California Plant Pest & Disease Report

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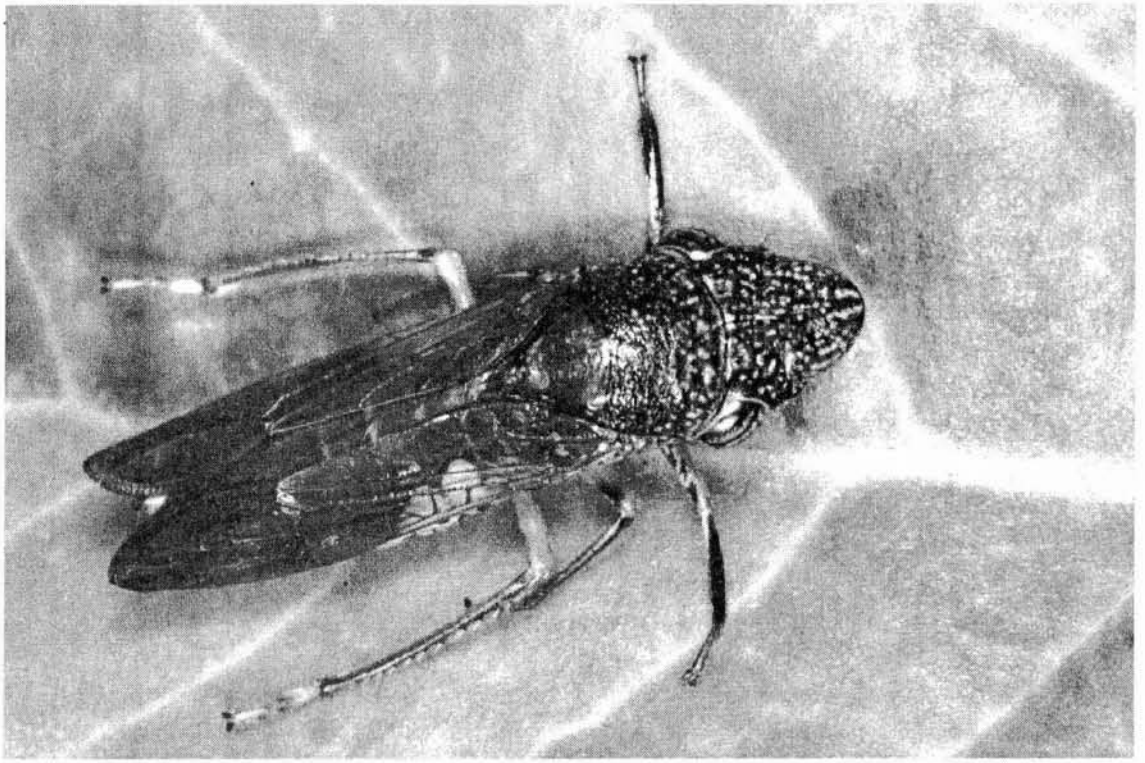

SEE PAGE 3 FOR AN UPDATE ON GLASSYWINGED SHARPSHOOTER IN CALIFORNIA

What's Inside:
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January-May, 2000

California Plant Pest & Disease Report

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ENTOMOLOGY HIGHLIGHTS

SIGNIFICANT FINDS

GLASSYWINGED SHARPSHOOTER, *Homalodisca coagulata* -(B)- As the summer wears on, more and more information about the distribution and means of spread of the glassy-winged sharpshooter are being discovered, as well as interesting facts about its identification, biology, and behavior. The map on page 6 shows the current known established populations of the sharpshooter in California, as of this writing. The map on page 7 shows those counties that are finding various life stages of the sharpshooter in incoming nursery shipments or in nurseries that regularly receive plants from wholesale nurseries in infested areas.

The number of collections of sharpshooter life stages from infested nursery stock is a suggestion of just how easily this sharpshooter could be introduced to new areas within the state and elsewhere. With known established infestations as far north as Sacramento County that appear to have existed for several years, indications are that the sharpshooter is able to do well in northern California, with fair to good survival during the winter months. This would seem to substantiate some distributional predictions based on the sharpshooter's range relative to temperature gradients in the southeastern United States (see map on page 8).

The Sacramento infestation, in Rancho Cordova, exists in an ideal residential neighborhood with multiple types of suitable hosts, including many crepe myrtles, citrus trees, grapes and oleanders. This infestation is very near several commercial outlets that sell nursery stock, and a restaurant that was built several years ago. The restaurant landscaping included numerous crepe myrtles. Sharpshooters in the neighborhood are showing a preference for crepe myrtle trees at this time.

How the sharpshooter will do in strictly agricultural settings remains to be seen. In the infestation in Temecula, the main catalyst for that infestation seems to be the citrus groves, which are planted in close proximity to vineyards. The same crop relationship also exists in the Kern County infestations, however , it does not occur north of the Fresno-Tulare citrus belt. So it is speculative now as to whether the sharpshooters will have hosts available to aid winter survival and subsequent build up to damaging populations during the summer in vineyard and orchard situations farther north in the absence of citrus.

Eggs are the most common sharpshooter stage intercepted in commercial nursery shipments. Various informational brochures clearly illustrating fresh, viable egg masses have been a great aid in training field personnel. Newly laid eggs are under the leaf epidermis, which remains as a flap over the individual eggs. In most cases the flap remains green until the eggs hatch, after which it begins to turn brown, and in many instances the flap will dry up and fall off. The leaf tissue underlying the eggs often will callous-over after the eggs hatch, leaving a very noticeable necrotic area that we are calling an "ovipositional scar." The eggs darken only slightly prior to hatching. Thus, if a portion of the epidermal flap is pulled back, the eggs will appear white, with the red eyespot of the nymph becoming prominent as the embryo matures. Near the end of embryonic development, the fully formed, unhatched nymph can be seen within the egg.

