Deciduous Tree Insect, Mite, Disease and Disorder Recommendation - 2014

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Any treatment recommendations, including those identifying specific active ingredients, are for the convenience of the reader. The active ingredients mentioned in this publication are generally those that are most commonly available in pesticides used in South Dakota for Turf & Ornamentals 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 and the label is the final authority for a product's use on a particular pest or plant. Not all active ingredients listed are in forms available to the general public and some may require a commercial pesticide license. It is the reader's responsibility to determine if they can legally apply any product identified in this publication. **Active ingredients in bold are the most commonly available in garden centers and may be used by the general public. See the publication *Commonly Available Garden Center Pesticide – 2014.*** Others are limited to commercial use.

BROADLEAF DISEASES AND DISORDERS

NAME	SPECIES	SYMPTOMS	CONTROL
Apple scab -*Venturia inaequalis,* a fungus	Apple and crabapple. Occurs throughout the state.	Dull, brown irregular spots on leaves, which change to olive-green velvety spots. Symptoms may also occur on petals and fruit.	Planting resistant cultivars is the best means of management. Treat with an application of **propriconazole, myclobutanil, chlorothalonil** or **captan** every 7 to 10 days beginning as the flower buds swell and continuing until three weeks after the petals fall or dry weather prevails. If using a myclobutanil fungicide, alternate with captan to delay occurrence of resistant variants of apple scab. **Note: these general recommendations apply to crabapples that will not be used for fruit production.**
Ash anthracnose -*Discula umbringla*, formerly *Gloeosporium aridum*, a fungus. Elm, maple, and oak anthracnose diseases are caused by related species.	Primarily green ash. Generally occurs East River.	Large, irregular, tan to brown lesions form on leaves, especially along the leaf margins, leaf may become distorted. Fungus can survive winter in branch cankers and fallen leaves.	Generally no treatment is required but **myclobutanil** or **chlorothalonil** can be used with the first treatment at bud swell and two more treatments spaced 10 days apart.

Ash rust - *Puccinia sparganioides*, a fungus	Black, green and white ash. Generally occurs in the eastern SD.	Begins as bright orange spots on petioles and undersurface of leaves. These enlarge with the leaves browning and falling by early summer.	No fungicides for homeowner use are commonly available.
Ash yellows -a phytoplasma	Green ash is intermediate, black ash is the least susceptible, white the most.	Witches' broom form on the trunk and major limbs. Leaves on broom tend to be small, simple and chlorotic. Reduced growth may be the only symptoms on green or black ash. White ash infected with ash yellows may experience dieback.	Maintain proper soil fertility and moisture. Vector *may* be a leafhopper. Oxytetracycline is labeled for control but rarely applied particularly with the looming threat of emerald ash borer.
Black knot - *Apdiosporina morbosum* - a fungus	Plums and cherries. Occurs throughout the state.	First year symptoms include faint light green swellings on twigs. By the following spring these have enlarged and turned a large velvety black mass.	Remove all knots by April 1 and burn them. However, this will only remove the 2nd year "knot", the 1st year infection merely appears as a slight swelling and is easily missed. Since trees with "knots" will continue to produce them, it is generally best to remove the tree.
Black spot of elm - *Stegophora ulmea*, formerly *Gnomonia*, a fungus	American and Siberian elm. Generally occurs in the eastern half of the state.	Yellow spots begin forming as the leaves expand in the spring. A black dot forms in the center. Heavily infected leaves may fall prematurely.	No control necessary as the tree can withstand the defoliation; however, **chlorothalonil** may be used at leaf flush and repeated 10 days later.

