

Control of Sunscald and Subsequent Buprestid Damage in Spanish Cedar Plantations in Yucatán¹

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In 1950 the Mexican lumber firm Maderas Trópicas was attempting to establish large-scale plantations of Spanish cedar (*Cedrela mexicana* Roem.) by replanting its cut-over forest lands in Yucatán. A nursery for production of planting stock was established (Fig. 1) and an efficient transplanting operation put into effect. Transplant stock was moved directly from the nursery to the forest via tramearts operating on an old logging tramroad (Fig. 2). Strips or *brechas*, spaced at 10-meter intervals perpendicular to the tramroad, were cleared by machete into the forest and savanna along each side of the road. Along each strip, at 8-meter

intervals, small plots approximately 2 meters in diameter were cleared of all vegetation and a young tree was planted in the center of each plot (Fig 3).

Subsequent routine inspection and clearing operations revealed that the rate of survival in these plantations was extremely low and suggested that most of the losses were caused by damage to the young trees at or near the ground line (Fig. 4). The company asked the FAO Forestry Mission in Mexico for assistance, and in March 1952 John M. Miller, entomologist for the mission, accompanied by Dr. N. E. Borlaug, visited the plantations to investigate the causes of the damage.

They found that 90 to 95 percent of the young trees had suffered some type of injury near the ground line, and that many of the injured areas had been infested (Fig. 5) by a species of Buprestid beetle. Since this borer normally invades only wounded, dead, or dying woody tissues, the

primary cause of the damage remained undetermined until a plantation recently established in grass-type savanna was visited. Here a careful examination revealed that 95 percent of the plants had suffered severe sunscald damage on the stem from 1 to 5 centimeters above the ground line.

It was noted that the bark surface damaged by sunscald soon acquired a characteristic pale orange-yellow color distinct from the normal light grey-green bark coloring of the young trees (Fig. 6). Once this fact was established it became a simple matter to locate sunscald-damaged plants within the plantations.

It was found that a high proportion of the young trees were killed outright by girdling due to sunscald. Continued observation of recently damaged plants revealed that the injured areas, usually only a centimeter in diameter, were frequently invaded by a borer and the seedlings girdled and killed through subsequent

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FIG. 1.—Nursery for production of *Cedrela mexicana* planting stock, Yucatán.



FIG. 2.—Moving planting stock from nursery to plantation.