Parasitized eggs at first appear rather reddish, then become almost black. Near the end of development, the fully formed adult wasps can be seen within the remains of the sharpshooter eggs. Parasitized eggs in the later stages of development will often appear black right through the epidermal leaf flap without having to lift the flap to determine viability. When the eggs hatch, the nymphs crawl out through the cut in the leaf epidermis that was made by the female during oviposition. However, in the case of parasitized eggs, adult wasps exit by chewing round holes at one end of the egg or the other. These holes are a sure sign of parasitism and are easily seen in the field.

It should be noted that there is no set pattern of exit holes. They can all be at either the end of the egg mass near the cut made by the sharpshooter, or they can alternate ends every other egg, or appear in other combinations. It is also not necessary that all eggs in the clutch will be parasitized.

So far, the primary egg parasite in California is the species *Gonatocerus ashmeadi*. It is thought to be less efficient in attacking the early spring summer brood of sharpshooters, and does better on the late summer brood. Efforts have been made to colonize and introduce other egg parasites that will be more effective on the first brood. As of August, a new species of egg parasite has been cleared for release in selected locations, hopefully giving more effective control of the sharpshooter.

On the pathogen side, a new test kit with a purported high sensitivity to *Xylella* disease causing organisms is now being tested in Sacramento and elsewhere. Work is currently underway in Brazil where the DNA sequence of the *Xylella* CVC (citrus variegated chlorosis) genome has been completed. Controlled experiments are being performed to determine the validity and reliability of this new and other test methods. Concurrently, diagnostic investigations are in progress in Brazil. DNA sequencing work now needs to be done for a strain that causes Pierce's Disease. This will help determine what differences exist relative to *Citrus* or *Vitus* susceptibility or resistance. Similarly, it has been determined that the oleander scorch strain does not cause Pierce's Disease. It also appears that the Pierce's Disease strain does not affect citrus.

Identification of adult sharpshooters is an easy matter. However, early on this spring, it was not possible to distinguish egg masses or nymphs of glassy-winged and smoketree sharpshooters. CDFA Senior Agricultural Biological Technician Scott Kinnee, using primers designed for Asian gypsy moth, found that these two sharpshooters had different banding patterns, allowing a definitive separation of eggs and nymphs. Similar egg masses not thought to be from *Homalodisca* sharpshooters also have been easily distinguished.

Dr. David Morgan at U.C. Riverside suggested that the eye color in the nymph of glassy-winged is red; that of smoketree is blue. This color difference seems to hold up even in alcohol on all but very young nymphs. Other sharpshooters will be checked eventually to see what other diagnostics can be worked out. CDFA workers are currently developing equipment and techniques in order to sequence parts of the genome of the two sharpshooter species.

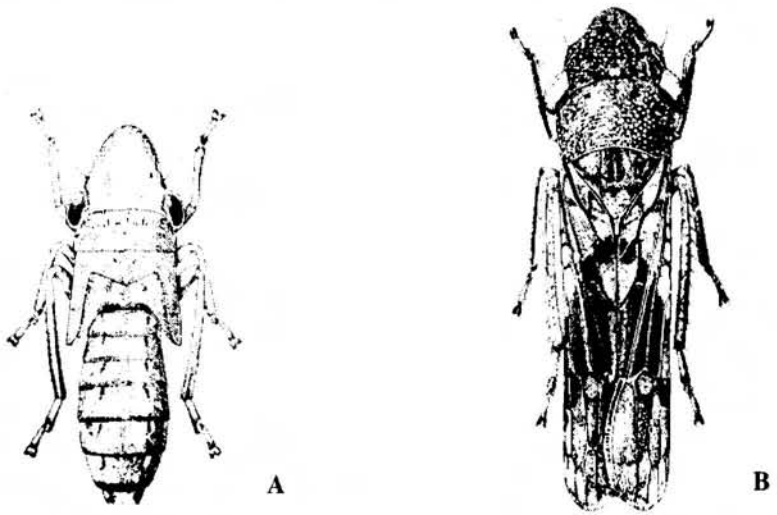


Fig. 1. A) *Homalodisca coagulata,* fifth instar nymph. B) *Homalodisca coagulata,* adult.