Cedar-apple rust -*Gymnosporangium juniperi-virginianae*, a fungus	Apple and crabapple, a closely related disease infects hawthorns. Occurs throughout the state.	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 fall by late summer. Most infections occur within 300 feet of junipers – the alternate host. The most common alternate hosts are the eastern redcedar and Rocky Mountain juniper.	**Myclobutanil** can be applied as the leaves unfold and repeat three more times at 7 to 10 day intervals.
Fire blight - *Erwinia amylovora*, a bacteria	Primarily apple, crabapple, and pear. Cotoneaster also very susceptible. Occurs throughout the state.	Leaves quickly wilt and turn black but remain attached to infected twigs. Affected branches appear water-soaked, then shrivel and turn brownish to black.	Infected wood should be pruned at least 12 inches below visible symptoms, treat pruning tools with Lysol disinfectant between cuts. **Copper** fungicides can be used beginning treatments as flowers fade and repeating once a week for five weeks (note: copper can injury plums and other fruit trees if applied after bud break)
Dutch elm disease (DED) -*Ophistoma novo-ulmi*, a fungus	American elm, red (slippery) elm, and Scots elm are the most susceptible. Siberian elm can become infected. Occurs throughout the state.	Leaves wilt, turn yellow and then brown. Affected leaves may remain on branches for some time. Should not be confused with black spot, a leaf disease. Always check for DED by checking a suspected twig for the characteristic discoloration in the inner bark.	Thiabenadazole and propiconazole as root flare injections can be performed on American elms during the summer. The treatment is best applied as a preventative measure. And will only protect trees from beetle vectored infection not those spread via root graft. Infected trees should be promptly removed and a trench cut between the infected trees and nearby (within 40 to 50 feet) healthy elms to prevent the spread of the disease.

Oak wilt – *Ceratocystis fagacearum*, a fungus	Affects all oaks but often fatal to members of the red oak group such as northern red oak and pin oak. Members of the white oak group, bur and swamp white oak may survive with the disease.	Wilt is often first noted near the top of the tree with the leaves turning a dull green or bronze, usually beginning along the margins. Leaves may also droop and usually begin to fall by mid-summer. Red oak group member may die within six weeks of the first symptoms, while members of the white oak group may have the symptoms limited to only a portion of the canopy. Bur oaks, particularly those on modified sites, such as native stands now in mowed areas, are susceptible to the disease and may die after becoming infected.	The most effective control is to avoid stressing oaks. Removal of dead or dying oaks is an important means of managing the disease. The disease is spread via root grafts so infected trees should be promptly removed and a trench cut between the infected trees and nearby (within 40 to 50 feet) healthy oaks to prevent the spread of the disease.
Septoria leaf spot – *Septoria musiva*, a fungus	Cottonwood, common in shelterbelts	Brown, circular leaf spots with brown margin, white or silvery spots may also occur. Infected trees often defoliate by August.	Control generally not recommended.
Tar spot - *Rhytisma.* - a fungus	Maples, particularly silver maple. Occurs primarily East River.	After leaves attain full size, yellowish spots appear. These spots become raised, black, and tarlike by midseason.	Treatment not recommended. However, **copper** fungicides applied at bud-break and repeated two more times three weeks apart may reduce infection.
Verticillium wilt - *Verticillium dahliae*, a fungus	Ash, catalpa, elm, maple, Russian-olive among others. Occurs throughout the state.	Decline in twig and leaf growth. Dieback in individual twigs and branches. Foliage becomes light green to chlorotic and then may scorch by midsummer. A discoloration of the inner bark may occur (except on ash where no color change occurs).	Maintain soil fertility and moisture. Prune out infected branches but this will not eliminate the infection only dead tissue.
Wetwood - a diverse group of bacteria that includes *Methanobacter*, *Enterobacter* and *Klebisiella*	Elms and cottonwood. Occurs throughout the state.	Light streaks running down the bark, generally originating with pruning wounds. Infected trees will emit a fetid odor and liquid when cut.	Wetwood does little injury to the tree; in fact, the alkaline condition retards the development of decay. Inserting a pipe to drain the liquid causes more injury.

Winter injury	All deciduous trees.	Twig or branch dieback usually to a defined line. The buds may fail to expand with growth delayed until after new buds form.	Remove dead and dying branches as soon as possible. Reduce winter injury by maintaining plant health with watering in late summer/early fall.

