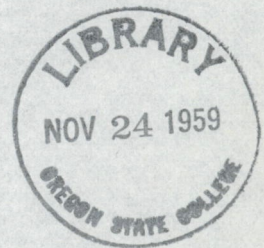


SILVICULTURE PROJECT 1947

THE WESTERN PINE BEETLE
AND ITS DESTRUCTIVENESS TO
WESTERN YELLOW PINE



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The Western Pine Beetle (*Dendroctonus brevicomis*) is one of the most destructive insects which infest the ponderosa pine forests. This insect is called bark beetle because it inhabits the inner layer of bark and feeds on the juicy cambium of the tree, which ultimately results in the death of the tree. This beetle is sometimes referred to as a "cambium miner."

The bark beetle goes through four stages in its life cycle. First, an egg is laid. When this hatches, the larva is produced. The larva is often referred to as a grub. The larva is white and about one-fourth of an inch long. It has a yellow head and no legs. When the larva is full grown, it turns into the pupa or resting stage, and from this stage, it emerges as the full grown adult.

While most forest insects are most destructive when in the larva stage, the pine beetle is most destructive when in the adult stage. It is in this stage that it kills the trees which it infests.

There are certain types of trees which are more susceptible to beetle attack than others. These different types have been classified according to relative susceptibility by Mr. F. P. Keen, Senior Forest Entomologist, Portland, Oregon.¹

The bark beetle in the adult stage is dark brown to almost black in color. It attacks the tree by boring a tiny

¹. "Relative Susceptibility of Ponderosa Pines to Bark Beetle attack." -- Journal of Forestry, 34 (10)

hole about one-sixteenth of an inch in diameter, and burrowing its way into the cambium where it starts its characteristic galleries. Often when examining a tree suspected of harboring "bugs", the interior of the bark will be found to have many small criss-cross galleries where the bugs have been working. Sometimes pitch tubes can be seen on the bole of the tree. Boring dust will also be noticed usually at the base of the tree.

The trees which seem to be the most susceptible to attack are the older aged, poorly formed and sparsely crowned types.

The writer has had his attention directed to this apparent preference, and on several occasions has noticed that even the more non-susceptible types aren't immune. Trees in the 2 and 3A classes are sometimes killed even when the beetles aren't in the epidemic stage.

Trees which have active beetle broods in them are easily identified by their general appearance. The foliage seems to be the best indicator. The needles take on a faded appearance, and gradually change to a reddish rust color.

The surest positive method of ascertaining whether the tree is infested is to chop into the bark, and look for the characteristic galleries and the bugs themselves.

This is a very good precaution to take anyway, as often times a supposedly "bug" tree will be marked to be logged or for treatment, when in reality the tree is merely getting ready to shed its old needles and add new ones, and is a perfectly healthy tree.

The tree which is actually dying as a result of beetle infestation is positively identified by the dying needles in the center of the needle cluster at the tip of the branches.

In areas where control work is being carried out, the "spotters" should be very careful not to mistake a real bug tree for one which is only getting ready to shed its needles for new ones.

It takes about a week or two to kill a tree providing the beetles are present in large enough numbers. When the beetles are in the epidemic stage, they will attack and kill trees of all ages and crown vigor classes. Some notable examples of this wholesale killing has been witnessed on the Klamath Indian Reservation by the writer. Many thousands of ~~dobars~~ have been lost in that area through beetle infestations in the early thirtys. Much control work was carried out in this area which met with gratifying results, however, it is the belief of the writer, that, when conditions become favorable again, there is an eminent possibility of the same thing happening over again. Only the amount of trees killed should be greatly lessened as most of the Reservation has been logged, and the residual stand is comprised mostly of the trees which are normally considered relatively non-susceptible.

Flight and attacks of the beetles start in the spring or early in summer and continue until stopped by cold weather.

In attempting to bring this insect under control artificially, there are several systems employed. They are the "peel and burn method," suncuring, and control through selection logging.

Obviously the best time to try control measures is in the late fall and winter when the insects are dormant and are holed up in the trees.

In order that the peel and burn method be used, it must be done in the winter when the forest is wet down by snows or rain and there is no danger from forest fires. The term "treating" is used in conjunction with the peel and burn method. In order that "treating" in the snow be properly done, the following precautions should be observed:

There should be a large chunk to fall the infected tree on. It is very important that the tree be up off the ground so that a good draft can be had. It is well worth the trouble to saw down a small snag to fall the tree on. It will save twice the labor and trouble cutting pitch and burning. Scrape snow out from under and along both sides of the tree before peeling. It is much easier to scrape the bark in along the tree if the snow is out of the way. It makes the chances for a good burn much better also. Before decking logs from small trees, scrape the snow out from between the skids as this makes the burning of the piles much more efficient. Do not try to burn a pile without having a skid under each end. Cut all trees in lengths which are easy to handle.

The sun curing method is employed in the summer. The bark is stripped from infested trees and laid in a position so as to receive the direct rays of the sun. The high temperatures are sufficient to kill the insects.