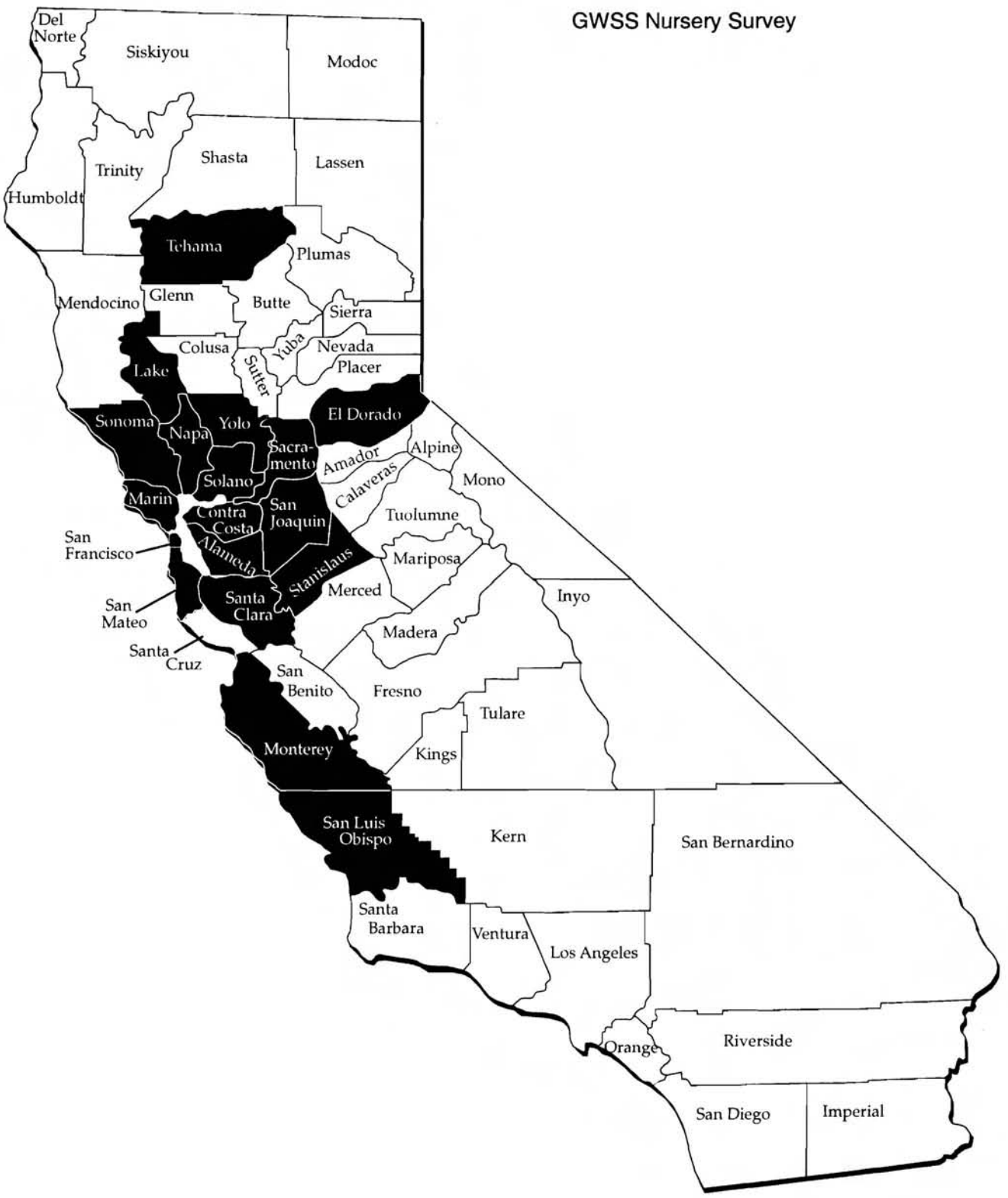
AFRICANIZED HONEY BEE (AHB), *Apis* "Africanized" -(B)- Two swarms of AHB were reported between January and May, 2000. The first swarm was found on April 3 by Roger Jacobs of the Imperial County Agricultural Department in Bard, Imperial County. The second swarm was found on April 21 by Richard Persky of the San Diego Department of Agriculture in Point Loma, San Diego County. The AHB colonized area in California is 43,840 square miles and includes all of Imperial, Los Angeles, Orange, Riverside, San Bernardino, and San Diego Counties, and portions of Kern and Ventura Counties.

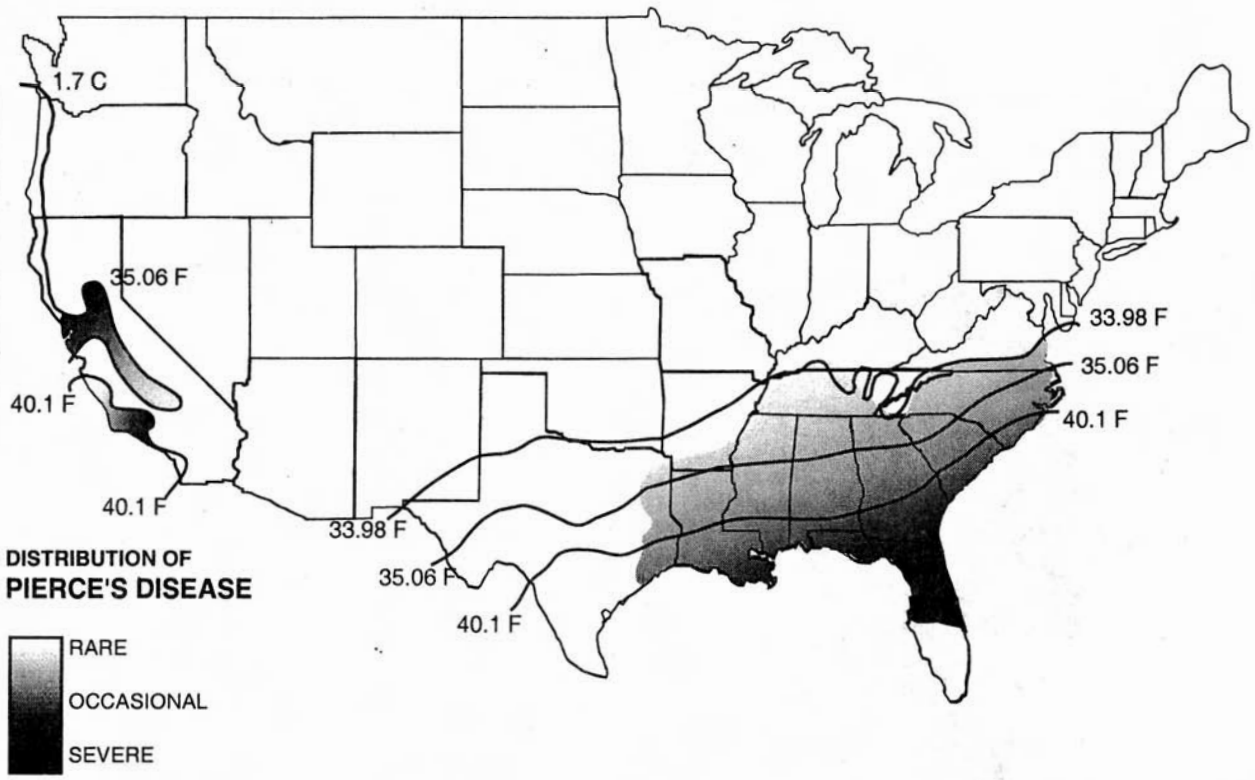
GUAVA FRUIT FLY, *Bactrocera correcta* -(A)- One guava fruit fly was found on April 5, 2000 in Reseda, Los Angeles County. The find was made by county trapper Araceli Torres from a Jackson trap placed in a lemon tree. Since no additional flies were found, no infestations exist.

