U S D A FOREST SERVICE
RESEARCH NOTE RM-311

FOREST SERVICE
U.S. DEPARTMENT OF AGRICULTURE

CKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION

INSECTS: A Guide to Their Collection, Identification, Preservation, and Shipment

John D. Stein[1]

Homeowners can send insects to their State extension entomologist for identification. The basic requirements for proper collection, preservation, and shipment of insects are summarized briefly here. A reference table lists 184 typical or prevalent insects associated with 52 tree and shrub hosts found in North and South Dakota.

Keywords: Insect collection, insect identification.

Introduction

Current urban forestry programs emphasize protection and management of planted trees. A survival survey in the Plains area indicated that 39 percent of all trees encountered were dead (Dahl 1940), with the majority mortality factor attributed to insects. Thus it is desirable to identify the insects responsible for damage, determine their biology, establish whether the insect is a new pest or a new outbreak of an old pest, and recommend control measures, if appropriate. A common question from property owners is, "How do we get this information?"

This Note was compiled to inform the public about who to contact for insect identification, and how to adequately collect, preserve, and ship specimens to the insect specialist.

Collection and Identification

Ideally, insect collections shipped for species determination should include 5 to 20 specimens, and represent all the different stages of the insect pest. Samples should be carefully preserved, and information concerning the date, location, host material, feeding habits, and extent of the infestation should be attached to each sample. Your State extension entomologist will identify insects, and provide current recommendations for control. Your local county agent can provide the name and address of the extension entomologist for your State.

Tree and shrub hosts of the 184 insects listed in table 1 are based upon research findings at the Shelterbelt Laboratory in Bottineau, North Dakota. The table lists the more typical representatives of certain insect groups or the more prevalent insects that attack a particular tree species.

Additional information on identification, biology, host, and distribution of those insects listed in the table is available in other publications (Baker 1972, Stein and Kennedy 1972).

Preservation and Shipment

Flies, wasps, plant bugs, and **beetles** can be killed in either 70 percent alcohol or a chloroform bottle. Those killed in alcohol are preserved, and can be shipped in the same material; those killed with chloroform should be transferred to alcohol or placed between layers of cleansing tissues in a pill box or a cigar-type box for shipment. **Adult moths** and **butterflies** may be killed by either method, but should be shipped between layers of cleansing tissues, not in alcohol. **Soft-bodied specimens** and **immature stages of any insect** should be killed by dropping them in boiling water for 1 or 2 minutes,

[1]*Associate Entomologist, located at the Station's Shelterbelt Laboratory at Bottineau, in cooperation with North Dakota State University—Bottineau Branch; Station's central headquarters maintained at Fort Collins, in cooperation with Colorado State University.*

and then transferred to vials that contain 70 percent alcohol for shipment. The boiling water prevents immatures from turning black.

Vials containing liquids must be wrapped separately in mailing tubes with adequate packing so they cannot move around. Dried insect material to be shipped in pill boxes or cigar-type boxes should be packed inside a second container with at least 2 inches of excelsior on all sides to hold the box in place. Invariably, **insects sent in ordinary envelopes are crushed and worthless.**

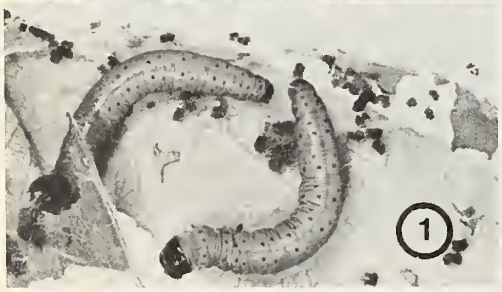
Before shipment you should again check to make sure that labels with the complete collection information are attached to the proper specimens.

Literature Cited

Baker, Whiteford L.
1972. Eastern forest insects. U.S. Dep. Agric., Misc. Publ. 1175, 642 p. Gov. Print. Off., Wash., D.C.

