Tree Insect, Mite, Disease and Disorder Recommendation - 2009

Dr. John Ball, Forest Health Specialist, Extension Forestry, South Dakota State University, e-mail john.ball@sdstate.edu

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 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 - 2009***

CONIFER DISEASES AND DISORDERS

NAME	SPECIES	SYMPTOMS	CONTROL
Cedar-apple rust - *Gymnosporang-ium juniperi-virginianae*, cedar-hawthorn rust – *G. globsum.* a fungus	Primarily eastern redcedar, and Rocky Mountain juniper. Some creeping juniper cultivars are also affected. Occurs throughout the state.	The reddish-brown galls form on twigs over two years. The mature galls produce orange-gelatinous tendrils (horn) during moist spring weather. Infested cedar stems may become swollen and the branch dies above the infected point. The galls from cedar-apple rust persist for one season while those from cedar-hawthorn rust may last for many years.	Treatments rarely applied, since the disease usually does little harm to its juniper host, however, azoxystrobin or **mancozeb** can be applied every 7 to 14 days from early July to late August to reduce gall formation on the junipers. However, it can take two-years for galls to form so control one year may still result in galls forming the following season.
Cytospora canker – *Leucostoma kunzei*, a fungus	Primarily blue spruce. Black Hills spruce may also be infected. Occurs throughout the	The needles on the infected lower branches turn brown in the spring. These branches generally have spots or streaks of bluish white resin (black fruiting bodies may be found beneath the resin patches)	Prune out all infected branches before the spring rains or in the summer. Disinfect pruning tools (Lysol) between

	state and is more common during and following droughts.	though the disease often begins as only a few blobs of reddish resin forming in an small canker. The disease is generally limited to branches and is most common in trees more than 15 years old.	cuts. Maintain health by mulch and irrigation.
Diplodia tip blight – *Diplodia pinea (Sphaeropsis pinea),* a fungus	Primarily Austrian pine, but also found on ponderosa, Scots, and mugo pine. Occurs throughout the state.	Symptoms occur in late spring with new shoots becoming brown and stunted and the new needles have similar symptoms. In the fall, small black fruiting bodies may be found at the needle base beneath the papery sheaths and on cone scales. Trees may be infected without showing symptoms until they are stressed by drought, hail or other stressors.	Thiophanate – methyl, propiconazole, **copper** or **chlorothalonil** applied just *as the buds are opening* (usually early May) and repeat just before the needles completely emerge and again 10 days later.
Dothistroma needle blight – *Dothistroma septospora* (*Mycosphaerella pini*) a fungus	Austrian and ponderosa pine are the most common species affected by this disease.	Symptoms occur in late summer or fall and are first seen on the lower crown and older needles. Needles have yellow and tan spots that become red to brown bands with yellow halos. The base of needle remains green though small black fruiting bodies may be seen in the spring erupting through the needle.	**Copper** fungicides or **mancozeb** applied as the new growth expands (mid-May) and repeated in late June. Ponderosa and Austrian pines should also receive a third application in mid-July.
Elytroderma needle cast – *Elytroderma deformans*, a fungus	Ponderosa and lodgepole pine. Occurs in the Black Hills – common along Skyline Drive in Rapid City.	Symptoms occur in the spring when groups of year-old needles turn reddish-brown except for the base. Needles usually drop by October. Often confused with Diplodia but can be separated by the brown lesions that often occur in the inner bark of twigs infected with elytroderma. The formation of witches' brooms are only a common occurrence.	No effective chemical control. Remove heavily infested trees.
Juniper blight -	Phomopsis and	Cercospora blight symptoms	**Copper** or