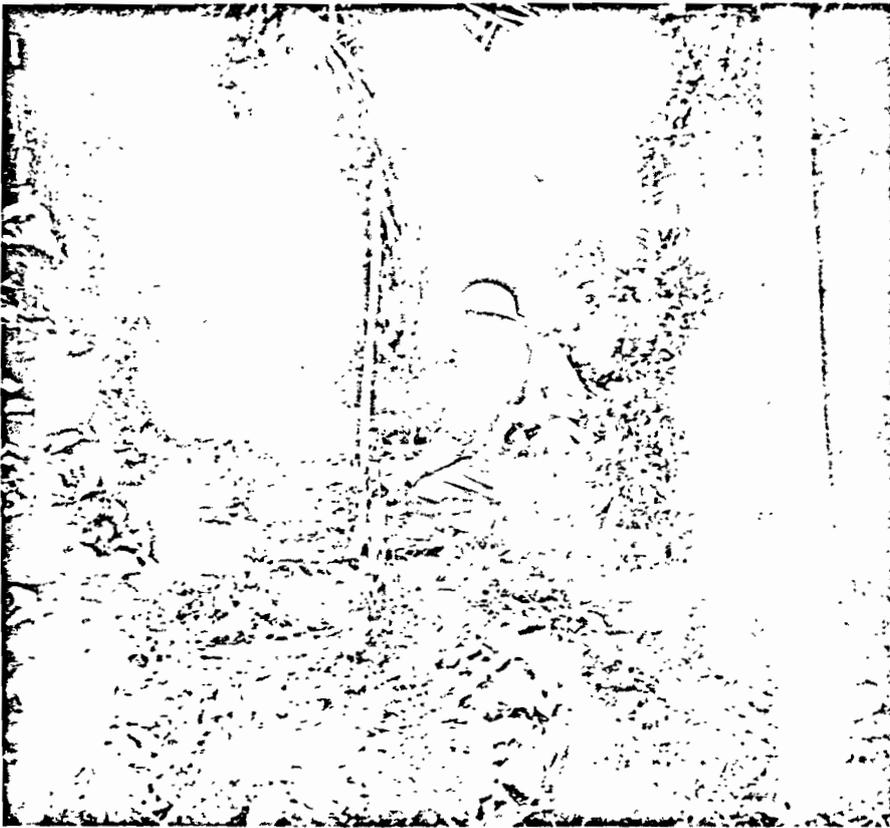


FIG. 3.—Cleared area along the *brecha* in which the young tree is planted.

mining activity of the larvae. In other cases, insect damage together with the rapid development of wood-rot fungi served to enlarge the damaged area (Fig. 7). With the resultant loss of vigor and growth the young trees were unable to compete with the growth of the surrounding vegetation and were soon overtopped and lost. It is interesting to note that the greatest incidence of insect infestation occurred in row number 3 (Table 1), which was parallel and adjacent to the forest. Rows number 1 and 2 were located entirely within the grass-type savanna. It was also observed that mortality was highest

TABLE 1.—SUNSCALD AND RELATED BUPRESTID DAMAGE IN *Cedrela mexicana*, GRASS-TYPE SAVANNA PLANTATION, MARCH 1952

Row number	1	2	3
Total number of seedlings in row	66	89	30
Number of seedlings damaged by sunscald	63	81	28
Percent of seedlings damaged by sunscald	95	91	93
Number of seedlings damaged by sunscald then infested with Buprestid	2	5	6
Percent of seedlings damaged by sunscald then infested with Buprestid	3	5.5	20



FIG. 5.—Typical sunscald and Buprestid damage.

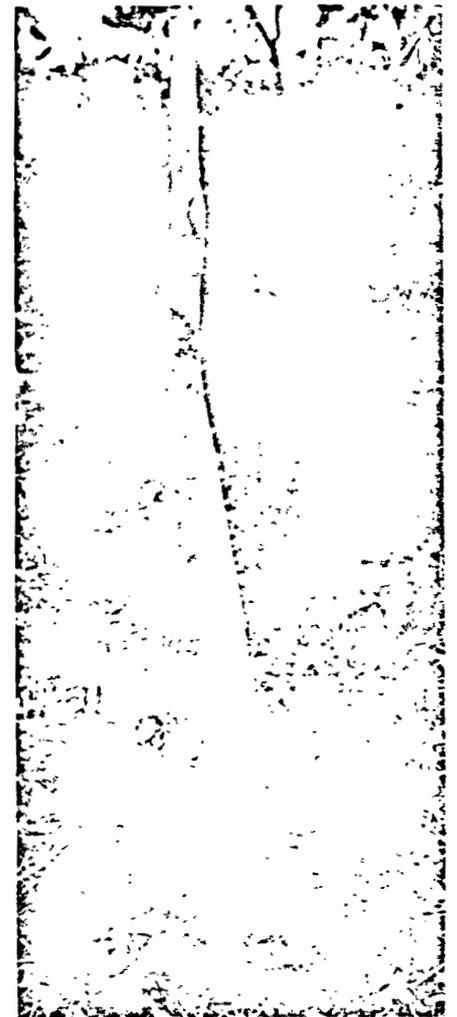


FIG. 4.—*Cedrela mexicana* in plantation damaged by sunscald and subsequent Buprestid infestation.

during the first year after the seedlings were transplanted into the field.

In order to obtain adult beetles for identification it was decided to transplant a number of infested young trees to one of the Rockefeller Foundation greenhouses near Mexico City. A number of mature Buprestid specimens were obtained in this manner, but efforts to identify them were unsuccessful and a few individuals were sent to Dr. E. C. Van Dyke at the California Academy of Sciences. Subsequent correspondence with Dr. Van Dyke revealed that the specimens belonged to a new species, described by him as *Chrysobothris yucatanensis*.⁵

⁵Van Dyke (posthumous). New Coleoptera from western North America (*Carabidae*, *Melastidae*, *Buprestidae*, *Curculionidae*). Pan-Pacific Entomologist 29(2): 107-108. 1953.