MELON FRUIT FLY, *Bactrocera cucurbitae* -(A)- One melon fruit fly was found on March 22, 2000 in Rosemead, Los Angeles County. CDFA trapper Saul Gonzalez found the fly in a Jackson/Cue-lure trap that was placed in an orange tree. Since no additional flies were detected, no infestations exist.

OLIVE FRUIT FLY, *Bactrocera oleae* -(A)- Olive fruit flies continued to be trapped in Ventura and Tulare Counties. In the month of May this pest was also found for the first time in Kern, Fresno, and San Luis Obispo Counties (see "New County Records" on page 9). Over 400 olive fruit flies have been found in the Central Valley. The California Department of Food and Agriculture has recommended an extensive research program to gain a better understanding of the biology and behavior of the fly in the state.


Distribution of
Homalodisca coagulata
in California
Del Norte
Siskiyou
Modoc
Shasta
Lassen
Trinity
Humboldt
Tehama
Plumas
Mendocino
Glenn
Butte
Sierra
Colusa
Yuba
Nevada
Lake
Sutter
Placer
El Dorado
Sonoma
Napa
Yolo
Sacramento
Amador
Alpine
Solano
Calaveras
Mono
Marin
San Joaquin
Contra Costa
Tuolumne
San Francisco
Alameda
Mariposa
Stanislaus
San Mateo
Merced
Inyo
Santa Clara
Madera
Santa Cruz
San Benito
Fresno
Monterey
Tulare
Kings
San Luis Obispo
Kern
Santa Barbara
Los Angeles
San Bernardino
Ventura
Riverside
Orange
San Diego
Imperial


GWSS Nursery Survey
Del Norte
Siskiyou
Modoc
Humboldt
Trinity
Shasta
Lassen
Tehama
Plumas
Mendocino
Glenn
Butte
Sierra
Colusa
Yuba
Nevada
Lake
Sutter
Placer
Sonoma
Napa
Yolo
El Dorado
Sacra-mento
Amador
Alpine
Solano
Calaveras
Mono
Marin
Contra Costa
San Joaquin
Tuolumne
San Francisco
Alameda
Stanislaus
Mariposa
Merced
Inyo
San Mateo
Santa Clara
Madera
Santa Cruz
San Benito
Fresno
Tulare
Monterey
Kings
San Luis Obispo
Kern
San Bernardino
Santa Barbara
Ventura
Los Angeles
Orange
Riverside
San Diego
Imperial



(Fahrenheit degrees and solid black lines are isotherms for an average minimum January temperature)*

GWSS distribution in southeastern U.S.

NEW COUNTY RECORDS

GLASSYWINGED SHARPSHOOTER, *Homalodisca coagulata* -(B)- The following collections are considered new county records since further surveys have confirmed the presence of established populations: On May 16 in Porterville, **Tulare** County, county trapper Susie Bist found a glassywinged sharpshooter in a yellow panel trap located in an apricot tree. A homeowner collected one from a California redbud tree in **Madera** County on May 26. This find was very close to the Fresno-Madera County border. On May 27 it was collected by Douglas Edwards of Fresno County Department of Agriculture in Fresno, **Fresno** County.

Sacramento County Department of Agriculture personnel discovered it in Rancho Cordova, **Sacramento** County on July 6. Initial findings were collected from yellow panel traps placed in grapefruit and peach trees. Chemical treatments have been made to eliminate the pest in Sacramento County.

OLIVE FRUIT FLY, *Bactrocera oleae* -(A)- Between January and May, this pest of olives was found in three new counties. On May 5, it was found in Bakersfield (Mayfair area), **Kern** County. Diane Mydland from Kern County Department of Agriculture is credited with the find. Kenneth Dickey of Fresno County discovered it in Reedley, **Fresno** County on May 17. On May 22, Gail Perez of San Luis Obispo County found olive fruit fly in Arroyo Grande, **San Luis Obispo** County.

RED IMPORTED FIRE ANT, *Solenopsis invicta* -(A)- Red imported fire ant was found for the first time in **Madera** County on May 30 by Art Gilbert of CDFA and Donald Mayeda of Madera County. The initial collection was made from an almond orchard in Chowchilla.

REDGUM LERP PSYLLID, *Glycaspis brimblecombei* -(Q)- This pest of eucalyptus has been found in several new counties since January. Collections were made in Middletown, **Lake** County on February 2 by Sheryl Gill. On April 20, Baldo Villegas collected this psyllid in Anderson, **Shasta** County and Red Bluff, **Tehama** County. Villegas also discovered it in Shingle Springs, **El Dorado** County on May 9. It now occurs in practically all the California counties where the redgum eucalyptus grows.

EXCLUSION

Several pest species that are not established in the state are collected every year on incoming or newly arrived nursery stock or similar quarantine situations. The following are examples of such rated pests. For additional information on significant quarantine and border station interceptions, see pages 11-13.

AN APHID, *Greenidea formosana* -(Q)- On March 31, 1999 this pest was collected on *Ficus microcarpa* from a nursery in Placentia, Orange County by Brad Sanford. On July 21, 1999 it was collected from a nursery in Gardena, Los Angeles County by Vuong. The host was Sago palm.

AN EULOPHID WASP, *Aprostocetus* sp. -(Q)- Found on July 30, 1999 by Sanford in a nursery in Yorba Linda, Orange County. The host was *Eucalyptus citriodora.*

AN AGAONID WASP, *Josephiella* sp. -(Q)- This wasp was collected from *Ficus microcarpa* at two nurseries in Orange County. The first was found in Irvine on March 31, 1999 by Sanford. Sanford also collected specimens in Placentia on April 12, 1999.

