MEETINGS

NOVEMBER 7 - Mira Vista G & CC, El Cerrito

DECEMBER 5 - Rancho Canada GC, Carmel (Annual Christmas Party)

JANUARY 13 - Poppy Hills, Monterey

FEBRUARY - Haggin Oaks, Sacramento

MARCH - San Jose CC, San Jose

APRIL - (OPEN) Annual Meeting

MAY - Rossmoor GC, Walnut Creek

JUNE - San Francisco GC, San Francisco

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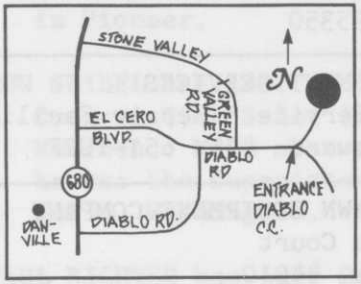
* Many thanks to Tom Neadeau and the Sierra Nevada GCSA for their hospitality in hosting the joint September meeting. It was to bad about the weather but it was even worse because of the attendance due to the cancellation of golf. Be prepared to send your money because you will be billed if you sent in a reservation and didn't show.
The food was great and many thanks to Jim Lipari on his presentation on seed production. Thanks to Walt Bray for setting up the meeting.

ADVANCED DRAINAGE SYSTEMS (ADS) Walt Bray - 6917 Flintwood Way Sacramento 95831	BROWN SAND, INC. 874 East Woodard Avenue Manteca 95336 209 982-4618
AUTOMATIC RAIN CO - Tom Jackson 4060 Campbell Avenue Menlo Park 94025	C-M CHAIN & HOIST 211 Dover Street Los Gatos 95030
BAY IRRIGATION & TURF SUPPLY 2041 Commerce Avenue Concord 94520	H. V. CARTER COMPANY, INC. 1700 East 14th St, Box 12006 Oakland 94604

HOST SUPERINTENDENT

SOHAN SINGH worked under Obie M. Noonkester at El Macero CC in Davis, California from 1963-1968. In December 1968, he moved to Sequoyah CC where he was assistant to Walter Boysen and Gunmil Sandhu. In January 1972, he got his first Superintendant's job at Diablo CC.
Many steps have been taken to improve the drainage in adobe soil, and with the help of architect Bob Graves and Algie Pulley, 24 bunkers and four lakes have been added. In addition, the 7th and 13th greens have been enlarged, many trees have been planted, and new tees and mounds constructed. In 1974 a Toro sprinkler system was installed and a new maintenance building was added in 1980.



DIABLO COUNTRY CLUB was established as a golf and country club in 1917. It is still one of the most historic and beautiful country clubs in No. California, set in a charming, natural atmosphere, and popular for that reason.
The club facilities include historic chalets and an old clubhouse, which will be remodeled in January 1987 at a cost of almost 4 million dollars. The 127.8 acre, course designed by Jack Neville, is nestled among the foothills at the base of 3,849 ft. Mt. Diablo. The General Manager of Diablo Country Club is Paul R. MacDonald.

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* DIRECTIONS: Located off Hwy. 680, between Walnut Creek and San Ramon. Take the EL CERRO exit from 680, drive 2.2 miles east. Left on Alameda-Diablo and left again onto Clubhouse Road.

HYDRO ENGINEERING-Adrian Bertens Box 505 Phone 415 837-1892 Danville 94526	K K W INC/ John Deming 20470 Corsair Blvd Hayward 94545
INTERNATIONAL SEEDS INC. P. O. Box 168 Halsey, ORegon 97348	KAR PRODUCTS INC. 779 Brannan Place Concord 94518
JENKINS MACHINERY COMPANY 1848 Arnold Industrial Place Concord 94520	NAIAD COMPANY - Don Scott 7531 Homewood Court Pleasanton 94566

Golf

- by Rod Kilcoyne, CGCS

at Palo Alto Hills

LOW NET

Dulbag Dubria	70
Terry Stratton	71
Jim Hustin	72
Mike Ginelli	74
Bob Wright	75
John Grant	75
Rich Scholes	75

