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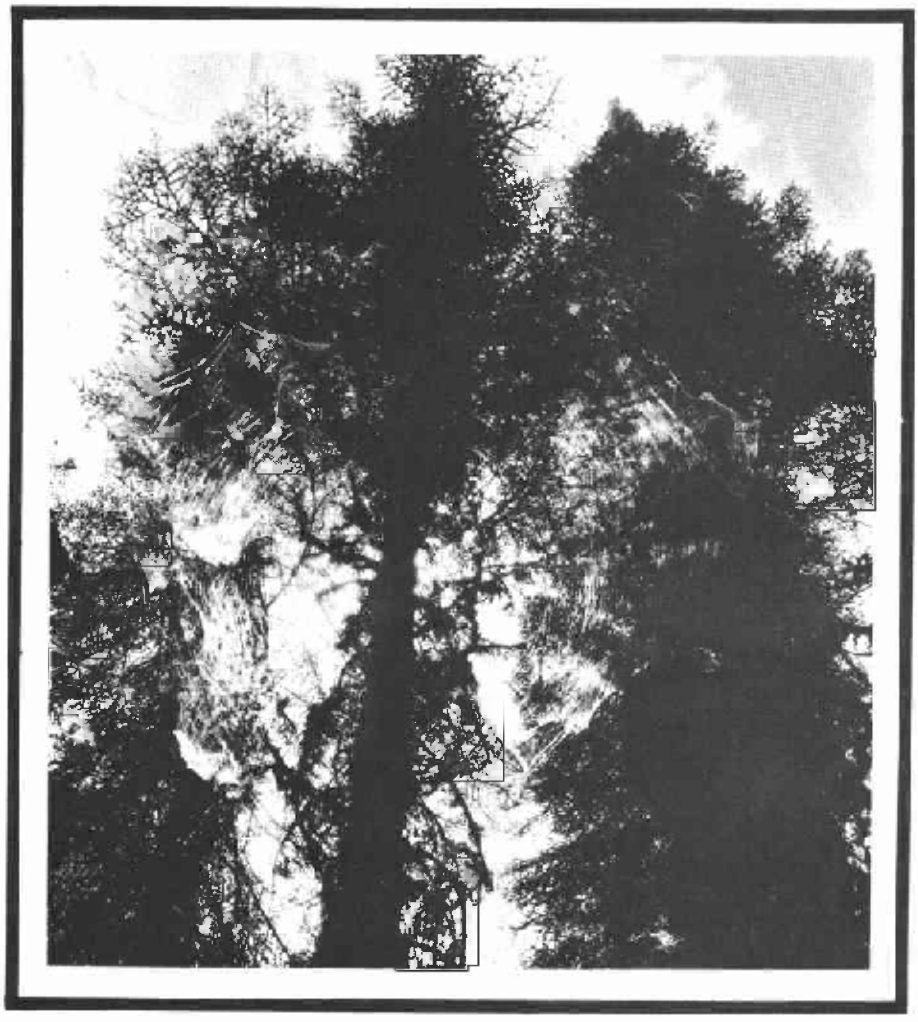
Western Hemlock Looper
IN THE NORTHERN REGION 1972

(A Potentially Devastating Forest Pest)



U. S. DEPARTMENT OF AGRICULTURE
DIVISION OF STATE AND PRIVATE FORESTRY

FOREST SERVICE
NORTHERN REGION

MISSOULA, MONTANA 59801

Cover photo: Western hemlock looper defoliated tree with subsequent larval webbing. (Photo taken from Evenden 1938.)

STATUS OF THE WESTERN HEMLOCK LOOPER IN THE NORTHERN REGION--1971

by

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ABSTRACT

Over 10,000 acres of aerially visible western hemlock looper defoliation on grand fir was detected on State and Federal forests of central Idaho in 1972. This is the first report of this insect building up in Region 1 since a widespread outbreak in 1937-39.

The western hemlock looper has the potential of being one of the most destructive forest insects in North America. It can cause tree mortality in 1 or 2 years of feeding. Extensive tree mortality has been associated with nearly all past outbreaks.

Outbreaks usually persist for about 3 years at epidemic levels prior to collapsing from natural control agents. Insecticides have been effective in protecting large stands during some looper infestations.