Dahl, Jerome.
1940. Progress and development of the Prairie States Forestry Project. J. For. 38:301-306.

Stein, John D., and Patrick C. Kennedy.
1972. Key to shelterbelt insects in the northern Great Plains. USDA For. Serv. Res. Pap. RM-85, 153 p. Rocky Mt. For. and Range Exp. Stn., Fort Collins, Colo. 80521.



1 *Archips cerasivoranus*
(uglynest caterpillar)
Top: webbed foliage
Bottom: larvae

2 *Clastoptera proteus*
(dogwood spittlebug)

3 *Diprion similis*
(introduced pine sawfly)

4 *Disonycha alternata*
(a chrysomelid leaf beetle)

5 *Eriosoma americanum*
(woolly elm aphid)

6 *Mordwilkoja vagabunda*
(poplar vagabond aphid)

7 *Neoborus amoenus*
(ash plant bug)

8 *Pachypsylla celtidismamma*
(hackberry nipplegall maker)

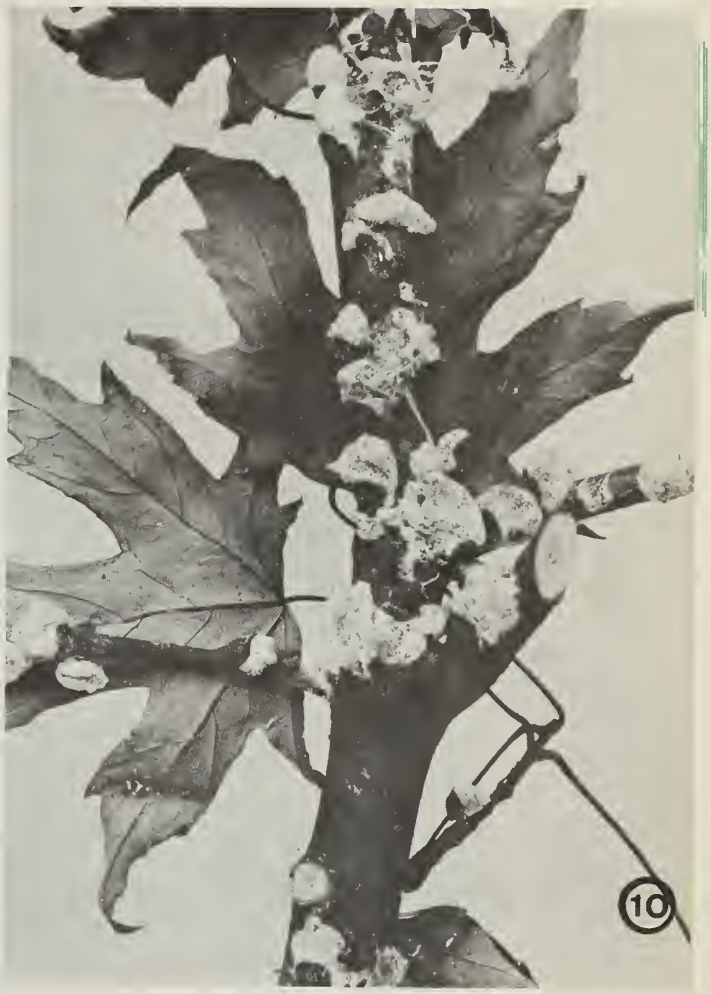
9 *Pemphigus populicaulis*
(poplar leaf-petiolegall aphid)

10 *Pulvinaria innumerabilis*
(cottony maple scale)

11 *Vasates quadripedes*
(maple bladdergall mite)