LOW GROSS

Chris Cantenelli	72
Ross Brownlie	73
Mike Garvale	79
Corey Eastwood	79
Jake Montes	80
John Winskowicz	82
Lewis, Scott	82

at Sequoyah

LOW NET

George Bell	64
Grady Simril	66
Bob Dauterman	70
Dave Archer	73
Mike Ginelli	73
Charles Oliveras	73
Russ Tsutsui	74
John Grant	75
Larry Mesa	75
George Santana	75
Dwight Denno	75
Bill Rattz	76
Jim Andrews	76
Bob Klinesteker	76

LOW GROSS

John Winskowicz	73
Craig Kilcoyne	73
Bruce Pluin	74
Bob Cox	74
Jim Ferrin	80
Scott Lewis	80
Todd Light	81
Frank Castellotti	81
Al Brownlie	82
Jim Bantrup	83
Warren Rattz	83

Naumann's Norcal News - by Don Naumann

BILL NIGH has accepted the Superintendent position at Gold Hills GC in Redding. Bill had been the Superintendent at Moffet Field GC in Mt. View.

AUBURN CC was recently purchased by a group of people including, Pat Markovitz and Dave Schondo. Paul Juberg is remaining as Superintendent.

La CONTENTA CC was recently purchased by a group from Davis GC including, Superintendent Tim Conner and PGA pro Kurt Hammand. Rod Butler is remaing as Superintendent at La Contenta.

JED NOONKESTER has accepted the Superintendent position at Mace Meadows CC in Pioneer.

RON SEIBEL has left Incline Village GC to accept the area managers job for Country Club Sales in Washington State. He is being replaced by Mike Nauroth. Mike most recently was the assistant at Incline. Prior to that he was the Superintendent of parks and golf course for the city of Walla Walla, Washington.

PAUL RICHTER has left Castlewood CC to go back to Michigan. He is being replaced by Grant Noonkester. The maintenance is contracted to Noonkester Golf.

IN THE last 5 years at Gleneagles GC in San Francisco, ERIK DeLAMBERT has been an extremely busy guy. Besides rebuilding the clubhouse, he has rebuilt 14 tees, 5 greens (1 more this coming year), and installed a new irrigation system.

DICK HOWE from Arbuckle GC has designed and is building 9 holes at Dunnigan off Hwy. 5. The golf course is yet to be named.

UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION

presents

1986 Northern California Turf and Landscape Short Course

- Weed Management and Control -

SESSION 1

Wednesday, November 5, 9-12 noon, San Mateo
1:30-4:30 San Jose

Thursday, November 6, 9-12 noon, Walnut Creek

PROGRAM: Weed Identification
Weed Control Strategies
Ground Cover and Bedding Plants
Weed Control

SESSION 2

Wednesday, November 12, 9-12 noon, San Mateo
1:30-4:30, San Jose

Thursday, November 13, 9-12 noon, Walnut Creek

PROGRAM: Aquatic Weed Control
Herbicides: What They Are and How They Work
Non-Cropland and Vacant Lot Weed Control

SESSION 3

Wednesday, November 19, 9-12 noon, San Mateo
1:30-4:30, San Jose

Thursday, November 20, 9-12 noon, Walnut Creek

PROGRAM: Preemergence Turf Weed Control
Postemergence Turf Weed Control
Tree and Shrub Weed Control

No Registration - No Fees

Certificate of Completion

3 PCA hours/session
total 9 PCA hours

LOCATIONS: See other side

In Cooperation With:
Walnut Creek Public Service Department
Evergreen Valley College

SPEAKERS:

*Larry Costello, Horticulture Advisor, UCCE, San Mateo - San Francisco Counties

*Dave Cudney, Weed Scientist University of California, Riverside

*Clyde Elmore, Weed Scientist University of California, Davis

*Ali Harivandi, Turf, Soil & Water Advisor, Alameda/Contra Costa/Santa Clara Counties

*Jim McHenry, Weed Scientist, University of California, Davis

*Pavel Svihra, Horticulture Advisor, Alameda/Contra Costa/Santa Clara Counties

FOR MORE INFORMATION CALL:

