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THE EUCALYPTUS LONGHORNED BORER

A new insect pest is threatening California's eucalyptus trees. So far, there aren't many solutions to the growing problem.

by Dr. A.D. Ali, Janet S. Hartin, and Dr. T.D. Paine

The eucalyptus longhorned borer (ELHB), *Phoracantha semipunctata* (F.), is an exotic beetle now attacking eucalyptus trees in southern California.

Adults are 1-1½ inches long, dark brown with two yellow zig-zag lines and two yellow oval dots on the wings. The beetle belongs in the family Cerambycidae whose members generally possess a pair of antennae as long or longer than the body, hence the name "longhorned."

The eucalyptus longhorned borer as an adult beetle (A) and as a larva (B). The larvae cause the heaviest damage to Eucalyptus trees.

This pest was first detected in October, 1984, in El Toro (Orange County). Since then, infestations have spread to six southern California counties ranging from Camp Pendleton, San Diego County; north to Simi Valley, Ventura County; inland to Redlands, San Bernardino County; and Hemet in Riverside County.

Life cycle and damage

Adult ELHB fly only at night and hide under loose eucalyptus bark in the day. Mated females lay eggs under loose bark in masses ranging from 10-100 eggs.

The larvae hatch in 10-14 days and feed superficially on the bark, leaving dark trails up to 1 inch in length.

As they increase in size, the larvae start boring inside the bark and feed in the cambium layer. The larval stages known as roundheaded borers cause most of the damage.

Larvae tunnel through the phloem and cambial tissues as they feed, producing galleries that usually run parallel to each other and are tightly packed with frass (fecal pellets which the larva produces as it feeds). These tunnels widen as the larva grows and may reach three times the width of the larva's head region.

This feeding disrupts the movement of water and nutrients through the plant, which leads to the death of infested limbs and branches. Under severe infestations the main trunk can be girdled, resulting in tree death.


The feeding galleries of the eucalyptus longhorned borer. Note the parallel galleries.

As the larva matures it starts boring into the wood up to a distance of 4-6 inches where it constructs a pupation chamber. The pupa, the intermediate stage between the larva and the adult, remains protected deep inside the tree until maturity.

At that time it transforms into an adult and emerges through characteristic oval-shaped exit holes on the trunk, completing the life cycle.

Under warm conditions, the cycle from egg to adult can be completed in two months. In cooler climates, this cycle may last as long as nine months. Consequently, in California this pest may have two or three overlapping generations per year.

To date, ELHB has only been found in eucalyptus species in California. Reports from other countries indicate that other trees in the Myrtaceae can be attacked as well. These include the gum myrtle (*Angophora* spp.) and the turpentine tree (*Syncarpia* spp.)

Cultural control

Although adult females lay their eggs on healthy, weakened, and dead eucalyptus trees, the larvae can only establish their infestation on weakened or dead trees.

Deep watering and proper fertiliza

Dr. A. D. Ali is extension entomologist, Ornamentals and Turfgrass, Cooperative Extension, UC-Riverside; Janet S. Hartin is environmental and urban horticulturist, UC-Cooperative Extension, San Bernardino County; and Dr. T. D. Paine is assistant professor, Department of Entomology, UC-Riverside.

The eucalyptus tree in the center shows symptoms of damage due to the longhorned borer.

tion which keep trees in good vigor are recommended to discourage ELHB attacks. Healthy trees produce copious amounts of dark sticky gum which drowns and kills penetrating larvae.

Dead trees and those weakened by physiological or moisture stress lack the ability to defend themselves. Branches and whole trees which have succumbed to ELHB attacks are brown in color and retain the dried up leaves.

When this situation is encountered, the affected branches and dead trees must be removed and disposed of through incineration or burial to a depth of 6-8 inches. This will prevent adults from emerging and spreading the infestation.

Adults can fly over distances up to nine miles. However, the physical transportation of infested eucalyptus logs may be the biggest cause contributing to fast spreading infestations in southern California.

Thus it is necessary that eucalyptus logs used for firewood be thoroughly inspected for infestation before transport. Furthermore, firewood logs should be arranged in uniform piles and covered with a thick plastic tarp.

The tarp prevents adult beetles from detecting the wood pile and depositing eggs on it. And, if the pile already contains an infestation, it prevents those adults from emerging and spreading.

Chemical control

Adults and eggs of the ELHB are sheltered under loose bark, whereas larvae and pupae are protected inside the trunk. Consequently, the use of foliar applications of insecticides is not recommended due to the difficulty of getting the material in contact with any stage of the pest's development.