The bark beetle seems to thrive more in the drier years.

In the selection logging method of control, the trees which are more susceptible to beetle attack are logged. The "high risk" types are taken out and more of the thrifty trees left in their place. This system has been very effective in reducing beetle losses to a minimum.

A system which is familiar to the writer and which is used extensively in the pine forests on the Klamath Indian Reservation is as follows:

Type I. Beetle Hazard High

Always leave all class 1, class 2, class 3A (unless beetle infested and merchantable)

Always cut 3C class, class 3D, class 4B, class 4C, class 4D, also cut all beetle infested trees of any class if merchantable.

<u>Marginal trees</u>	<u>Cut</u>	<u>Leave</u>
Class 3B	When over 30" and others 18" if not thrifty	When below 30" if thrifty
Class 4A	Cut except as noted	Leave occasional trees below 34" if needed in gaps

Type 2. Beetle hazard low

Always leave all class 1, all class 2, class 3A (unless beetle infested and merchantable)

Always cut class 3D, class 4B, class 4C, class 4D. Also cut all beetle infested trees of any class if merchantable.

<u>Marginal trees</u>	<u>Cut</u>	<u>Leave</u>
Class 3B	When over 34" unless needed to fill gaps	Leave when under 34" or need to fill gaps
Class 3C	Cut except as noted	Leave exceptionally good trees up to 22" if needed.

<u>Marginal trees</u> (Type 2)	<u>Cut</u>	<u>Leave</u>
Class 4A	When over 34" unless needed to fill gaps.	When under 34" or when needed to fill large gaps.

Very severe winter temperatures for long periods have been found to greatly reduce the beetle mortality.

In cruising sections to determine the number and volume of trees killed by beetles, the plot method is good method to use. Eight compass lines across a section (660 feet) apart or two tallies in a gridiron manner. It is best to use two spotters, one on each side of the compass line, each covers a strip (330 feet) wide and in this way a 100% cruise is made. Each tree killed should be tallied by season of death, and by diameter in even inches. The spotters should also determine the age and crown vigor classification of each tree tallied. Keen's tree classification should be used.

The strip method is a better method if the area to be cruised is extensive.

The Western Pine beetle have been found ranging from lower California to British Columbia Canada.

The conclusions as reached by the author are that intensive control measures can only be used on Areas which are not of great extent and where the beetles have not reached the epidemic stage. When the beetles are in the epidemic stage, control measures tend to become too costly for the results obtained. It would therefore, appear to be sound reasoning to let nature take care of the situation when it becomes evident that artificial measures of control are prohibitive from the standpoint of cost, time spend and results obtained.

CHARACTERISTICS OF WESTERN YELLOW PINES KILLED BY THE WESTERN PINE BEETLE
AS OBSERVED IN FALL CRUISING

Foliage Characters:		Current Year's Loss		Previous Year's Loss		Older Loss
		: Winter Brood	: Summer Brood	: Winter Brood	: Summer Brood	: All Brood
Color		: Green, fading green or yellow	: Yellow or red	: Red	: Dark red	: Dark red or brown or black
Needles		: All on; new growth complete	: All on; new growth short	: All on; new growth complete	: Many fallen; new growth short	: Mostly fallen
<u>Bark Characters</u>		: Moist and fairly tight	: Moist and usually loose	: Usually dry and loose	: Usually dry and loose	: Usually dry and loose or fallen
Mixture or looseness		: Red dust only	: Red or white dust	: White dust	: Old white or red dust	: Not conspicuous
Sawdust in Crevices at Base		: Soft and red	: Hard and red	: Hard and yellow	: Hard and yellow	: Hard and yellow
Pitch Tubes		: Few small round; no large oval	: Many small round; no large oval	: Many small round; some large oval	: Many small round; some large oval	: Many and various
Insect Holes		: Mostly none; few fresh large patches	: None or mostly small fresh round holes; few large patches	: None or mostly large patches, slightly weather-beaten	: None or mostly small round holes weather-beaten	: Various amounts badly weather-beaten
Woodpecker Work		: None	: Few soft Fresh ones	: Usually few small; hard or dry	: Usually many large hard and dry, or some fallen	: Hard, dry broken open or fallen
Fungus Fruiting Bodies		: Moist and Clear or slightly bluestained	: Moist and bluestained	: Dry or moist; blue-stained	: Dry or moist, stained; starting to get punky	: Dry or moist, hard or punky; stained
Wood Characters		: None	: Few just Starting	: Few to many	: Usually Many	: Wood often complete riddled
Sapwood		: New attacks parent adults, eggs or larvae	: Mostly emerged; some larvae, pupae and new adults	: None	: None	: None
Wormholes		: Small to halfgrown larvae under bark	: Fullgrown larvae under bark	: None; oval exit holes conspicuous	: None, oval exit holes evident	: None
Insects Found		: Adults on bark; small larvae on or under bark	: None or fullgrown larvae or pupae in outer bark	: None	: None	: None
Western Pine Beetle						
Roundheaded Pine Bark Borers						
Clorids						

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