others. Statewide. | Pale yellow caterpillars form nests at the tips of branches in mid to late summer. | When nests first appear spray foliage with acephate, azadirachtin, carbaryl, or spinosad. |
| **Hackberry nipplegall** - *Pachypsylla celtidismamma* | Hackberry.<br><br>Occurs statewide. | The leaves develop light green nipple-shaped galls on the underside of leaves. | No treatment is necessary as the galls do not harm the trees. |

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| **Japanese beetle** – *Popillia japonica* | Mostly a lawn pest, but can also severely defoliate buckeyes, lindens, mountain-ash, Norway maple and roses.<br><br>Common in the southern half of the state (Hwy 14). | The adults are about 3/8-inch long with a dark metallic head and dark tan wing covers. There will be two white rear tufts and five white lateral tufts of hairs. The adults emerge in July and defoliate trees by chewing leaf tissue between the veins. This skeletonizing of the foliage gives a lacy appearance to the tree. The larvae feed in the soil on grass roots. | Treat adult beetles with acephate, azadirachtin, carbaryl, or permethrin when first observed.<br><br>Acephate, dinotefuran, or imidacloprid may be used but are ineffective on roses when the beetles are feeding on the petals and may kill bees and other pollinators foraging the flowers. |
| **Lecanium scale** - *Parthenolecanium*, a soft scale | Most broadleaf trees including ash, elm, and maples.<br><br>Occurs statewide. | The scale appears as a hardened 1/4-inch diameter, reddish-brown shell that is tightly attached to the bark. Leaves may become sticky and discolored from honeydew excreted by the insects as they feed. | The crawlers become active in late spring (when lindens are in bloom). Treat with insecticidal soap at that time. Insecticidal soap does not injure the scale's natural enemies.<br><br>Imidacloprid can be used as a soil drench in the fall to control the insects the following year. |
| **Maple bladder gall mite** – *Vasates quadripedes*, a mite | Most common on Freeman and silver maples.<br><br>Occurs statewide. | Mites move from bark scales to unfolding leaves in early spring. The feeding on the underside of the leaves results in galls on the upper side that begin as green bumps that become red and black with time. They cause little harm to the tree. | Most treatments are ineffective as timing is difficult to achieve. Some insecticides can make the problem even worse. |
| **Oystershell scale** – *Lepidosaphes ulmi*, an armored scale | Ash, maple, lilac, and cotoneaster are common hosts.<br><br>Occurs statewide. | Scales overwinter as eggs beneath the shell of the adult scale. The eggs hatch in the spring and the crawlers move onto the branches and twigs to begin feeding.<br><br>The adults are immobile and about 1/8-inch diameter. They resemble small oysters or mussel shells. | Apply horticultural oil when the crawlers begin to move, about the time lilac flowers begin to fade (late May).<br><br>Pyriproxyfen, an insect growth regulator, can be sprayed at this time.<br><br>Dinotefuran can be applied as a soil treatment earlier in the spring. |

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| **Pear slug** (sawfly) - *Caliroa cerasi* | Plum, cherry, cotoneaster, and mountain-ash.<br><br>Occurs statewide. | Slug-like larvae can be found feeding on the upper leaf surface between the veins. | Treat leaves with azadirachtin or carbaryl when damage and larvae are first noticed, about the end of June. |



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