San Jose and Walnut Creek Locations

ALI HARIVANDI (415) 881-6341
Turf, Soil & Water Advisor

Pavel Svihra (415) 881-6341
Horticulture Advisor

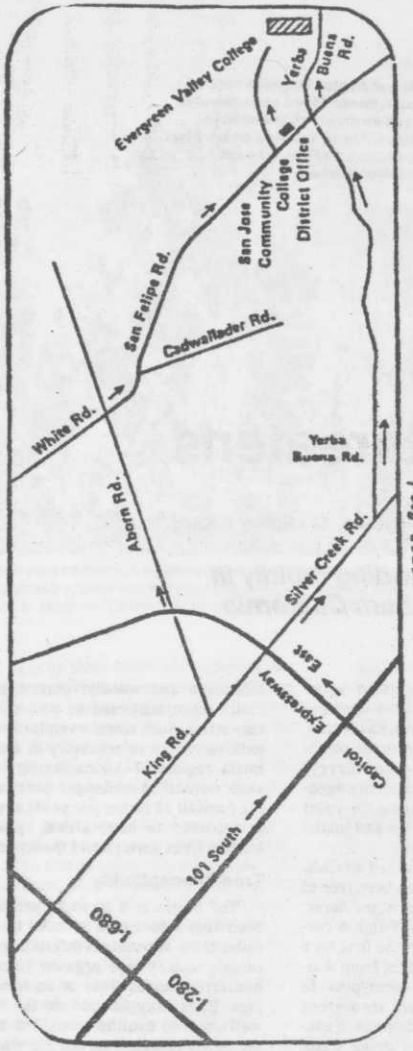
San Mateo Location

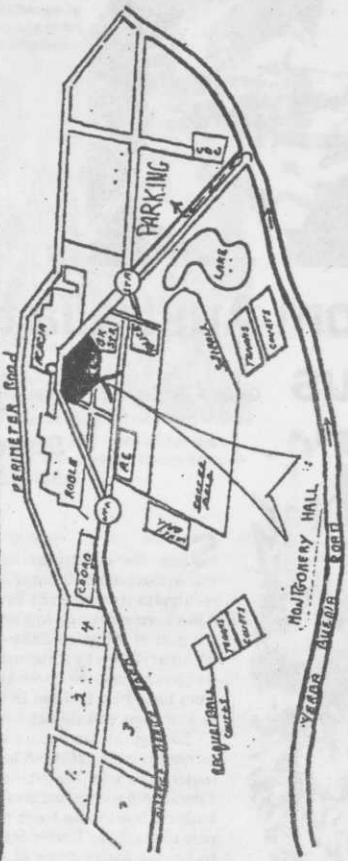
Larry Costello (415) 726-9059
Horticulture Advisor

San Jose Location

Montgomery Hall
Learning Center Theatre
Evergreen Valley College
3095 Yerba Buena Road
San Jose

Tel: (408) 274-7900





San Mateo Location

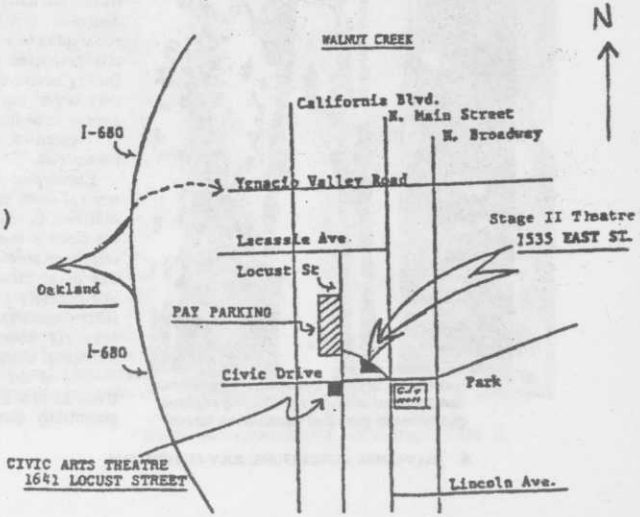
Please call for this location information after Oct. 15, 1986.