A GALL WASP, *Epichrysocharis* sp. -(Q)- On November 2, 1999, this wasp was collected by Marquez in a nursery in Los Angeles County. The host was *Eucalyptus citriodora.*

A MEALYBUG, *Nipaecoccus* sp. -(Q)- Found in a nursery in Cerritos, Los Angeles County on November 3, 1999. It was collected by Milles from *Syagrus romanzoffianum.*

AN APHID, *Melanaphis sacchari* -(Q)- Found on *Saccharum officinarum* by Mark Nestor in a nursery in Anaheim, Orange County on October 27, 1999.

Border Stations

Important "A", "B", and "Q" Rated Arthropods and Mollusks Intercepted through May 2000

Pest	Station	Date	Origin	Collector	Host
vanda orchid scale-*Genaparlatoria pseudaspidiotus*	AP	07/28/99	Florida	Cochrane	*Mangifera indica*
a mealybug- *Pseudococcus odermatii*	AP	09/03/99	Florida	Sharma	*Averrhoa carambola*
palm whitefly- *Aleurocerus palmae*	AP	10/10/99	Florida	Cochrane	*Cocos nucifera*
coconut scale - *Aspidiotus destructor*	AP	10/10/99	Florida	Cochrane	*Cocos nucifera*

Important "A", "B", and "Q" Rated Arthropods and Mollusks Intercepted in Quarantine through May 2000

Rating	Species	Common Name	Date	Origin	County	Host	Collector(s)
A	*Selenothrips rubrocinctus*	redbanded thrips	07/12/99	Hawaii	SMT	*Piper betel*	Garibaldi
A	*Selenaspidus articulatus*	rufous scale	07/15/99	Equador	SMT	*Cordyline terminalis*	Bradburuy
Q	*Hypoclinea* sp.	an ant	07/14/99	Hawaii	SMT	*Ananas comosus*	Romaine
B	*Diaphania nitidalis*	pickleworm	07/29/99	Dominican Republic	SCL	*Tindora*	Khokhar
Q	*Aulacaspis yasumatsui*	cycad aulacaspis scale	07/07/99	Florida	SMT	*Cycas revoluta*	Ventura
Q	*Philodoria* sp.	gracillariid moth	07/21/99	Hawaii	SCL	*Strelitzia* sp.	Barrera
Q	*Philodoria* sp.	gracillariid moth	07/21/99	Hawaii	SCL	*Strelitzia* sp.	Barrera
B	*Ceroplastes sinensis*	Chinese wax scale	07/27/99	Florida	SCL	*Ficus benjamina*	Nachand
A	*Rhizotrogus majalis*	European chafer	08/03/99	Indiana	ALA	aircraft	Deloney
Q	*Magicicada* sp.	a periodical cicada	07/23/99	New Jersey	LAX	aircraft	Valladares
Q	*Meghimatium striatum*	a slug		Hawaii	LAX	*Dracaena* sp.	Dias
Q	*Myrmelachistus* sp.	an ant	08/17/99	Tennessee	LAX	paper products	Marquez
Q	*Lepidosaphes tokionus*	croton mussel scale	08/12/99	Hawaii	LAX	*Codiaeum variegatum*	Burton
A	*Lopholeucaspis cockerelli*	cockerell scale	08/19/99	Hawaii	LAX	cut foliage	Marquez
A	*Ostrinia nubilalis*	European corn borer	08/26/99	Iowa	LAX	*Zea mays*	Burton
Q	*Pallifora* sp.	a slug	08/23/99	Florida	LAX	*Dracaena fragrans*	Tsai
Q	*Dyscinetus* sp.	a scarab beetle		Indiana	LAX	aircraft	Hansen
Q	*Callirhopalus bifasciatus*	twobanded Japanese weevil	08/16/99		RIV	*Salvia* sp.	Domenigoni
A	*Ceroplastes rusci*	fig wax scale	07/28/99	Florida	ORA	*Ficus benjamina*	Gibbs
Q	*Sciothrips cardamomi*	Cardamon thrips	08/11/99	Hawaii	RIV	cut flowers	Lomeli
A	*Parlatoria ziziphi*	black citrus scale	08/04/99		SJQ	*Citrus hystrix*	Curtoni
Q	*Philephedra tuberculosa*	a soft scale	08/23/99	Costa Rica	SDG	*Codiaeum* sp.	Fritz
Q	*Aleuroclava jasmini*	jasmine whitefly	08/12/99	Florida	CCA	leaves with stems	Slate
Q	*Hortensia similis*	a sharpshooter	08/12/99	Florida	CCA	kalunay	Slate
A	*Parlatoria proteus*	Sansevieria scale	09/15/99	New York	LAX	palm leaves	Dias
B	*Nezara viridula*	southern green stink bug	08/31/99	Hawaii	LAX	salot (herbs)	Marashi
Q	*Oxydema longula*	a weevil	09/08/99	Hawaii	LAX	cut flowers	Carrillo
Q	*Trichoferus* sp.	a longhorned beetle	09/21/99	China	ORA	artificial wooden trees	Park
Q	*Pseudococcus lycopodii*	club moss mealybug	09/08/99	Hawaii	ORA	*Lycopodium* sp.	Sanford
Q	*Thysanofiorinia nephelii*	longan scale	09/16/99	Florida	ORA	*Dimocarpus longan*	Fernandez
B	*Protopulvinaria pyriformis*	pyriform scale	09/21/99	Costa Rica	SJQ	*Shefflera* sp.	Dinandi
A	*Spodoptera latifascia*	an armyworm	09/29/99	Florida	SMT	*Schefflera arboricola*	Toruno
Q	*Odontomachus* sp.	an ant	09/29/99	Florida	SMT	*Spathiphyllum* sp.	Thomas
B	*Ceroplastes sinensis*	Chinese wax scale	09/11/99	Florida	SCL	*Dizygotheca elegantissima*	Fairbanks
Q	*Frankliniella schultzei*	cotton bud thrips	09/27/99	Hawaii	SLO	*Morinda citrifolia*	Thomas