6


7


10


8


9


11

Table 1.--Common insects found on trees and shrubs in North and South Dakota

Tree species	Insect species		
	Leaf feeders	Borers	Sucking insects
AMERICAN ELM *Ulmus americana*	*Alsophila pometaria* (fall cankerworm) *Cimbex americana* (elm sawfly) *Ennomos subsignarius* (elm spanworm) *Erannis tiliaria* (linden looper) *Hyphantria cunea* (fall webworm) *Nymphalis antiopa* (mourningcloak butterfly) *Pyrrhalta luteola* (elm leaf beetle)	*Dicerca divaricata* (a flatheaded wood borer) *Hylurgopinus rufipes* (native elm bark beetle) *Magdalis armicollis* (red elm bark weevil) *Neoclytus acuminatus* (redheaded ash borer) *Scolytus multistriatus* (smaller European elm bark beetle)	*Corythucha ulmi* (elm lace bug) *Cuerna striata* (a leafhopper) ****Eriosoma americanum*[2] (woolly elm aphid) *Stictocephala bubalus* (buffalo treehopper)
AMERICAN PLUM *Prunus americana*	*Alsophila pometaria* (fall cankerworm) *Caliroa cerasi* (pearslug) *Hyphantria cunea* (fall webworm) *Neurotoma inconspicua* (plum webspinning sawfly) *Paleacrita vernata* (spring cankerworm)	*Coccotorus hirsutus* (sandcherry weevil) *Coccotorus scutellaris* (plum gouger) *Conopia pictipes* (lesser peachtree borer) *Conotrachelus nenuphar* (plum curculio) *Hyperplatys aspersus* (a roundheaded wood borer)	*Aphis setariae* (rusty plum aphid) *Asiphonaphis pruni* (a plum aphid) *Empoasca fabae* (potato leafhopper) ****Eriophyes emarginate* (a finger gall mite) *Macropsis trimaculata* (plum leafhopper) *Stictocephala taurina* (a treehopper)
AMUR MAPLE -- (see silver maple) *Acer ginnala*			
ARNOLD HAWTHORN *Crataegus arnoldiana*	*Acrobasis indiginella* (a leaf crumpler) *Antheraea polyphemus* (polyphemus moth) *Caliroa cerasi* (pearslug) *Hyalophora cecropia* (cecropia moth)	*Saperda candida* (roundheaded apple tree borer) *Xylotrechus convergens* (a roundheaded wood borer)	*Chaitophorus populicola* (aphid) *Corythucha cydoniae* (hawthorn lace bug) *Eriosoma lanigerum* (woolly apple aphid) *Rhopalosiphum fitchii* (aphid) *Telamona tristis* (treehopper)

**Damage by this species results in abnormal growths, swellings, or leaf curls.

[2]Illustrated on page 2.

Table 1.--Continued

Tree species	Insect species		
	Leaf feeders	Borers	Sucking insects
AUSTRIAN PINE -- (see ponderosa pine) *Pinus nigra*			
BLACK HILLS SPRUCE -- (see blue spruce) *Picea glauca* var. *densata*			
BLUE SPRUCE *Picea pungens*			
	Archippus packardianus (a caterpillar) *Choristoneura fumiferana* (spruce budworm) *Epizeuxis aemula* (a spruce cutworm) *Pikonema alaskensis* (yellowheaded spruce sawfly) *Taniva albolineana* (spruce needleminer)	*Dioryctria reniculella* (spruce coneworm) *Dioryctria zimmerman* (Zimmerman pine moth) *Pissodes strobi* (white pine weevil) *Scolytus piceae* (a spruce bark beetle)	*Nalepella halourga* (a mite) *Phenacaspis pinifoliae* (pine needle scale) *Tetranychus urticae* (twospotted spider mite) *Toumeyella* sp. (a tortoise scale)
BOXELDER *Acer negundo*			
	Acronicta americana (American dagger moth) *Alsophila pometaria* (fall cankerworm) *Halisidota tessellaris* (pale tussock moth) *Paleacrita vernata* (spring cankerworm)	*Dicerca divaricata* (a flatheaded wood borer) *Prionoxystus robiniae* (carpenterworm) ****Proteoteras willingana*** (boxelder twig borer) *Tremex columba* (pigeon tremex)	****Aceria negundi*** (warty leafgall) *Lecanium corni* (European fruit lecanium) *Periphyllus negundinis* (boxelder aphid) *Psylla negundinis* (boxelder psyllid) *Pulvinaria innumerabilis*[3] (cottony maple scale)
BUR OAK *Quercus macrocarpa*			
	Acronicta americana (American dagger moth) *Alsophila pometaria* (fall cankerworm) *Halisidota tessellaris* (pale tussock moth) *Heterocama manteo* (variable oakleaf caterpillar) *Maldcosoma disstria* (forest tent caterpillar)	*Agrilus bilineatus* (twolined chestnut borer) *Conotrachelus posticatus* (an acorn weevil) *Curculio iowensis* (an acorn weevil) *Curculio strictus* (an acorn weevil) *Elaphidion mucronatum* (spined bark borer) *Elaphidionoides villosus* (twig pruner)	****Aceria querci*** (a blister gall mite) ****Andricus ignotus*** (woolly oak gall) *Corythucha arcuata* (oak lace bug) ****Disholcaspis quercusmamma*** (oak bullet gall) *Heliria molaris* (a treehopper) *Telamona maculata* (a treehopper)