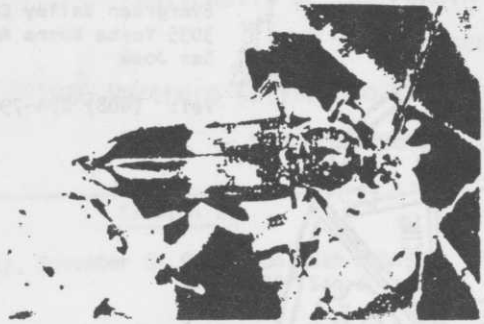
Larry Costello:
(415) 726-9059

Walnut Creek Location

Thursday, Nov. 6, 1986: (Session 1)
Stage II Theatre
1535 East Street

Thursday, Nov. 13 and 20
(Session 2, 3)
Civic Arts Theatre
1641 Locust Street





Max Badgley

The female eucalyptus longhorn borer, a pollen feeder, doesn't feed on eucalyptus but lays eggs on diseased or moisture-stressed trees. The larvae feed on the inner bark and cambium and can kill even healthy eucalyptus trees.

Beetle from Australia threatens eucalyptus

Glenn T. Scriven □ Eldon L. Reeves □ Robert F. Luck

Healthy eucalyptus trees respond to *Phoracantha* larval boring by producing copious quantities of gum that smother the larvae.

Spreading rapidly in southern California

Since the eucalyptus longhorn borer was discovered in October 1984 infesting eucalyptus trees near El Toro, California, it has been spreading rapidly in the southern part of the state. Subsequent surveys (February 1986) by state and county agencies have found the borer along the coast from Long Beach to San Diego and inland to Van Nuys and Hemet.

Eucalyptus has been planted in California since the 1860s but has been free of major pests until the arrival of the borer, *Phoracantha semipunctata* (Fab.), a cerambycid beetle. The borer is the first such pest to reach the United States from Australia, the native home of eucalyptus. In Australia, this beetle occurs throughout eucalyptus forests, but its damage is usually restricted to dead and dying trees. During severe droughts, beetle outbreaks may occur, but its populations normally appear to be limited by a complex of natural enemies, including predators and parasitoids.

Eucalyptus has also been planted in several other countries, including Israel, Morocco, Spain, and South Africa, where the wood is used for lumber, paper pulp, telephone poles, mine supports, and fuel. The eucalyptus longhorn borer has been accidentally introduced into many of these countries, and is killing trees and severely damaging logs intended for structural timber and telephone poles.

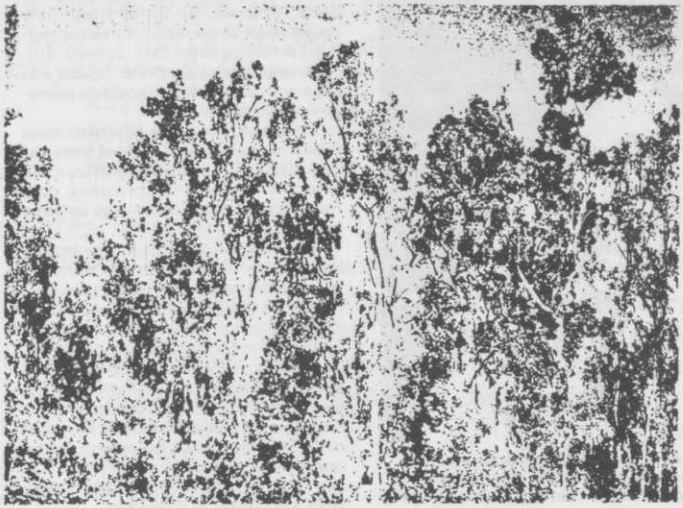
One of the more common broadleaf trees in urban California, eucalyptus is potentially threatened by the beetle in landscape and woodlot plantings, especially when subjected to periodic moisture stress. Such stress, even for brief periods, increases vulnerability to attack. In moist regions of Africa (eastern Transvaal, rainfall 54 inches per year, and Natal, rainfall 38 inches per year), the beetle is reported to have killed apparently healthy trees during brief moisture stress.

Tree susceptibility

The beetle is a strong flyer and has been known to attack isolated trees nine miles from the nearest infested tree. The female usually lays eggs on diseased or moisture-stressed trees or on freshly cut logs. Eggs may be laid on the bark of well-watered healthy trees, but most of the newly emerged larvae die when they attempt to penetrate the bark. Healthy trees respond to larval boring by producing copious quantities of gum that smother the larvae.