Important "A", "B", and "Q" Rated Arthropods and Mollusks Intercepted in Quarantine through May 2000

Rating	Species	Common Name	Date	Origin	County	Host	Collector(s)
Q	*Camponotus abdominalis*	an ant	09/07/99	Florida	SMT	*Spathiphyllum* sp.	Thomas
Q	*Mikiola fagi*	beech pouch gall fly	09/29/99	Holland	BUT	*Fagus sylvatica*	Pejsa
Q	*Xylosandrus compactus*	a bark beetle	09/22/99	Hawaii	SON	*Arundina graminifolia*	Bryant
A	*Coccus viridis*	green scale		Hawaii	SCL	Musaceae	Fairbanks
Q	*Crenidorsum* sp.	a whitefly	09/10/99	Hawaii	SCL	*Cordyline terminalis*	Khokhar
Q	*Tetranychus* sp.	a tetranychid mite	09/23/99	Colombia	RIV	*Rosa* sp.	Lahti
Q	*Tibicen* sp.	a dogday cicada	10/25/99	Florida	SAC	*Asparagus sprengeri*	Saunders
A	*Selenothrips rubrocinctus*	redbanded thrips	09/28/99	Costa Rica	SDG	croton	Worcester
Q	*Sinoxylon conigerum*	false powderpost beetle	10/03/99	Indonesia	ORA	wooden pallets w/ tile	Krueger
Q	*Pinnaspis uniloba*	unilobed scale	10/21/99	Hawaii	ORA	*Alyxia olivaeformis*	Fernandez
Q	*Pinnaspis uniloba*	unilobed scale	09/29/99	Hawaii	SDG	*Alyxia olivaeformis*	Dobbins
A	*Orgyia leucostigma*	whitemarked tussock moth	10/25/99	Texas	SAC	*Cytisus scoparius*	Omar
Q	*Meghimatium* sp.	a slug	10/12/99	Hawaii	RIV	orchid	Chandler
A	*Orgyia leucostigma*	whitemarked tussock moth	10/25/99	Florida	SAC	*Asparagus plumosus*	Saunders
Q	*Heterocampa* sp.	a notodontid moth	10/25/99	Florida	SAC	*Asparagus plumosus*	Saunders
A	*Ceroplastes rubens*	red wax scale	10/05/99	Hawaii	RIV		Chandler
Q	*Aleurotulus anthuricola*	Anthurium whitefly	10/20/99	Hawaii	RIV	*Anthurium* sp.	Chandler
Q	*Palmicultor palmarum*	palm mealybug	10/11/99	Hawaii	SCL	palm	Barrera
A	*Ischnaspis longirostris*	black thread scale	10/25/99	Florida	YOL	*Monstera deliciosa*	Lyon
A	*Coccus viridis*	green scale	10/20/99	Hawaii	SCL	ginger	Barrera
Q	*Crenidorsum* sp.	a whitefly		Hawaii	SMT	*Monstera* sp.	Buerer
B	*Ferrisia virgata*	striped mealybug	10/06/99	Hawaii	SMT	*Ananas comosus*	Joo
A	*Coccotorus scutellaris*	plum gouger	10/25/99	Florida	YOL	*Tillandsia usneoides*	Lyon
A	*Aonidiella orientalis*	oriental scale	11/05/99	New York	ALA	*Catha edulis*	Sum
A	*Diatraea saccharalis*	sugarcane borer	11/17/99	Florida	ALA	purple grass	Sum
Q	*Milviscutulus mangiferae*	mango shield scale	11/02/99	Hawaii	ALA	*Cordyline terminalis*	Grazzini
Q	*Pachymerus* sp.	a seed weevil	11/22/99	Brazil	ALA	*Syagrus macrocarpa*	Eaton
A	*Hemiberlesia palmae*	tropical palm scale	11/12/99	Florida	LAX	bromeliad	Dias
A	*Hemiberlesia palmae*	tropical palm scale	11/12/99	Florida	LAX	bromeliad	Dias
Q	*Pseudaonidia trilobitiformis*	trilobe scale	11/23/99	Florida	SCL	*Chamaedorea cataractarum*	Barrera
A	*Aonidiella orientalis*	Oriental scale	10/30/99	Hawaii	SMT	*Cycas* sp.	Toruno
A	*Aspidiotus destructor*	coconut scale	11/22/99	Hawaii	SMT	*Cocus nucifera*	Garibaldi

SIGNIFICANT FINDS OTHER STATES

Several aphid species have been collected in Florida and other southeastern states in the past two years that represent new records, range extensions, or re-collections of rare species. Newly established species include *Acyrthosiphon kondoi* Shinji, *Aphis amaranthi* Holman, *Brachycaudus helichrysi* (Kaltenbach), *Coloradoa achilleae* Hille Ris Lambers, *Hyadaphis coriandri* (Das), *Hyperomyzus carduellinus* (Theobald), *Melanaphis* sp., *Schizaphis rotundiventris* (Signoret), *Shivaphis celti* Das, *Takecallis arundicolens* (Clarke), and *Toxoptera citricida* (Kirkaldy). Further establishment records were reported for *Trichosiphonaphis polygoni* (van der Goot), previously reported from a few counties in Florida and Georgia. For more information, see the article in Florida Entomologist, Volume 83(1): 79-91.