**Damage by this species results in abnormal growths, swellings, or leaf curls.

[3]Illustrated on page 3.

Table 1.--Continued

Tree species	Insect species		
	Leaf feeders	Borers	Sucking insects
	Paleacrita vernata (spring cankerworm)	*Prionus imbricornis* (tilehorned prionus)	*Telamona monticola* (a treehopper) *Telamona spreta* (a treehopper)
CAROLINA (NORWAY) POPLAR -- (see Siouxland cottonwood) *Populus canadensis eugenei*			
CHINKOTA ELM -- (see Siberian elm) *Ulmus pumila* 'Chinkota'			
COMMON CHOKECHERRY *Prunus virginiana*			
	Alsophila pometaria (fall cankerworm) *Archips cerasivoranus*[4] (uglynest caterpillar) *Hyphantria cunea* (fall webworm) *Malacosoma californicum lutescens* (prairie tent caterpillar)	*Chaetophlocus heterodoxus* (a bark beetle) *Clytophorus verrucosus* (a roundheaded wood borer) *Ropalopus sanguinicollis* (a roundheaded wood borer)	*Asiphonaphis pruni* (a plum aphid) ****Contarinia virginianiae* (chokecherry midge) *Gyponana flavilineata* (a leafhopper) *Rhopalosiphum cerasifoliae* (chokecherry aphid) *Tortistilus inermis* (a treehopper)
DROPMORE ELM -- (see Siberian elm) *Ulmus pumila* 'Dropmore'			
EASTERN REDCEDAR *Juniperus virginiana*			
			Lecanium corni (European fruit lecanium) *Lecanium fletcheri* (Fletcher scale)
GOLDEN CURRANT *Ribes aureum*			
		Conopia tipuliformis (caterpillar)	
GOLDEN WILLOW -- (see white willow) *Salix vitellina*			
GREEN ASH *Fraxinus pennsylvanica*			
	Alsophila pometaria (fall cankerworm) *Malacosoma disstria* (forest tent caterpillar)	*Leperisinus aculeatus* (eastern ash bark beetle) *Leperisinus californicus* (a bark beetle)	*Aspidiotus ancylus* (Putnam scale) ****Eriophyes fraxiniflora* (ash flower gall mite)

**Damage by this species results in abnormal growths, swellings, or leaf curls.

[4]Illustrated on page 2.