In unirrigated woodlots, some trees are under more moisture stress than others. Stress symptoms include sprouting of inactive buds on the tree bole and changes in leaf color. The leaves of such trees viewed through a No. 8 yellow photographic filter appear much lighter than those on healthy trees. The beetles repeatedly lay eggs on such trees and avoid neighboring healthy trees.

Larvae that survive the tree's initial gum defenses and reach the cambium confine their feeding to a limited area, forming a lesion. The beetles continue to



When viewed through a yellow photographic filter, leaves of eucalyptus trees under moisture stress appear much lighter than those of healthy trees. Massive beetle attacks on such trees in southern California are causing major losses.

Longhorn borer larvae can riddle the inner bark and cambium of vulnerable eucalyptus trees. Below, *Phoracantha* lesion and emergence hole on living eucalyptus tree.

lay eggs on these trees, and surviving larvae form additional lesions. Finally, gum production ceases and the tree succumbs to a massive attack; the larvae riddle the inner bark and cambium with frass-packed galleries. Larvae can mine the trunk and branches as small as ¾ inch in diameter.

Our preliminary observations suggest that eucalyptus species vary in susceptibility to attack under comparable drought conditions. Massive beetle attacks quickly kill *Eucalyptus globulus* and *E. viminalis* when their gum defenses decline. In contrast, the gum defenses of *E. blakelyi* continue to cause high mortality of larvae entering the bark, but some larvae survive, producing long narrow lesions. Occasionally, a single larva will girdle the trunk and kill the tree. *Eucalyptus cladocalyx* has substantial gum defenses, even during severe drought, but some larvae penetrate the bark of certain trees and produce large oval-shaped lesions exposing bare wood. We are currently evaluating other species of *Eucalyptus*.

Biology

The beetle is about 1 inch long; the body is shiny black; and a yellow band extends across the upper half of the forewings. Within the yellow band is an irregular black line. The female's antennae are about the same length as the body; those of the male are somewhat longer and heavier with prominent spines at each segment.

Upon emergence, the adult male is ready to mate; the female, however, must wait 48 hours. After mating, which takes 8 to 28 minutes, the female must wait an additional period of 2 to 4 days before she can begin laying eggs. The sex ratio is one to one, and unmated females lay no eggs. We have observed females feeding on the flowers of eucalyptus and other plants, apparently to gain additional nutrition for egg production. Adult females may live 40 days in summer and 180 days in winter and lay up to 300 eggs. However, they tend to live only 3 to 14 days in the laboratory.

Egg laying occurs at night. The eggs are laid under loose bark in groups of 3 to 30 eggs, which incubate in 10 to 14 days. When the eggs hatch, the larvae may feed along the bark surface for a short distance (¼ to 1 inch) forming a conspicuous dark trail. Then they turn into the bark and proceed toward the cambium — the living tissue beneath the bark. They feed in the cambium region until they are nearly mature.

The larvae grow as they feed, and gallery size increases correspondingly. The gallery is oval in cross-section and about twice as wide as the young larva's head. As the larva matures, the gallery widens, increasing to more than three times the head width. A single larval gallery can extend several feet and can girdle a tree. When the larva nears maturity, it first forms a short tunnel to the bark surface then bores several inches into the wood to

Maturing larvae bore tunnel through bark, then several inches into wood to form a pupal chamber. Following pupal stage (left) adult beetle emerges through tunnel.

form a pupal chamber. The tunnel near the bark surface will provide the exit for the emerging adult beetle.

Larvae develop in about 70 days in fresh logs and up to 180 days in dry logs. The pupal stage lasts about 20 days. During the spring and summer, the beetle requires three to four months to complete its life cycle, but in the fall and winter, it may require up to nine months. Two to three generations per year occur in Mediterranean climates similar to that of California.

Chemical control measures

Living eucalyptus trees are not easily protected by pesticides, since the beetles' behavior limits their exposure to the chemicals. The beetles hide during the day under loose bark and do not feed on leaves or bark. The adults are active from February to November, and so it would be necessary to use pesticides with long residual activity or frequent applications to kill adults landing on the tree. Also, since viable eggs can be laid on sprayed trees before the pesticide can kill the female beetle, killing the adult would not necessarily prevent infestation of a susceptible tree.