Two other considerations also limit the effectiveness of foliar applications against this insect.

The first is the height of trees, especially those planted in windbreaks that may be more than 100-years-old. Coverage becomes a problem with such trees that are 100 feet or taller.

The other problem with using foliar applications of insecticides is the lack of distinct generations or "peak flight" of this insect which would better allow timing of applications.

It is believed that two or three overlapping ELHB generations occur in California and adult females may live up to six months. This has led researchers at the University of California in Riverside to initiate studies for controlling this pest with systemic soil-injected insecticides.

The objectives are to determine efficacy and to document the economic feasibility of such control practices in both windbreak and woodlot eucalyptus plantings.

Biological control

Due to the wide-area planting of eucalyptus alongside highways, in parks, woodlots, and backyards, it seems that long-term control could be achieved through the use of biological agents.

However, not many native predators or parasites feed on this introduced pest.

While a predaceous mite has been observed feeding on ELHB eggs in California, the quantitative impact of such mortality has not yet been assessed.

In its native Australia, ELHB is attacked by numerous biological agents including both predators and parasites. Researchers at the University of California in Riverside are studying the feasibility of introducing parasites from Australia into California to combat this pest problem.

No long-term solutions

The use of cultural practices (keeping trees in good growing condition, cutting and destroying infested limbs and trees, tarping eucalyptus firewood piles) is recommended.

Use of systemic insecticides may provide a short-term solution to slow down the spread of ELHB infestations. And the successful introduction and establishment of effective parasites could provide a long-term solution for containment of the eucalyptus longhorned borer. **WT&T**

County Stadium gets a new water supply

by Bernie Rupp, Milwaukee Brewers

Last fall, a new irrigation and drainage system was installed at Milwaukee County Stadium under the direction of Harry Gill, superintendent of buildings and grounds, and his assistant Gary Vanden Berg.

They decided that the Toro 640 irrigation system would be best for use. Fifty-seven rotary, gear-driven, pop-up heads were installed. They are constructed of cycoloc plastic with spring-loaded retractors, delirn gears and locking caps with check valves.

All irrigation heads were installed on swing joints. The heads were positioned 1 to 1½ inches below the finished grade. Sprinkler head connections were made to the existing 3-inch PVC main. Each irrigation head is controlled by a remote electric valve placed in a control box next to the irrigation head.

The field controllers are electromechanical units, capable of operating 12 normally closed 24-volt A.C. valves. Each controller has a 0- to 30-minute station timing, a 24-hour clock and a calendar clock allowing fully automatic independent programming.

Each of the field controllers is wired to the central controller which has one module capable of individual standard cycle functions such as "syringe" or "cancel" for each satellite or field control.

The central controller has a 24-hour clock, a 14-day program dial and a manual start button. The central control is the Toro VT-XP 4000 varitime unit, and the field controllers are Toro solid state VT-3 models.

Harry Gill (right) supervises installation of the irrigation pipe and wires through slit sod. "The only places we had to remove the sod was when we came to a sprinkler head," Gill notes.

Workers from Milwaukee Lawn install the Toro sprinkler heads.

The pipe used for the irrigation system is polyvinyl chloride pressure pipe rated at 200 psi. The piping and wiring were installed using a vibratory type apparatus. Pipe was placed 18 inches below grade.

In conjunction with the installation of our new irrigation system, a field drainage system was also installed. It is based on the concept developed by Cambridge Soil Services of Cambridge, England. It was installed by David Heiss of Turf Services in Spring Lake, Mich.

The system is implemented in three phases. Phase one consists of a slit measuring ¾-inch wide and 9 inches deep, placed 20 inches on centers radially from home plate. The slits were back-filled with sand, analyzed in the accompanying chart.

About 80 percent of the sand was in the 18- to 25-millimeter range, which is very good for sand-slitting work. It's uniformity and round particle size is especially good for this type of drainage system.

Phase two, which consists of an ID perforated pipe at the trench bottom, and phase three, a 4-inch perimeter drain adjacent to the warning track, were not installed at this time. The existing drain tile was adequate for the new drainage system.

All work was completed in eight working days. **WT&T**

SAND ANALYSIS

Mesh	(%) Retained
30	.2
40	5.8
50	27.0
70	47.0
100	19.8
140	.2

ED. NOTE: Milwaukee County Stadium received national media attention when heavy rain caused four feet of water to accumulate on the floor of the stadium this summer. Gill and his ground crew had the stadium ready to play ball the next day. "The irrigation system has been super," says Gill today. "It's probably one of the best things we've ever done here."