Table 1.--Continued

Tree species	Insect species		
	Leaf feeders	Borers	Sucking insects
	Paleacrita vernata (spring cankerworm) *Sphinx chersis* (great ash sphinx) *Tethida cordigera* (blackheaded ash sawfly)	*Neoclytus acuminatus* (redheaded ash borer) *Podosesia syringae fraxini* (ash borer) *Prionoxystus robiniae* (carpenterworm) *Thysanocnemis nr. fraxini* (an ash seed weevil)	*Lecanium corni* (European fruit lecanium) *Neoborus amoenus*[5] (ash plant bug) *Prociphilus fraxinifolii* (leafcurl ash aphid) *Pulvinaria innumerabilis*[5] (cottony maple scale)
HACKBERRY *Celtis occidentalis*			
	Asterocampa clyton (hackberry butterfly) *Calligrapha* sp. (a leaf beetle) *Paleacrita vernata* (spring cankerworm) *Sphinx drupiferarm* (hackberry sphinx)	*Agrilus celti* (a flatheaded wood borer) *Elaphidion mucronatum* (spined bark borer) *Elaphidionoides villosus* (twig pruner) *Phloeotribus dentifrons* (a bark beetle) *Scolytus muticus* (hackberry engraver)	*Aspidiotus ancylus* (Putnam scale) *Pachypsylla celtidismamma*[5] (hackberry nipplegall maker) *Pachypsylla celtidisvesicula* (hackberry blister gall) *Pachypsylla venusta* (hackberry petiolegall)
HANSEN HEDGEROSE *Rosa* sp.			
	Malacosoma californicum lutescens (prairie tent caterpillar)	****Diplolepis spinosa* (rose twiggall) ****Rhabdophaga rosacea* (rosette midge) *Rhynchites bicolor* (rose curculio)	
HARBIN PEAR *Pyrus ussuriensis*			
	Caliroa cerasi (pearslug) *Paleacrita vernata* (spring cankerworm)		****Eriosoma lanigerum* (woolly apple aphid)
HONEYLOCUST *Gleditsia triacanthos*			
	Alsophila pometaria (fall cankerworm) *Datana ministra* (yellownecked caterpillar)	*Xyleborus saxeseni* (a barkbeetle)	*Lecanium corni* (European fruit lecanium) *Macropsis* sp. (a leafhopper) *Pulvinaria innumerabilis*[5] (cottony maple scale)

**Damage by this species results in abnormal growths, swellings, or leaf curls.

[5]Illustrated on page 3.

Table 1.--Continued

Tree species	Insect species		
	Leaf feeders	Borers	Sucking insects
LATE LILAC *Syringa villosa*			
	Ceratomia undulosa (sphinx moth) *Sphinx chersis* (great ash sphinx) *Sphinx kalmiae* (sphinx moth)	*Podosesia syringae fraxini* (ash borer)	*Stictectphala bubalus* (buffalo treehopper)
LAUREL WILLOW -- (see white willow) *Salix pentandra*			
LILAC -- (see late lilac) *Syringa vulgaris*			
MANCHURIAN CRABAPPLE -- (see Siberian crabapple) *Malus baccata mandshurica*			
MISSOURI RIVER WILLOW -- (see white willow) *Salix missouriensis*			
NORTHWEST POPLAR -- (see Siouxland cottonwood) *Populus deltoides* x *Populus balsamifera*			
PEKING COTONEASTER *Cotoneaster acutifolia*			
	Acrobasis indigenella (leaf crumpler) *Alsophila pometaria* (fall cankerworm) *Malacosoma californicum lutescens* (prairie tent caterpillar) *Paleacrita vernata* (spring cankerworm)		*Ligyrocoris diffusus* (a lygaeid bug)
PLAINS COTTONWOOD -- (see Siouxland cottonwood) *Populus sargentii*			
PONDEROSA PINE *Pinus ponderosa*			
	Cotalpa lanigera (goldsmith beetle) *Diprion similis*[6] (introduced pine sawfly) *Neodiprion fulviceps* (a sawfly) *Neodiprion ventralis* (a sawfly)	*Dioryctria auranticella* (a pine cone moth) *Dioryctria cambiicola* (a pine moth) *Dioryctria gulosella* (a pine moth) *Dioryctria tumicolella* (a pitch moss borer)	*Cinara* sp. (a pine aphid) *Cuerna striata* (a leafhopper) *Phenacaspis pinifoliae* (pine needle scale)

[6] Illustrated on page 2.