BROADLEAF INSECTS AND MITES

NAME	SPECIES	SYMPTOMS	CONTROL
Ash (lilac) borer -*Podosesia syringae*	Ash, lilac and privet. Occurs throughout the state.	Early symptoms are yellowing foliage, wilting of terminal twigs and branch dieback. Infestation sites are marked by cracked or loose bark particularly near the base of the trunk.	A single treatment of **permethrin** applied 10 days after the first sustained male catch in traps or approximately a week after Vanhouttee spireas begin to bloom (early to mid-May)
Ash flower gall mite - *Eriophye fraxiniflora,* a mite	Male green ash. Occurs throughout the state.	Male flowers clusters become branched and turn black as they dry.	No control is necessary as they do not harm the tree, however, **carbaryl** applied just *before* the flowers open may provide some limited control.
Ash plant bug -*Tropidosteptes anmoenus*	Primarily green ash, other ashes are susceptible. Occurs throughout the state.	Light to moderate feeding causes yellow stippling and spotting of brown leaves. Excessive feeding may curl leaves.	Treat with **acephate** or **carbaryl** when leaves are expanding or **imidacloprid** applied as a soil drench in the fall for control the following year.
Bronze birch borer - *Agrilus anxius*	Paper and European white birch. Occurs in the Black Hills and East River. Bronze birch borer does not attack river birch.	Dieback beginning generally at the top of the tree. Dying branches may have bumps and D-shaped holes. Trees that have more than 25% crown dieback are generally beyond treating.	Treat trees with **permethrin** when buckeyes begin to bloom (early June), repeat three weeks later. **Imidacloprid** can also be used as a soil drench in the fall for control the following year.

Cankerworms -Spring, *Paleacrita vernata* and Fall, *Alsophila pometaria*	Preferred hosts include apple, crabapple and elm. Occurs throughout the state.	Larvae feed during the spring (for spring and fall cankerworm) on the softer tissue of the leaves, leaving the main veins. They often appear just as the leaves are opening	Use sticky bands in April-May (Spring cankerworm) and October (Fall cankerworm). Treat with **carbaryl**, or **permethrin** when leaves are fully expanded and the larvae are beginning to feed.
Cottony maple scale - *Pulvinaria innumerabilis,* a soft scale	Maples, hackberries, lindens and elms. Occurs throughout the state.	The scale overwinters as immature females on twig. Eggs are laid in the spring beneath 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: **do not use oils or soaps on maples,** it may result in twig and branch dieback). Treat with dinotefuron or insecticidal soap when little-leaf linden is in full bloom (mid-June) and 10 days later.
Cottonwood borer - *Plectrodera scalator*	Cottonwood and poplars. Occurs throughout the state.	Mature larvae are cream-colored and about 1.5 inches long. They are found in the sapwood near the base of the tree and in the roots during summer. Young infested cottonwoods often snap off near the base.	Treat trunk with **permethrin** in the mid-May as the adult borers are emerging.
Cottonwood leaf beetle - *Chrysomela scripta*	Cottonwood. Occurs throughout the state.	The mature larvae (blackish with two white spots) skeletonize the leaves and may be found along with the adults during the summer.	Treat with **carbaryl** when high populations of larvae are detected.
Cottonwood petiole gall aphids - *Pemphigu*s	Cottonwood. 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** as leaves begin to expand, however control is generally not necessary.

Eastern tent caterpillar - *Malacosoma americanum*, Forest tent caterpillar – *Malacosoma disstria* and Western (Prairie) tent caterpillar – *Malacosoma californicum*	Chokecherry, ash and many other hardwoods. Eastern and Forest tent caterpillars occur primarily East River while Western tent caterpillar is found East and West River.	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 form nests at the crotches of branches in early summer but the forest tent caterpillar nests are very open.	When nests first appear treat with sponosad, **bifenthrin**, **carbaryl, malathion** or **permthrin.**
Elm leaf beetle -*Xanthogaleruca luteola*	Primarily Siberian elm but American elm is also susceptible. Occurs throughout the state.	Feeding results in perforations of the leaf surface, leaving an extensive lacy network of veins not consumed by beetles.	Treat with azadirachtin, **acephate**, **carbary, gamma-cyhalothrin** or **permethrin** when the leaves are fully expanded. This first generation causes most of the damage. **Imidacloprid** as a soil drench may provide two seasons of control but must be applied at least 60 days *before* feeding begins.
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 mountainash or ash-leaf maple (Boxelder). Emerald ash borer is found in most eastern states and Colorado. Closest infestations are in Minnesota and Iowa.	The symptoms of an infestation are 1) a general decline and thinning of the canopy, 2) extensive woodpecker damage on the trunk, 3) excessive watersprouts and suckers on the tree and 4) vertical splits on the bark.	The insect is not yet found in South Dakota. Treatment is not recommended until the insect has been detected within 15 miles of your tree or the adjacent county, whichever is closer.