caused by one of three fungi: *Phomopsis juniper-ovora, Cercospora sequoiae* var. *juniperi* or *Kabatina juniperi.*	kabatina are found on eastern redcedar and Rocky Mountain juniper as well as the Chinese and creeping junipers. Cercospora is generally found on eastern redcedar and Rocky Mountain juniper.	occur in late summer with the oldest needles on the lower, inside branches turning bronze or red and the symptoms are limited to the needles. Phomopsis and Kabatina blight affects shoot tips and these turn yellowish-brown to red, eventually becoming brown. Kabatina symptoms occur on new growth in April and May with the brown tissue dropping by June. Phomopsis symptoms occur during the growing season from May to September.	**mancozeb** applied three times - mid June, early July and mid July for Cercospora. Phomopsis can be treated with **copper**, **mancozeb** or thiophanate-methyl at 14-day intervals beginning in mid May and continuing until growth ceases or dry weather begins. No effective control for Kabatina as it enters through wounds, typically those caused by insects, and occurs in the autumn.
Lirula needle cast – *Lirula macrospora*, a fungus	Black Hills spruce is the most susceptible. Rarely found in state.	A common symptom is black bands on 2nd or 3rf year interior needles that late turn purplish-brown and this extends over the entire needle by fall. Despite the name, needecast, the infected gray needles may remain attached for several years due to the fungus disrupting the abscission zone.	A treatment of **chlorothalonil** in mid-May followed by a second in two weeks.
Pine wilt – *Bursaphelenchus xylophilus,* a nematode	Scotch and Austrian pines. Found mostly south of US Hwy 14 and primarily in the southwestern part of the state.	Symptoms begin in midsummer with foliage yellowing then browning. Infected trees generally die later that same fall with the gray needles hanging from the branches. The wood in the dead, infected trees will be often be blue-stained. Typically infects trees more than 15 years old.	Sawyer beetles carry the nematode to host trees hence remove and burn infested trees before the beetles emerge, usually early May. Infected trees must be cut level to the ground as even a slight

			stump may harbor the nematode. High value trees can be injected with abamectin.
Rhizosphaera needle cast – *Rhizosphaera kalkhoffii*, a fungus	Primarily Colorado blue spruce. Most common East River.	Symptoms occur in midsummer with the previous season needles turning yellow then purplish-brown by late winter. Small black fruiting bodies emerge from the needle stomates in the spring.	**Chlorothalonil**, with the first application when new growth is ½ inch long and the second about three weeks later.
SNEED, (Sudden Needle Drop) *Setomelanomma holmiii*, a fungus	Primarily Colorado blue spruce, may be found across the state.	The 2nd year needles turn a brown to purple-brown and drop prematurely. One branch may be affected or all the branches. Small dark fruiting bodies can be found on the affected twigs.	**Chlorothalonil** applications when new growth begins to expand in spring and repeated two weeks later. This disease may only be a secondary stressor, present on trees already declining from other stresses.
Sirococcus shoot blight, *Sirococcus strobilinus*, a fungus	Primarily Colorado blue spruce, may be found across the state.	The young shoots are killed, the needles are shed and the tip of the bare shoot droops to form a curve.	**Chlorothalonil** applications when new needles are ½ to 1-inch long (late May) and repeat 3 to 4 weeks later.

Stigmina needlecast, *Stigmina lautii,* a fungus	Primarily Colorado blue spruce, may be found across the state.	Symptoms are similar to Rhizosphaera needlecast, purpling and loss of older needles, usually beginning with the lower branches. Small dark fruiting bodies can be found on the needles.	Little is known regarding this disease at this time so no control recommendations are available.
Western gall rust – *Endocronartium harknessii,* a fungus	Primarily ponderosa pine, Scots and mugo pine can be infected. Primarily in the Black Hills, but found across the state.	A round gall on the branches of the tree. The woody gall will produce masses of orange spores each spring.	Resistance varies from tree to tree. The galls may be pruned from small, infested trees but once a tree is infected, repeated infections are very likely.
Weir's cushion rust – *Chrysomyxa weiri,* a fungus	Occurs on both Black Hills and Colorado blue spruce. The disease is more common in the Black Hills but now can be found throughout the state.	Needles on the current year's shoot develop yellow bands by late summer. The following year the infected needles have gold and yellow banding. Tiny yellow blisters also are found on the needles.	**Chlorothalonil** applied at bud-break and repeaed two more times about 10 days apart.
Winterburn (browning)	All evergreens but arborvitaes, firs and yews are most susceptible.	Needles turning brown or reddish brown. This is desiccation due to the needles transpiring during mild, windy winter conditions when water uptake is limited by cold or frozen stems or soils.	Plant susceptible plants such as yews in areas where they will not be exposed to winter sun or wind. Make sure that evergreens do not undergo moisture stress in late summer/early fall.