The brown spruce longhorn beetle, *Tetropium fuscum*, has been discovered in Point Pleasant Park in Halifax, Nova Scotia. The Halifax Regional Municipality has removed more than a thousand trees from the park in recent years. It was originally thought that the problem could be a combination of factors, including insect pests, a fungus, drought or environmental pollution. A study conducted in this spring by Natural Resources Canada (Canadian Forest Service) determined that it was the brown spruce longhorn beetle, foreign to North America, attacking the red spruce trees in the park. Newspaper reports are that a Canadian judge has issued a temporary restraining order prohibiting further tree removal and destruction. Unless the Canadian Food Inspection Agency is allowed to proceed with its eradication efforts, the United States and Mexico will have to evaluate the need for federal foreign quarantines to prevent artificial spread of the pest in North America.

Fig. 2 - Adult *Tetropium fuscum*

SIGNIFICANT FINDS OTHER STATES, continued

The following is a report written by D.R. Miller, Research Entomologist at USDA, Beltsville, MD.

Specimens of *Pseudococcus elisae* Borchsenius were submitted by Avas Hamon of the Florida Department of Agriculture and Consumer Services and were given lot number 0003487. The specimens were collected in Apopka, by Lance Osborne on *Aglaonema* sp., October 21, 1999. The Florida lot number is: 1999-2879-301. This is a new continental U.S. record, but there are a few provisos.

This species was at one time confused with another species (*Pseudococcus jackbeardsleyi*) and was reported on a diversity of agricultural crops. However, recent research [Gimpel, W.F. &: Miller, D.R. 1996. Systematic analysis of the mealybugs in the *Pseudococcus maritimus* complex (Homoptera: Pseudococcidae), Contributions on Entomology, International 2: 1-163] studied the complex of species more carefully and determined that *P. elisae* occurs on a more restricted range of host plants and is much less common throughout the world than its counterpart *P. jackbeardsleyi*. After making the above mentioned identification from Florida, I discussed the matter with Avas Hamon and he examined other material in the collection at Gainesville. He found additional material from as early with the following data: Apopka, by L. S. Osborne on *Aglaonema nitidum* "Silver Queen", November 21, 1995; Apopka, by L. S. Osborne on *Diffenbachia maculata* "Camille", November 1, 1995; Homestead, by J. Gutierrez, Jr., on *Aglaonema* sp., January 22, 1997.

Introduction of this pest into the United States could have important consequences. It currently is known from Colombia, Costa Rica, Ecuador, Guatemala, Honduras, and Panama. The known hosts of *P. elisae* are *Coffea, Diffenbachia, Musa, Aglaonema,* and *Citrus*. It is commonly taken in quarantine on bananas from central America.

At one time I reported an identification of *P. elisae* from California and indicated that it was a new U.S. record. After discussions with Ray Gill, California Department of Food and Agriculture, it now is apparent that the California specimens actually originated from Hawaii and were destroyed before becoming established in California. We have never seen material from Hawaii and cannot confirm its presence there.

Note: The elisa mealybug, *Pseudococcus elisae,* along with the alazon mealybug, *Dysmicoccus alazon* have been intercepted in the past from South American bananas. Bananas from these locations have moved for many years through California to destinations throughout the western U.S. and Hawaii. Because of this these two mealybugs are currently "B" rated, even though both species are currently not established in California.

PLANT PATHOLOGY HIGHLIGHTS

TWO UNUSUAL DISEASES OF INCENSE CEDAR

Two rather unusual fungal diseases were submitted to the plant pathology laboratory in the month of April on incense cedar *(Calocedrus decurrens)* from the Lake Almanor area of Northern California.

The first sample was a rust disease, *Gymnosporangium libocedri,* that normally doesn't generate a lot of attention in forest stands. However, it can be fairly damaging in nurseries or in ornamental planting situations, i.e. where infected trees may be more closely spaced, perhaps sprinkler irrigated, and subjected to stress due to transplanting. The disease is found throughout the range of incense cedar in the western states, and attacks trees of all ages. The rust fungus itself appears like tiny brick-colored pustules on the undersides of the flat sprays of needles. These pustules, when wetted, become gold to orange, jelly-like, dripping "globs" (the telial stage of the fungus) on the foliage. These eventually dry down to a rather messy-looking film on the foliage. This degrades the ornamental value of infected trees considerably.

The fungus produces spores (the sporidial stage) on incense cedar, which are wind blown to Rosaceous alternate hosts, including apple, pear, quince, hawthorn, and most frequently—service berry (*Amalanchier* spp.). On these alternate hosts, the aecial stage is formed. It is this stage that infects incense cedar. Although very small, young branches may be killed, the fungus seldom kills incense cedar branches outright. Severely infected trees may develop witches' brooms which can weaken the tree, and make it more susceptible to other pests. While they are at times mistaken for similar-appearing clumps of mistletoe (*Phoradendron libocedri*) which hang down from the branches, the witches brooms caused by this rust fungus tend to grow upright, erect, and "bushy", appearing like small shrubs growing on branches up in the canopy.

The sample was submitted by Plumas County biologist, Suzanne Ebright, who reported that the disease was ruining the appearance of several very expensive ball & burlap ornamental specimens which had just been planted in a landscape.

The second disease on incense cedar was submitted by USFS Forestry pathologist, Bill Woodruff. The branch and foliage appeared to have been splattered with white paint. An initial microscopic examination revealed that the white "paint" was actually a fungal mycelial mat, the hyphae of which exhibited "clamp connections," structures typical of fungi in the taxonomic group known as the "Basidiomycetes" (i.e. the mushrooms, wood rotting conk-formers, etc.).