AUTHOR BIO: Bernie Rupp is employed by the Milwaukee Brewers.

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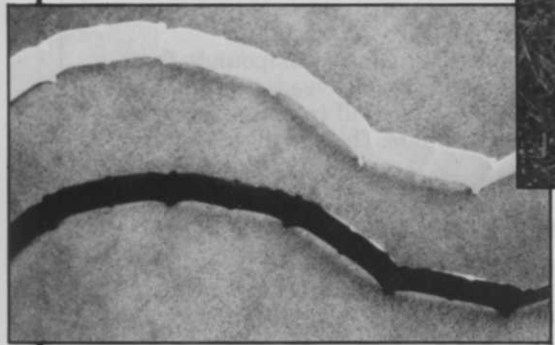
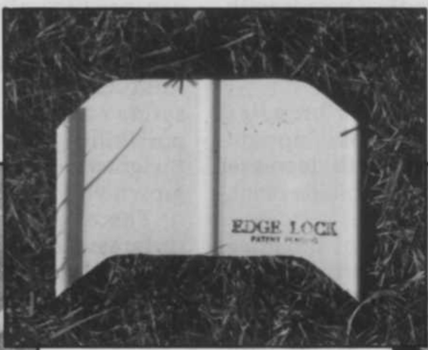
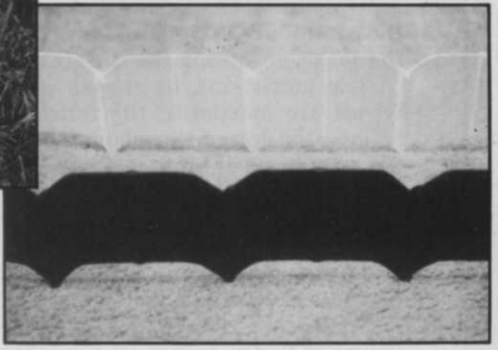
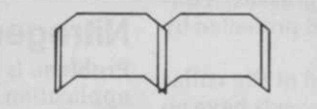
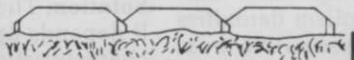








BEFORE SHOWING INTERLOCKING METHOD



AFTER INSTALLATION

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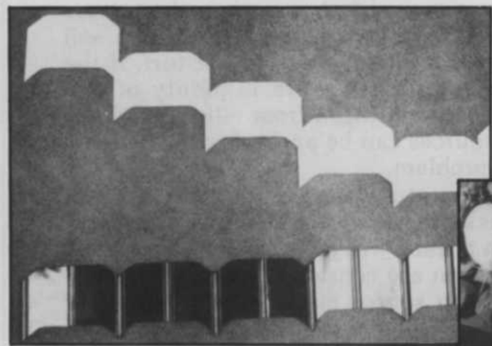

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Circle No. 113 on Reader Inquiry Card

PROBLEM SOLVERS

by **Balakrishna Rao**, Ph.D

Why herbicides don't kill grass

Problem: *Why don't broadleaf herbicides kill turfgrass? (Georgia)*

Solution: Auxin herbicides (2,4-D, MCPP, dicamba) are able to selectively control broadleaf weeds without killing turfgrass because of basic morphological and physiological differences between the two types of plants.

The horizontally-oriented leaves of broadleaf weeds collect more herbicide than leaves of upright-growing turfgrasses. This vertical growth decreases the potential of toxic amounts of the herbicide reaching sensitive sites in the turfgrass plant.

The meristems, or growth points, of broadleaf weeds are located in the terminal portion of the stems—the top of the plant. This location exposes the meristems of broadleaf weeds to foliar sprays of herbicides. The meristems of turfgrasses, conversely, are close to the soil surface and protected by the leaf sheath.

Turfgrasses have meristems located at the collar and base of each leaf, while broadleaf weeds have no leaf meristems. Herbicides being translocated in the leaves of turfgrasses must pass through these meristematic areas where rapid metabolism detoxifies the herbicide before it reaches more sensitive areas of the plant. Broadleaf weeds, however, do not have the ability to detoxify herbicides before being translocated out of the leaf tissue since the leaves lack metabolic sites.

Turfgrasses can be severely injured by broadleaf herbicides under certain conditions. The immature leaves of seedlings cannot metabolize the herbicide before it is translocated to more delicate plant tissues. Heat- and drought-stressed turf is also more likely to be injured by herbicides because of reduced metabolic activity. Proper application of broadleaf herbicides to thriving, mature turf will selectively control broadleaf weeds without injuring the turfgrass.