Fall webworm - *Hyphantria cunea*	Elms, chokecherry and most other hardwoods.	Pale yellow larvae form nests at the tips of branches in mid to late summer.	When nests first appear spray foliage with **acephate**, **bifenthrin** or **cabaryl**.
Hackberry nipplegall - *Pachypsylla celtidismamma*	Hackberry. Occurs throughout the state.	The leaves develop light green nipple-shaped galls on the underside of leaves. The small biting flies that occur in late September are the adults. These are small enough to pass through screens so will often enter homes as the weather cools.	No control is necessary as the galls do not harm the trees. However, **carbary** as a spray when the leaves just formed or **imidacloprid** as a soil drench in the spring may reduce the damage. Treatments will not affect the population of adults out in the fall.
Honeylocust pod gall midge - *Dasineura gleditschiae*	Honeylocust. Occurs throughout the state.	Injured leaflets form a pod around the midge larvae. These pods eventually turn brown and fall. Look for clusters of red eggs on the newly expanded leaves (can be seen with a 10x len).	Treat new foliage with **carbaryl**, thiamethoxam or fenoxycarb as soon as it begins to expand. Repeat treatment every 10 to 14 days till early summer. Can also use horticultural oil to kill the first generation.
Lecanium scale - *Parthenolecanium*,a soft scale	Most hardwoods including ash, elm and maples. Also junipers. Occurs throughout the state.	The scale appears as a hardened brown shell that is tightly attached to the bark. Leaves may become sticky and discolored with heavy feeding.	The crawlers become active in late spring (when lindens are in bloom). Treat with **insecticidal soap** at that time. Insecticidal soap is the best means of control, as it does not injure the scale's natural enemies. Imidaclorid as a soil or trunk injection provides good control if applied in autumn.

Maple bladder gall mite – *Vasates quadripedes*, a mite	Primarily silver maple but can also occur on sugar, found 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 upperside that begin as green bumps that become red and black with time. They cause little harm to the tree.	Most controls are ineffective as timing is difficult and some treatments can make the problem even worse.
Oystershell scale – *Lepidosaphes ulmi*, an armored scale	Ash, maple, lilac, and cotoneaster are common hosts. Found throughout the state.	Scales overwinter as eggs. The eggs hatch in the spring and the crawlers move onto the branches and twigs to begin feeding.	Apply **horticultural oil** when the crawlers begin to move, about the time lilac flowers begin to fade (late May). **Dinotefuron** can be applied as a soil treatment earlier in the spring.
Pear slug (sawfly) - *Caliroa cerasi*	Plum, cherry, cotoneaster and mountain-ash. Occurs throughout the state.	Slug-like larvae can be found feeding on the upper leaf surface between the veins.	Treat leaves with **carbaryl** when damage is first noticed, about the end of June.
Two-lined chestnut borer - *Agrilus bilineatus*	Bur oak throughout the state.	Dieback beginning generally at the top of the tree. Dead branches and trunks may have D-shaped holes. Trees that have more than 25% crown dieback are beyond treatment and should be removed.	Treat trees with **permethrin** in mid-May, repeat three weeks later. **Imidacloprid** can also be applied as a soil drench in the fall for control the following summer.
Rabbit and deer damage.	All plants, but members of the rose family are very susceptible.	Twig and branches eaten or girdled. If more than 2/3s of the stem is girdled the plant is not likely to survive.	The most effective deer repellants contain putrescent egg solids but may not work if the deer population is high. Egg solids or blood meal products are often used as rabbit repellants with some success.