The fungus, *Dendrothele incrustans,* was a member of a group of fungi known as the "crust fungi" which form crust-like mycelial mats over substrates such as branches, tree trunks, and even rocks. From a distance these fungal mats look variously like splattered paint to powdery snow-like flocking. They do not actually parasitize the hosts, but merely grow over them, using

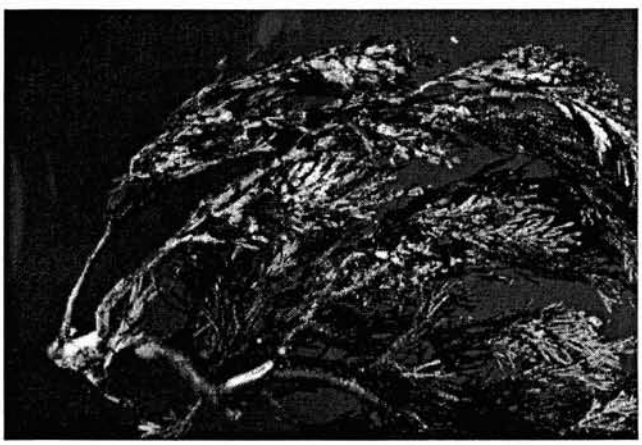
the tree's trunk, foliage, and branches as a substrate on which to anchor themselves. The branches of this particular sample had reportedly been under snow cover for the better part of winter—a fairly common scenario for the crust fungi. Unlike other members of the Basidiomycetes which commonly form spores within a "sporocarp" or fruiting body such as a mushroom or shelf-like "conk" on the side of a tree trunk, the crust fungi produce a fertile layer of spore-bearing structures and air-borne spores directly on the surface of the mycelial mat. This structure, which is common to a few Basidiomycete fungi, is known as a "resupinate" sporocarp. Rather than forming a reproductive structure such as a mushroom, with its own particular shape and morphology, it merely forms a flattened structure that conforms to the shape of its substrate. The particular fungus on this sample of incense cedar, *Dendrothele incrustans*, has a fairly wide host range, but seems to be relatively confined geographically to the Pacific Northwest.

References

Scharpf, Robert F. 1993. Disease of Pacific Coast Conifers, Agriculture Handbook 521, USDA Forest Service, Albany, CA. 1999 pages.

Lemke, Canadian J. Bot. 1964. 42:723-750. The genus *Aleurodiscus* (sensu lato) in North America.

A



B

Fig. 3A) *Gymnosporangium libocedri* on incense cedar, B) *Dendrothele incrustans* on incense cedar.

BOTANY HIGHLIGHTS

The last issue of CPPDR [V. 18(5-6): 88-90. 1999] reported on a then-unidentified perennial species of *Cotula* found infesting golf green turf. Identification work performed by the CDFA Senior Plant Systematist at the UC Herbarium on the UC Berkeley campus has now determined that this taxon is *Cotula mexicana* (DC.) Cabrera. Nomenclatural details are as follows:

ASTERACEAE - Sunflower Family

Cotula mexicana (DC.) Cabrera
Published in: Boletín de la Sociedad Argentina de Botánica 8: 207. 1960; BPH 210.20
Basionym: *Soliva mexicana* DC.
Published in: Prodromus Systematis Naturalis Regni Vegetabilis 6: 143. 1837.

Additional synonymy:
Cotula minuta (L. f.) Schinz non Forster, Prodr. 57. 1786
Published in: Mémoires de la Société des Sciences Naturelles de Neuchâtel 5: 429. 1913.
Basionym: *Hippia minuta* L. f.
Published in: Supplementum Plantarum 389. 1781.

Cotula pygmaea (Kunth) Benth. & Hook. f. ex Hemsl. non Poir, Encyc. Suppl. ii, 371. 1810
Published in: Biologia Centrali-Americana, Botany 2: 230. 1881.
Basionym: *Soliva pygmaea* Kunth
Published in: Nova Genera et Species Plantarum 4: 238. 1820 [1818].

The native range of *Cotula mexicana* extends from southern Mexico south to at least Bolivia, generally at elevations above about 3000 meters. All the conspecific specimens from within its native region that are held at UC were collected in wet seeps or alongside small ponds. These ponds and seeps generally form, in the habitat and regions delimited above, from continuous slow snowmelt originating upslope. This habitat seldom supports any shrubs and has no trees; most of these areas are vegetated by a low-growing forb/sedgeland with a few perennial grasses.

Cotula mexicana remains low-growing in cultivation and is clearly pre-adapted to golf course greens, i.e. abundant water, little overstory competition, and low perennial growth that avoids mower blades. According to Sacramento County Agricultural Commissioner, Frank Carl, young individuals continue to appear on established greens indicating the plant is able to compete with growing grasses — even as a seedling. This isn't unexpected as observations on plugs removed from infested turf indicate that the roots of *Cotula mexicana* occupy a considerably deeper soil zone than do turf roots, and are thus not in direct competition.

Greenhouse grown plants in Sacramento are in full flower by early June. Although a daisy relative, the plants do not have showy inflorescences; rather, these are only 2.5-3 mm. diameter. Moreover, the peduncles remain below the foliage until the fruits are mature. At maturity the scapes quickly elongate and the diclesia abscised (diclesium, pl. disclesia, is a technical term

for a dry fruit derived in part from perianth tissue; see Spjut, R.W. 1994, Mem. NY Bot. Gard. V. 70 for a full description and discussion). This maturation pattern clearly promotes its survival and spread on mowed turf. *Cotula mexicana* diclesia are seldom more than 1 mm. long and half as wide; they are thus also easily carried in mud on shoe soles or on mowing equipment.

The only apparent physiological weakness to this plant's growth capacity is a sensitivity to drought; potted plants can be killed outright by drying, although they tolerate a severe wilt for a day or two. In addition, the species needs bright light or it will be attacked by a pathogenic organism(s) not currently under investigation.

This plant is a potentially serious pest of turf growing operations, particularly those that specialize in low-growing turf types. It is already a pest of actual golf course greens, and is currently known from golf courses in Sacramento, Marin, Contra Costa and Alameda Counties. Expect to find it ultimately in turfgrass production nurseries and wild areas. Although California does not have a lot of suitable wild habitat, it does have a large number of golf courses and turf nurseries.