INTRODUCTION

The western hemlock looper, *Lambdina fiscellaria lugubrosa* Hulst, was detected defoliating true firs at several locations in the Clearwater and St. Joe National Forests in 1972. A total of 10,140 acres of aerially visible defoliation was mapped in late August (Fig. 1). This is the first report of this insect causing noticeable defoliation in Region 1 since 1938.

The western hemlock looper has the potential to be one of the most damaging of the forest insect pests in North America, having the reputation of a "real tree killer." Infestations have been reported in the Pacific Northwest since the late 1800's. An infestation in Oregon from 1919 to 1921 is reported to have killed 500 million board feet of fir and hemlock on 22,000 acres (Keen 1930).

Another infestation on 50,000 acres in Washington killed 200 million board feet of timber from 1929 to 1932. Certain portions of this infestation were aerially treated with a calcium arsenate dust. This control measure was attributed to have saved an additional 90 million board feet from destruction (Furniss 1945).

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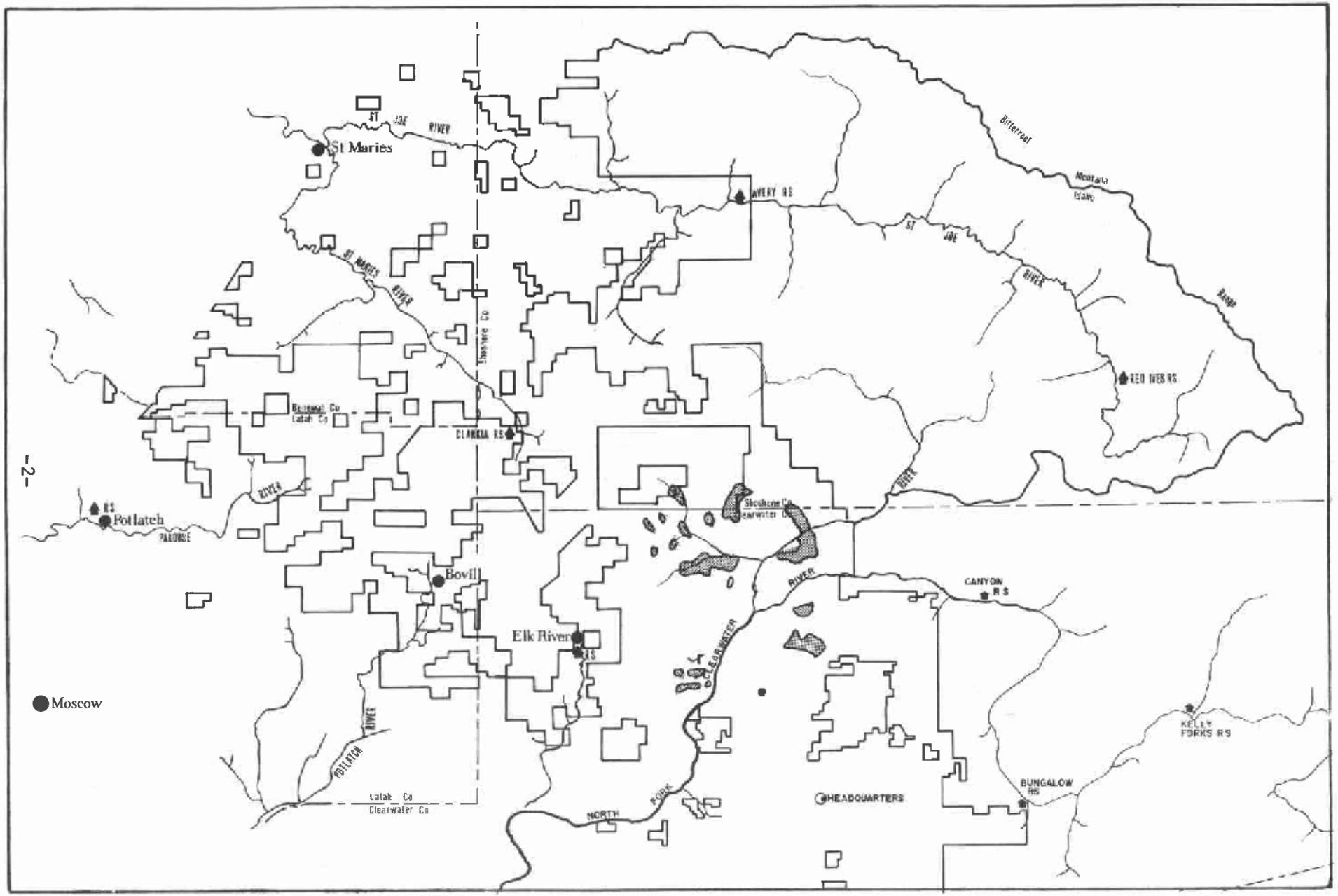