Eggs are usually protected from exposure to pesticides, because they are laid under layers of loose bark. Once the larvae are inside the bark, they escape pesticide applications.

The long-term cost of repeated applications to large eucalyptus trees also seems economically impractical. Zinc chloride injections into cut logs kill the larvae and prevent infestation, but the procedure is slow and expensive. Removal of the bark on felled logs can also prevent infestation, but labor costs have prevented its adoption in most infested areas. Fumigation may be a practical means of preventing the larvae from developing in cut logs stored for use as firewood. The type of fumigant and dosages required have not yet been determined. Covering uninfested cut logs with sturdy tarpaulins could protect them from beetle attack.

In Spain, freshly cut trap logs, treated with 2 percent lindane, were placed in woodlots to attract adult beetles. The beetles laid eggs on the sprayed logs and then died from contact with the pesticide. The logs were replaced every two weeks with fresh ones, and the old logs were destroyed within two months to prevent beetle emergence. Up to 100 egg masses were laid on one log and about 1,000 dead adults were found nearby. These measures apparently limited the impact of the beetle in some woodlots.

Biological control

Several predators and parasites appear to cause significant mortality to beetle larvae in Australian eucalyptus forests. Two braconid parasites, *Syngaster lepidus* Brulle and *Bracon capitator* F., are common in beetle-infested logs. Also, two predatory beetles, the clerid *Trogodendron fasciculatum* Schr. and a colydiid, *Bothrideres vittatus* Newm., may cause substantial mortality of beetle larvae in cut logs at some sites. In moist areas, the fungus *Beauveria bassiana* (Balsamo) attacks all active stages of the beetle. In Israel, the Syrian woodpecker causes about 28 percent of the larval mortality occurring in the bark. In South Africa, colonization of *Syngaster lepidus* was apparently successful, although no follow-up evaluation is available.

In Orange County, we have seen some woodpecker activity on infested trees, but it appears to be of minor importance. We have also observed the predatory mite *Pyemotes* sp. killing beetle eggs on some trees.

To assess whether native parasitoids have adapted to the beetle in California, we collected exposed logs from sites near Corona, Redlands, and Irvine and placed them in rearing chambers. We monitored beetle and parasitoid emergence. So far, we have recovered two parasitoids, *Xorides humeralis* (Say) and *Atanycolus simplex* (Cresson). Both parasitoids occur on the native cerambicid beetle *Xylotrechus nauticus*, which was also present in the sample logs. We have no evidence that any of the Australian parasitoids or predators are present in California.

Conclusion

Eucalyptus trees are well adapted to California's Mediterranean climate and for many years have been free of major pests. Consequently, several varieties have become important landscape plants and have also been extensively used in windbreak and woodlot plantings. Now these plantings are threatened by the eucalyptus longhorn borer, which is capable of reproducing in living eucalyptus trees. Cut infested logs stored for firewood are a major source of beetles. Dead and dying trees weakened by the beetle's feeding present a public danger, and their removal and replacement will be expensive.

Since chemical control with pesticides appears impractical, alternative measures need to be considered. Beetle populations can be limited by prompt removal of dead trees and protection of infested eucalyptus wood. Using pesticide-treated trap logs to attract and destroy adult beetles may reduce their numbers, but we are uncertain about the degree of control likely. Establishment of parasitoids that attack the beetle larvae and predators that feed on its eggs may be a long-term solution. Limiting the impact of the beetle on eucalyptus in California will probably require the coordinated use of these measures on a communitywide basis.

Glenn T. Scriven is Staff Research Associate, Department of Entomology, University of California, Riverside; Eldon L. Reeves is Entomologist, Riverside County Department of Agriculture; and Robert F. Luck is Associate Professor, Department of Entomology, UC Riverside. *The authors thank Nick Nissan, Orange County Entomologist, for field assistance and the following for information incorporated into this report: T.W. Drinkwater, H. Helal, Z. Mendel, K.M. Moore, and R.L. Penrose.*