FIG. 6.—Left to right: canker formed on stems as a result of sunscald damage; young stem completely girdled as a result of sunscald; stem showing the damaged area beginning to shrink and discolor; stem showing first effects of sunscald damage; stem of healthy young *Cedrela mexicana* tree.

In order to eliminate the primary damage by sunscald it was recommended that the company employ some method of protecting the young stems from the high temperatures of the cleared planting areas. Two methods were suggested: a shading device around the stem of the plant when transplanted into the cleared area or leaving enough native vegetation in the planting area to ensure the transplants partial shade rather than full sunlight. If successful, the latter method promised in addition to reduce the cost of clearing operations.

A number of rows of young trees were planted by the company for a test of both the recommended methods. An inexpensive way of shading the stems was devised using refuse strips from the company's log lathe. Following the

planting operation, short strips approximately 8 to 10 inches wide were wrapped loosely around the stem and then thrust into the ground (Fig. 8). These afforded excellent shade to the part of the stem nearest the ground line and by the end of the rainy season were completely destroyed by rot so that hand removal was unnecessary. To try out the second method, clearing crews were instructed to leave sufficient woody vegetation to shade the planting area partially at all times.

In June 1954 the plantings were revisited for a check on the results obtained. Use of the loose cylinders around the young plants had reduced injury by sunscald to approximately 35 percent, but many young plants with the lower part of the stem perfectly shaded

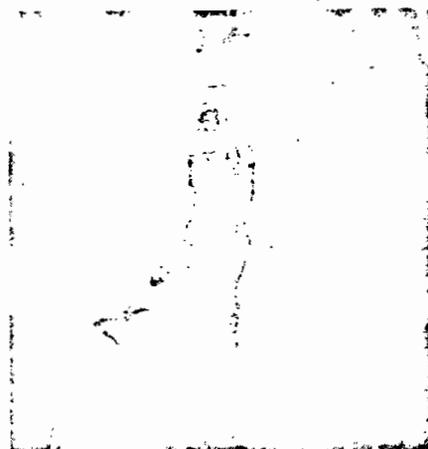


FIG. 7.—Young *Cedrela mexicana* tree severely damaged by sunscald and subsequent Buprestid infestation.

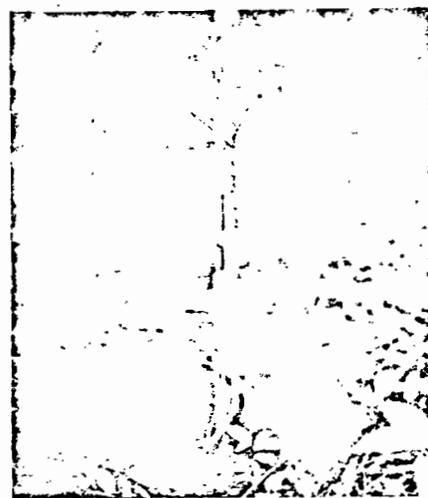


FIG. 8.—Shading cylinder of lathe refuse placed around young tree already transplanted.

had been damaged by sunscald. In an effort to determine the reasons for this it was decided to check the condition of the plants before transplanting. Accordingly an inspection was made of a number of tramcart loads of young plants ready to be moved into the cleared strips for planting. It was found that 27 percent of the young plants had already suffered sunscald injury before they were transplanted in the *brechas*.

Reviewing the entire transplanting operation, it was noted that nursery stock was maintained under partial shade (Fig. 1) until ready to be moved to the plantations. Workers then moved the young trees from the shaded nursery and placed them in groups, in full direct sunlight, awaiting the return of one of the tramcarts. This



FIG. 9.—Placing strips of lathe refuse around the stem of the young plants immediately upon removal from the nursery plots.

waiting period varied from a few minutes at times to an hour or more.

Stems of young trees still in the nursery were also inspected for sunscald injury; 5 percent of the plants were found damaged. All of the damaged plants in the nursery were located at the borders of the shaded nursery plots, where they were subject to direct sunlight during part of the day.