Table 1.--Continued

Tree species	Insect species		
	Leaf feeders	Borers	Sucking insects
		Dioryctria zimmermani (Zimmerman pine moth) *Neoclytus acuminatus* (redheaded ash borer) *Orthotomicus caelatus* (a bark beetle) *Petrova luculentana* (pine pitch-nodule maker) *Pogonocherus mixtus* (a roundheaded wood borer) *Rhyacionia bushnelli* (western pine tip moth)	
REDOSIER DOGWOOD *Cornus stolonifera*			
	Acleris sp. (a budworm) *Macremphytus testaceus* (a sawfly)	*Oberea tripunctata* (dogwood twig borer)	*Aspidiotus ancylus* (Putnam scale) *Clastoptera proteus*[7] (dogwood spittlebug) *Pulvinaria innumerabilis*[8] (cottony maple scale)
ROBUSTA POPLAR -- (see Siouxland cottonwood) *Populus angulata* x *Populus nigra*			
ROCKY MOUNTAIN JUNIPER -- (see eastern redcedar) *Juniperus scopulorum*			
RUSSIAN ALMOND -- (see American plum) *Prunus tenella*			
RUSSIAN OLIVE *Elaeagnus angustifolia*			
	Choristoneura rosaceanus (obliquebanded leafroller) *Estigmene acrea* (saltmarsh caterpillar)		*Capitophorus* sp. (an aphid) *Empoasca fabae* (potato leafhopper)
SASKATOON SERVICEBERRY *Amelanchier alnifolia*			
	Alsophila pometaria (fall cankerworm) *Archips cerasivoranus*[7] (uglynest caterpillar)	*Chaetophloeus heterodoxus* (a barkbeetle)	*Stictocephala* sp. (a treehopper)
SCOTCH PINE -- (see ponderosa pine) *Pinus sylvestris*			
SIBERIAN APRICOT -- (see American plum) *Prunus armeniaca sibirica*			

[7]Illustrated on page 2.
[8]Illustrated on page 3.

Table 1.--Continued

Tree species	Insect species		
	Leaf feeders	Borers	Sucking insects
SIBERIAN CRABAPPLE *Malus baccata*			
	Alsophila pometaria (fall cankerworm) *Biston cognataria* (pepper-and-salt moth) *Erannis tiliaria* (linden looper) *Paleacrita vernata* (spring cankerworm)	*Conotrachelus nenuphar* (plum curculio) *Hyperplatys aspersus* (a roundheaded wood borer) *Saperda candida* (roundheaded apple tree borer)	*Eriosoma lanigerum* (woolly apple aphid)
SIBERIAN ELM *Ulmus pumila*			
	Alsophila pometaria (fall cankerworm) *Antheraea polyphemus* (polyphemus moth) *Calligrapha scalaris* (elm calligrapha) *Cimbex americana* (elm sawfly) *Heterocampa guttivitta* (saddled prominent)	*Astyleiopus variegatus* (a roundheaded wood borer) *Magdalis armicollis* (red elm bark weevil) *Mecas mornata* (a roundheaded wood borer) *Saperda tridentata* (elm borer)	***Aceria* sp. (a finger gall mite) *Deraeocoris histrio* (a plant bug) *Empoasca bipunctata* (a leafhopper) *Lecanium corni* (European fruit lecanium) *Stictocephala taurina* (a treehopper) *Tortistilus inermis* (a treehopper)
SIBERIAN LARCH *Larix sibirica*			
	Anavitrinella pampinaria (cranberry spanworm) *Coleophora laricella* (larch casebearer) *Pristiphora erichsonii* (larch sawfly) *Semiothisa sexmaculata* (an inchworm)	*Dioryctria abietvorella* (a coneworm)	
SIBERIAN PEASHRUB *Caragana arborescens*			
	Epicauta fabricii (ashgray blister beetle) *Epicauta subglabra* (caragana blister beetle) *Lytta nuttallii* (Nuttall blister beetle)	*Bruchophagus caraganae* (caragana seed chalcid)	*Acyrthosiphon caraganae* (caragana aphid) *Empoasca fabae* (potato leafhopper) *Macrosiphum caraganae* (an aphid) *Stictocephala bubalus* (buffalo treehopper) *Stictocephala taurina* (a treehopper)