Figure 1.--Areas of western hemlock looper defoliation on the ST. JOE AND CLEARWATER FORESTS

The last hemlock looper infestation reported in Region 1 lasted for 3 years, 1937 through 1939. Fifty-six centers of severe defoliation were identified on eight National Forests in northern Idaho and western Montana, plus another in Glacier National Park. Greatest damage was done on the St. Joe, Coeur d'Alene, and Clearwater National Forests. Though precise acreages were not determined, it was said to have covered several hundred thousand acres. Losses were reported to be up to 60 percent of the stems in the more severely defoliated stands (Evenden 1944). Evenden (1938) reported that in many forested areas of northern Idaho and western Montana, the "fir and intermingled tree species began to turn brown as though scorched by fire." In the fall of 1937 the moths were so numerous on portions of the St. Joe National Forest that "in some areas the ground was actually white with their dead bodies, and small streams were even clogged and dammed (Fig. 2). A very disagreeable odor from the decaying bodies prevailed along the creek bottoms." All but spring water was rendered unfit to drink.

Figure 2.--Small stream dammed with dead adult moths, St. Joe National Forest, 1937. (Photo taken from Evenden 1938)

In 1944, an infestation in Oregon killed approximately 40 million board feet outright and affected a great deal more by partial defoliation (Furniss 1945).

The last major western hemlock looper infestation in the United States was from 1961 to 1964 in Oregon and Washington. It covered an area of

about 70,000 acres. Chemical control was applied to 55,000 acres. Tree recovery was good in areas of good control, but tree mortality existed in areas where looper control was poor (Buffam 1964).

LIFE HISTORY AND HABITS

Eggs.--The eggs are smaller than the head of a pin and laid individually on the needles, branches, trunks, and in the moss on the trees (Fig. 3). They are of a gray-green iridescent color (Keen 1931). The eggs are deposited in the fall and remain unhatched throughout the winter. Hatching occurs in May and June.

Figure 3.--Western hemlock looper egg. (Photo courtesy of Region 6, USFS, Portland, Oregon.)

Larvae.--Mature larvae are about 1½ inches long and of the typical inch worm appearance (Fig. 4). They are green to brown in color with diamond-shaped markings on their backs. Larval development is completed near the end of August. They then spin from the tree upon a silken web to a sheltered location near the base of the tree on the ground to pupate. In areas of looper epidemics "these silken webs may become so abundant that the whole forest looks and feels like one big cobweb" (Keen 1952).

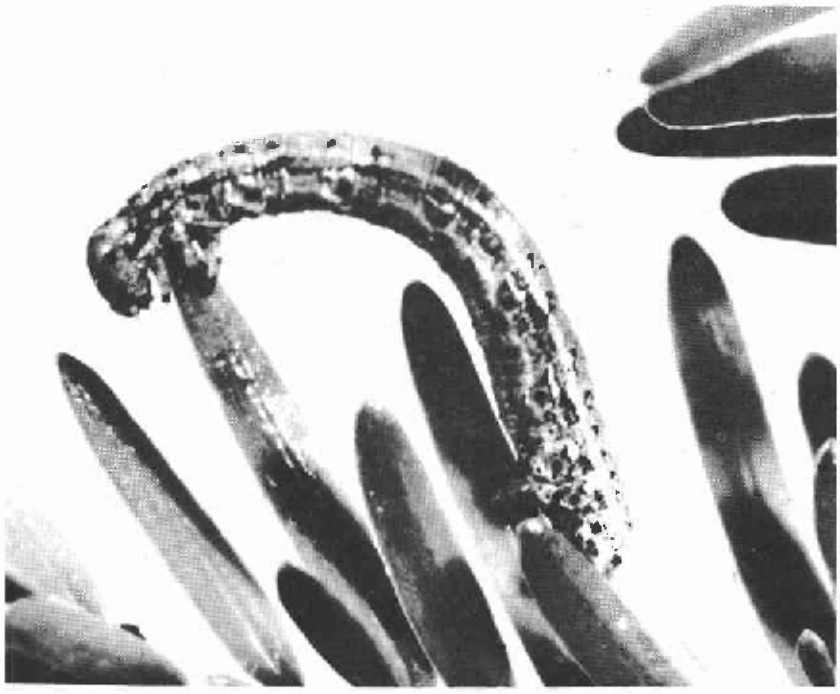

Figure 4.--Western hemlock looper larva. (Photo courtesy of Region 6, USFS, Portland, Oregon.)