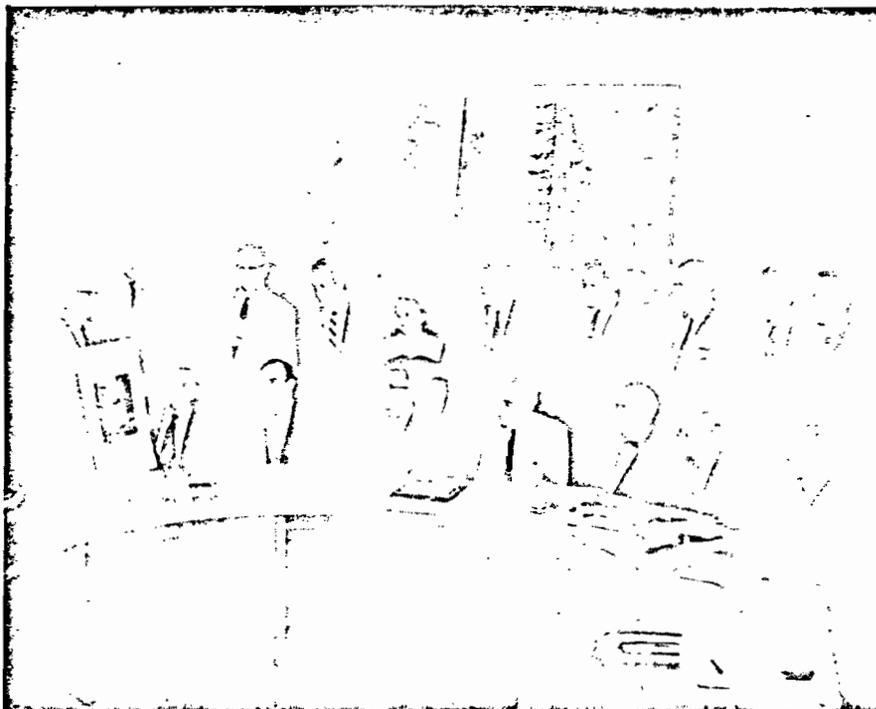
In summary, 5 percent of the nursery stock had suffered injury

from sunscald prior to movement from the shaded nursery plots and an additional 22 percent of the plants were damaged by sunscald by the time they arrived at the planting site. Since in the experiments referred to above the condition of the seedlings before they were transplanted and shaded with strips was unknown, it was impossible to state just how effective this method was in reducing damage by sunscald. However a comparison of the results obtained where arti-

ficial stem shading was used with the results where no shading was used (Table 1) definitely shows that injury from sunscald can be reduced by artificially shading the lower part of the stems of the young plants. Shading the plants by leaving overhanging vegetation was abandoned as impractical since vines and other vegetation soon completely overran the planting area and the young plants were lost.

In view of the high percentage of sunscald damage occurring in the nursery and before the transplanting operation had been completed, it was recommended that: (1) nursery shade be extended in order to protect trees on the edges of the beds; (2) a "hardening" period of gradually reduced shade be given to beds of seedlings soon to be transplanted; (3) all stock moved from the nursery be protected by placing strips of lathe refuse around the stems immediately upon removal from the nursery (Fig. 9). It is believed that these precautions will almost entirely eliminate sunscald injury and subsequent damage by *Chrysobothris yucatanensis* in plantations of *Cedrela mexicana* in Yucatán.

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←PRESENTATION of the 1957 Smokey Bear Forest Fire Prevention Program. Shown are: *Standing*, James P. Felton and Richard Stow, Foote, Cone & Belding; J. Morgan Smith, U. S. Forest Service; Ervin Grant, Foote, Cone & Belding; Anna Mary Freas, Forest Service; Henry C. Wehde, Jr., The Advertising Council, Inc.; Richard E. McArdle, chief, Forest Service; William W. Huber, A. Brands, and Wallace E. Wheeler, Forest Service. *Seated*, Gareth C. Moon, state forester, Montana; Clint Davis, Forest Service; Roger L. Guernsey, state forester, Idaho; James N. Diehl, Forest Service; Alden T. Cottrell, state forester, New Jersey; James C. Turner, Jr., district forester, Macon, Ga.; and Merle S. Lowden, Forest Service.