**Damage by this species results in abnormal growths, swellings, or leaf curls.

Table 1.--Continued

Tree species	Insect species		
	Leaf feeders	Borers	Sucking insects
SILVERBERRY -- (see Russian olive) *Elaeagnus commutata*			
SILVER BUFFALOBERRY *Shepherdia argentea*			
	Datana sp. (a caterpillar) *Erannis tiliaria* (linden looper)		*Paratrioza arbolensis* (a psyllid) *Psylla magnicauda* (a psyllid)
SILVER MAPLE *Acer saccharinum*			
	Erannis tiliaria (linden looper) *Halisidota maculosus* (spotted tussock moth) *Paleacrita vernata* (spring cankerworm)	*Chrysobothris femorata* (flatheaded appletree borer)	*Aspidiotus ancylus* (Putnam scale) *Pulvinaria innumerabilis* (cottony maple scale) ***Vasates quadripedes*[9] (maple bladdergall mite)
SIOUXLAND COTTONWOOD *Populus deltoides* 'Siouxland'			
	Acronicta lepusculina (cottonwood dagger moth) *Alsophila pometaria* (fall cankerworm) *Chrysomela scripta* (cottonwood leaf beetle) *Hyphantria cunea* (fall webworm) ***Phyllocolpa bozemani* (poplar leaffolding sawfly)	*Agrilus liragus* (bronze poplar borer) *Cryptorhynchus lapathi* (poplar-and-willow borer) *Dicerca divaricata* (a flatheaded wood borer) *Prionoxystus robiniae* (carpenterworm) *Saperda calcarata* (poplar borer)	***Aceria parapopuli* (poplar bud gall mite) ***Mordwilkoja vagabunda*[9] (poplar vagabond aphid) *Neothomasia populicola* (cloudywinged cottonwood leaf aphid) ***Pemphigus populicaulis*[9] (poplar leaf-petiolegall aphid *Pterocomma populifoliae* (reddishbrown poplar aphid)
TATARIAN HONEYSUCKLE *Lonicera tatarica*			
	Linsleya sphaericollis (a blister beetle) *Zaraea inflata* (honeysuckle sawfly)		*Empoasca fabae* (potato leafhopper) *Macrosteles fascifrons* (aster leafhopper) *Psylla negundinis* (boxelder psyllid)
WESTERN SANDCHERRY -- (see American plum) *Prunus pumila besseyi*			
WHITE SPRUCE -- (see blue spruce) *Picea glauca*			

**Damage by this species results in abnormal growths, swellings, or leaf curls.

[9] Illustrated on page 3.

Table 1.--Continued

Tree species	Insect species		
	Leaf feeders	Borers	Sucking insects
WHITE WILLOW *Salix alba*	*Antheraea polyphemus* (polyphemus moth) *Chrysomela scripta* (cottonwood leaf beetle) *Cimbex americana* (elm sawfly) *Disonycha alternata*[10] (a chrysomelid leaf beetle) *Hyphantria cunea* (fall webworm)	*Cryptorhynchus lapathi* (poplar-and-willow borer) *Janus abbreviatus* (willow shoot sawfly) ****Pontania proxima*** (bean gall sawfly) *Prionoxystus robiniae* (carpenterworm)	*Cavariella* sp. (a willow aphid) *Pterocomma* sp. (a willow aphid) *Stictocephala bubalus* (buffalo treehopper)

**Damage by this species results in abnormal growths, swellings, or leaf curls.

[10]Illustrated on page 2.