Winter kill	All evergreens.	Needles turning brown or reddish brown. The inner bark of twigs and branches may also have brownish streaks. This is due to an unusual drop in temperature as the plant is entering or leaving dormancy.	

CONIFER INSECTS AND MITES

NAME	SPECIES	SYMPTOMS	CONTROL
Cedar bark beetle - *Phloeosinus spp.*	Primarily junipers but some species may be found infesting arborvitae.	Foliage on individual twigs wilts, dies, and breaks off, occasionally may affect entire tree. Small holes found in the trunk with galleries beneath. Larvae are white and legless, galleries similar to elm bark beetles.	Remove and burn infested branches and trees. Treat trees with **carbaryl** or **permethrin** by mid June. Treat the trunk and all branches larger than 1-inch.
Pine bark beetles – pine engraver beetle *Ips pini* and mountain pine beetle *Dendroctonus*	Primarily ponderosa pine, also Scots. Both insects occur in the Black Hills and	Needles on infested trees turn reddish-brown, boring dust may be found at base of tree. Pitch tubes (small masses of pitch) can be found along the lower trunk for mountain pine beetle attacks. Trees usually die within	Treat tree susceptible to pine engraver beetle attack, typically injured or recently transplanted trees with **carbaryl** or

ponderosae	native pines in West River.	a year.	**permethrin** in mid-April about the time apple leaf buds are opening for the pine engraver beetles. Treat trees vulnerable to mountain pine beetle attack with the same chemicals but by early July. Note: once a tree has been attacked, it is too late for effective control.
Pine needle scale – *Chionapsis pinifoliae*, an armored scale	All pines and spruce.	Look for white-flecks or brownish foliage. Heavy infestations give the needles a pale "snowy" look. Crawlers are very small (need 10x lens) and are reddish-brown.	Treat with 2% **horticultural oil** or **insecticidal soap** as these do little harm to the natural enemies of scales. The other possibility is dinotefuran. All applications should be made beginning in late May (about one week after Tartarian honeysuckle blooms) and another application when Hill-of-snow hydrangea blooms (mid-July).
Pine sawfly - *Neodiprion spp.*	Ponderosa, Scots and Austrian pine.	Tufts of dry, straw-like needles or only stubs of needles. Larvae found in clusters on the previous season's foliage.	**Acephate**, **carbary**l or **insecticidal soap** when larvae seen, usually late April.

Pine tip moth - *Rhyacionia spp.*	Ponderosa, Austrian or Scotch pine. Generally occurs only in southeastern South Dakota.	Symptoms are dead and dying new shoots with expanded needles. Brown to orange larvae (3/8") found in pitch masses near the tips of shoots during the summer.	Treat with **acephate**, **cyhalothrin, imidacloprid** or **permethrin**, spinosad, or tebufenozide just as needles begin to expand in May. Several generations per year so additional treatments may be needed in late June and July.
Pine tortoise scale – *Toumeyella parvicornus*, a soft scale	All pines but most common on mugo pines.	Look for sooty mold, a black powdery substance, on needles and twigs. At the base of the needles there will be small reddish-brown global insect.	**Imidacloprid** as a soil drench in mid September or **acephate** or **malathion** applied in late June when mockorange are in bloom, and repeated 10 days later to kills the hatched crawlers.
Spruce bud scale – *Physokermes piceae*, a soft scale	All spruce. Occurs throughout the state.	Small reddish-brown globular scales found in clusters at the base of twigs. They resemble buds so are often overlooked. Often associated with dying lower branches.	Treat trees when lindens begin to bloom (mid-June) with **acephate**, **carbaryl** or dinotefuran. **Imidacloprid** can be used as a soil drench in early fall for control the following season.