Controlling undesirable plants

Problem: *Can you tell me some uses of allelopathic plants for control of undesirable plants? (New York)*

Solution: This is a very good question and concept in vegetation management. There is not much information on uses of allelopathic plants for control of undesirable plants. Most of the information is on the effect of allelopathic plants on desirable plants or crops. There is quite a bit of information on the allelopathic effect of the walnut plant on other plants. Ten- to 12-year-old walnut plants can produce juglone, an inhibitory chemical. I am not familiar with any studies showing juglone's effect on undesirable plants.

These allelopathic compounds released from plants are short-lived in the soil because they are subject to chemical or microbial decomposition. To be very effective, economical and practical to use, these compounds should be safe on desirable crops and sensitive and specific to undesirable plant species like weeds.

Reports from Michigan State University suggest that crops, like cucumbers, sorghum and sunflowers, can produce allelopathic chemicals which inhibit weeds. Reports from Rhode Island indicate that leachates from perennial ryegrass, red fescue and Kentucky bluegrass can affect the growth of forsythia and dogwood plants. This study suggests the possibility of allelopathic compounds released from turfgrass affecting ornamental plants if turfgrass is grown very close to them.

The effect of these inhibitory compounds from turfgrass culture on undesirable weeds is unknown. It may already be working well in nature in some situations and poor in others. This area needs further research.

Nitrogen amounts on sandy soils

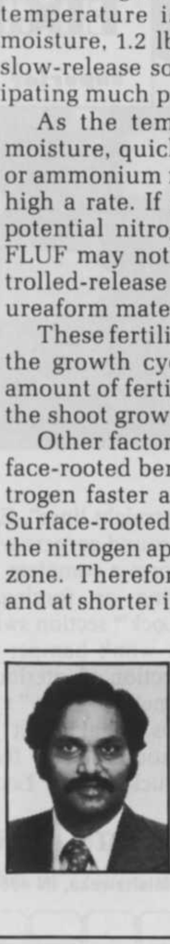
Problem: *Is 1.2 lbs. of nitrogen per 1,000 sq. ft. per application excessive on bluegrass turf in west Michigan for a spring treatment on sandy soils? (Michigan)*

Solution: The answer to your question is yes and no. It depends upon several factors such as the release characteristics of nitrogen source, temperature, soil moisture, growth cycle and activity of turf. If the temperature is cool and there is plenty of soil moisture, 1.2 lbs. of nitrogen from either quick- or slow-release sources can be applied without anticipating much problem.

As the temperature increases with less soil moisture, quick-release nitrogen sources, like urea or ammonium nitrate, will present a problem at that high a rate. If you are considering using low-burn potential nitrogen source materials, Formolene or FLUF may not present problems at that rate. Controlled-release products like sulfur-coated urea or ureaform materials would be the safest of all.

These fertilization practices should coincide with the growth cycle of turfgrass. Provide the proper amount of fertilization based on soil test results and the shoot growth activity in spring.

Other factors to consider are sandy soils and surface-rooted bentgrass. Sandy soils will leach the nitrogen faster and deeper than finer textured soils. Surface-rooted bentgrass may not be able to use all the nitrogen applied before it leaches below the root zone. Therefore, consider applying at lower rates and at shorter intervals to overcome these problems.



Balakrishna Rao is Director of Lawn Care Technical Resources for The Davey Tree Co., Kent, Ohio.

Questions should be mailed to Problem Solver, Weeds Trees & Turf, 7500 Old Oak Boulevard, Cleveland, OH 44130. Please allow 2-3 months for an answer to appear in the magazine.

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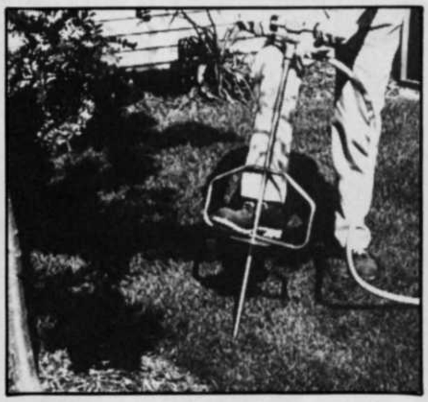

The lightweight feeder comes with a permanent splash plate, and can be operated with either foot. The feeder is compatible with the Lesco Digital Flow Meter for accurate application.

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