Pupae.--The pupae are a mottled tan in color and about one-half inch long (Fig. 5). Favorite pupation sites include crevises in the bark, cracks in stumps and logs, and in the litter layer. The pupal period lasts for about 2 weeks.

Adults.--The moths emerge from early September to October. Keen (1952) states that moths "during an epidemic are so abundant as to give the impression of a snowstorm in the woods." They are tan colored with two dark wavy lines on the forewing and one on the hind wing (Fig. 6). The wingspread is about 1½ inches. The sexes are quite similar with the male having bipectinate (comblike) antennae while the female's are filiform (threadlike).

Some moths may be observed as late as November, but most egg laying occurs from mid-September to mid-October. The adults of the western hemlock looper do not overwinter, so any similar appearing moths observed in spring or early summer are of a different species (Furniss 1945).

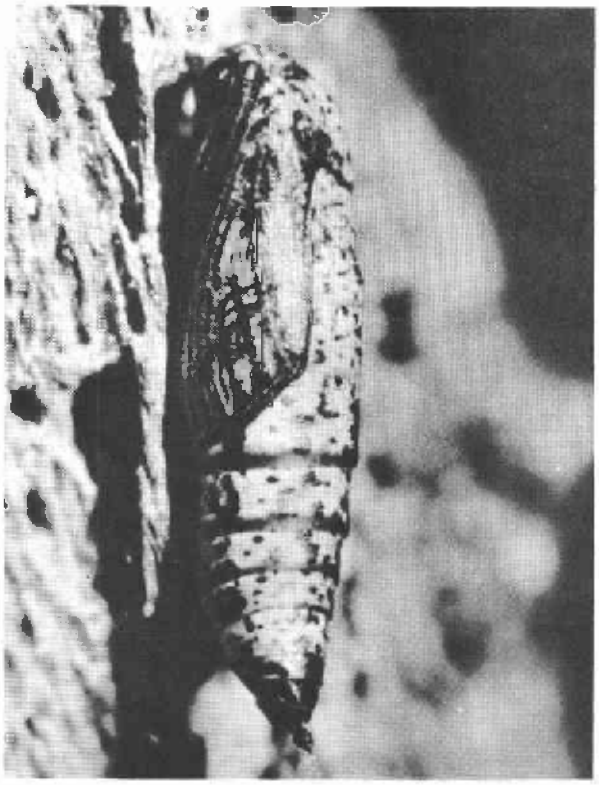

Figure 5.--Western hemlock looper pupa.

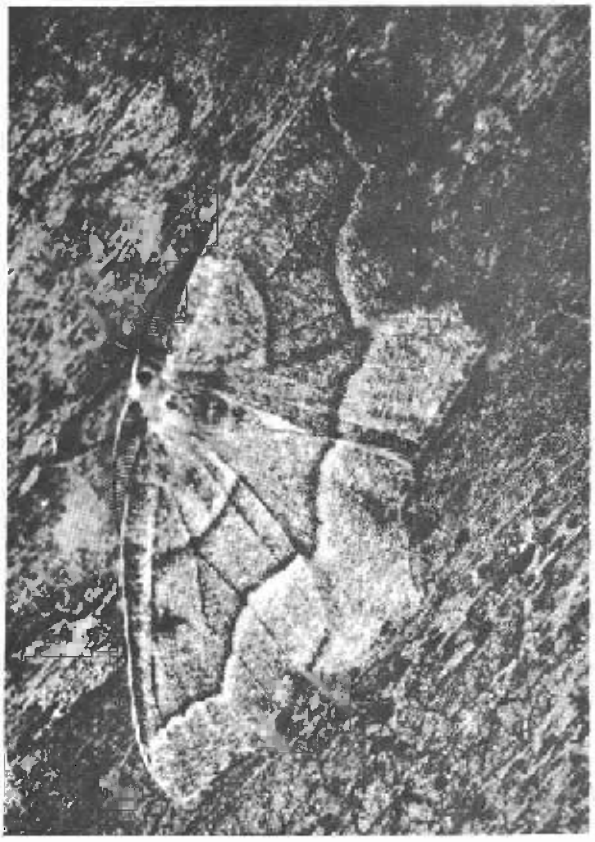

Figure 6.--Adult western hemlock looper (male).