Spruce needleminer – *Endothenia albolineana*	All spruce, but most common on Colorado blue spruce. Occurs generally East River.	Small clusters of discolored needles webbed tightly together and flattened against the branch. Needles are hollowed-out with small hole near the base. Symptoms usually begin on the lower 1/3 of the tree.	Treat trees with **acephate**, **carbaryl** or **permethrin** in early April and early July. Can use high-pressure water to knock the nest off in early spring then rake and burn debris.
Spruce spider mite - *Oligonychus ununguis*	Primarily spruce, but also a problem on junipers.	Yellowish to rusty-brown needles are a common symptom of an infestation and usually do not appear until mid-summer after the mite has become inactive. Silken webs may also be seen lacing across needles. Mites may be detected early in the season by shaking a branch over a white sheet of paper; the tiny slow-moving black or gray-green spots are most likely spruce spider mites. Spruce spider mite is a cool season mite so it starts becoming active when silver maple leaves are expanding. Another period of activity is when the maples begin their fall color change.	Treat with spiromesifen, two applications 6 to 10 days apart. 2% **horticultural oil** also shows promise (**but will remove the blue coloration on spruce**). Insecticidal soaps may be used but have limited effectiveness against this mite as it rarely penetrates the web and this can also be a problem with oils. **Acephate** can be used, at the same schedule as above, but is not as effective as oil.
Zimmerman pine moth – *Dioryctria spp.*	Austrian, ponderosa and Scots pine. *D. ponderosae* found mostly West River while *D. zimmermani* is found only East River. *D.*	Infested branches bend or break at the trunk. Masses of reddish pitch near where branch attaches to the trunk. Larvae creamy white for *D. ponderosae*, *D. zimmermani* larvae are greenish-brown while *D. tumicolella* is brownish. Larvae overwinter only for *D. ponderosae*.	Drench trunk and branches with **bifenthrin** or **permethrin**. *D.tumicolella* and *D. zimmermani* should be treated during the middle of August and the end of April.

	tumicolella may be found statewide but mostly West River.		Treatment for *D. ponderosae* is first week in June and repeat four weeks later.

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. **Note: these general recommendations apply to crabapples that will not be used for fruit production (fruit that will be eaten).**
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 **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 East River.	Begins as bright orange spots on petioles and undersurface of leaves. These enlarge with the leaves browning and falling by early summer.	**Myclobutanil** applied as the leaves begin to open with at least three applications spaced 10 days apart but control is rarely necessary.
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.
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. Limit pruning to late winter. Treat branches with lime sulfur *before* bud-break and then use **captan** at weekly intervals till the end of May.
Black spot of elm - *Stegophora ulmea*, formerly *Gnomonia*, a fungus	American and Siberian elm. Generally occurs East River.	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.	**Chlorothalonil** or **mancozeb** can be applied as the leaves unfold and three more times at 7 to 10 day intervals until three weeks after petal fall or dry weather prevails. Triadimefon applied as the leaves unfold and repeated three weeks later will also provide control. **Note: these general recommendations apply to crabapples that will not be used for fruit production. Readers looking for fruit tree recommendation should contact their local extension educator.**
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 between cuts. **Bordeaux** or **Copper** fungicides have limited effectiveness but 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	American	Leaves wilt, turn yellow	Thiabendazole or

(DED) -*Ophistoma ulmi*, a fungus	elm, red (slippery) elm, and Scots elm are the most susceptible. Siberian elm can become infected. Occurs throughout the state.	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.	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 oaks 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 spp.* - 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.
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** or **bifenthrin** applied 10 days after the first sustained male catch in traps or approximately a week after Vanhouttee spireas begin to bloom (early 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 will provide some 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 i**midacloprid** 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** or **bifenthrin** when buckeyes begin to bloom (early June), repeat three weeks later. **Imidacloprid** can also be soil drench in the fall.
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 **acephate**, ***Bacillus thuringiensis-kurstaki,*** cyhalothrin**,** **permethrin** or cyfluthrin 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 again 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 sp.)	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 acephate, ***Bacillus thuringiensis-kurstaki*,** sponosad, **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 **acepahte**, azadirachtin, **carbaryl** 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.
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, ***Bacillus thuringiensis-kurstaki***, **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.	No control is necessary; however, **acephate** or thiamethexan can be sprayed when the leaves have half-expanded. However, control has only a minimal effect on gall production and the galls are not harmful.

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 spp.* ,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 **acephate** or **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 fall.
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 a **horticultural oil** or dinotefuron when the crawlers begin to move, about the time lilac flowers begin to fade (late May). **Acephate** may also be used but will kill beneficial insects as well.
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** *or* **bifenthrin** 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.