HOSTS AND DAMAGE

The true firs (grand and subalpine) are the preferred hosts of the western hemlock looper in Region 1, but during epidemics associated species (Douglas-fir, Engelmann spruce, hemlock, white pine, and larch) are also attacked (Evenden 1938). The young larvae feed considerably on such shrubs as huckleberry, salmonberry, and devils club defoliating them quite severely before migrating to coniferous species (Furniss 1945).

Most larval feeding is at the base of the needle, so the needle is cut off and falls to the ground. This destroys much more foliage than is actually eaten. Both old and new foliage is fed upon. As the caterpillar grows, it feeds on buds and tender shoots. This explains why defoliation by this insect can cause such extensive tree mortality in such a short period of time (Keen 1930). Carolin et al. (1964) reported that "one year's heavy feeding by the western hemlock looper can cause tree mortality on western hemlock."

The most severe damage usually occurs in extensive stands of old-growth trees. Stands under 50 to 60 years of age are relatively unsusceptible to looper damage (Anon. 1968). Heavy damage usually occurs for about 3 years before the outbreak is controlled by natural agents.

NATURAL CONTROL

Natural control of an insect outbreak is a result of such things as:

1. Predators
2. Parasites
3. Disease
4. Competition
5. Climatic conditions

Predators and parasites have been found associated with all past infestations, but never credited entirely with the collapse of the outbreak. At least four parasitic insects have been reared from looper pupae collected in 1972. These are unidentified to date. Evenden (1938) indicated that large numbers of a dipterous parasite (*Phyrnalydella* n. sp.) and a hymenopterous parasite (*Itoplectis montana* Cush.) were involved in the 1937-39 infestation.

Buffam (1964) states that a virus disease is mainly responsible for controlling outbreaks. Generally, it takes several years for natural agents (predators, parasites, and diseases) to build up to a sufficient level to control an outbreak.

High larval mortality often exists from a shortage of food, especially in areas severely defoliated the preceding season.

Unfavorable climatic conditions can strongly influence survival of the western hamlock looper. Keen (1952) says heavy rains during the flight period (September and October) reduce egg laying and hasten the decline of the epidemic.

There are no known proven silvicultural control methods for preventing or controlling outbreaks.

CHEMICAL CONTROL

Past looper infestations have been considered successfully controlled with the use of such materials as lead arsenate, calcium arsenate, and DDT. All of these insecticides are no longer available for looper control because of the undesirable side effects experienced with their use.

The only currently registered insecticide for western hemlock looper control is malathion applied as an ultra-low volume concentration (95 percent ULV), undiluted, at the rate of 8 fluid ounces per acre. This formulation is applied aerially. Chemical spraying must coincide with the larval stage (late June to early August) to be effective.

DISCUSSION AND RECOMMENDATIONS

With so little history of this insect's activity in Region 1, it is difficult to predict its future. However, from the records of the 1937-39 infestation and others in Oregon and Washington, it appears likely that we are in the early stages of an outbreak. Carolin et al. (1964) indicated that "by the time hemlock looper damage is visible from the air, an outbreak is usually well underway."

Looper infestations have been evaluated by using the overwintering egg populations to predict the following season's defoliation. This is a very laborious evaluation that is not always reliable.

From the information currently available, it is premature to plan for suppression at this time. However, because of the potential destructiveness of this insect, it is recommended that it be given close consideration. Men on the ground should be alert to abnormal numbers of the moths in forested areas from September through November. Also areas with firs showing defoliation away from centers of spruce budworm activity should be reported. These areas will probably also show defoliation on the brush species, especially huckleberry, if examined prior to leaf fall.

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PESTICIDES PRECAUTION STATEMENT

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key -- out of the reach of children and animals -- and away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment if specified on the container.

If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicides from equipment, do not use the same equipment for insecticides or fungicides that you use for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary land-fill dump, or crush and bury them in a level, isolated place.

NOTE: Some States have restrictions on the use of certain pesticides. Check your State and local regulations. Also, because registrations of pesticides are under constant review by the U.S. Department of Agriculture, consult your county agricultural agent or State Extension specialist to be sure the intended use is still registered.