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What's Inside:

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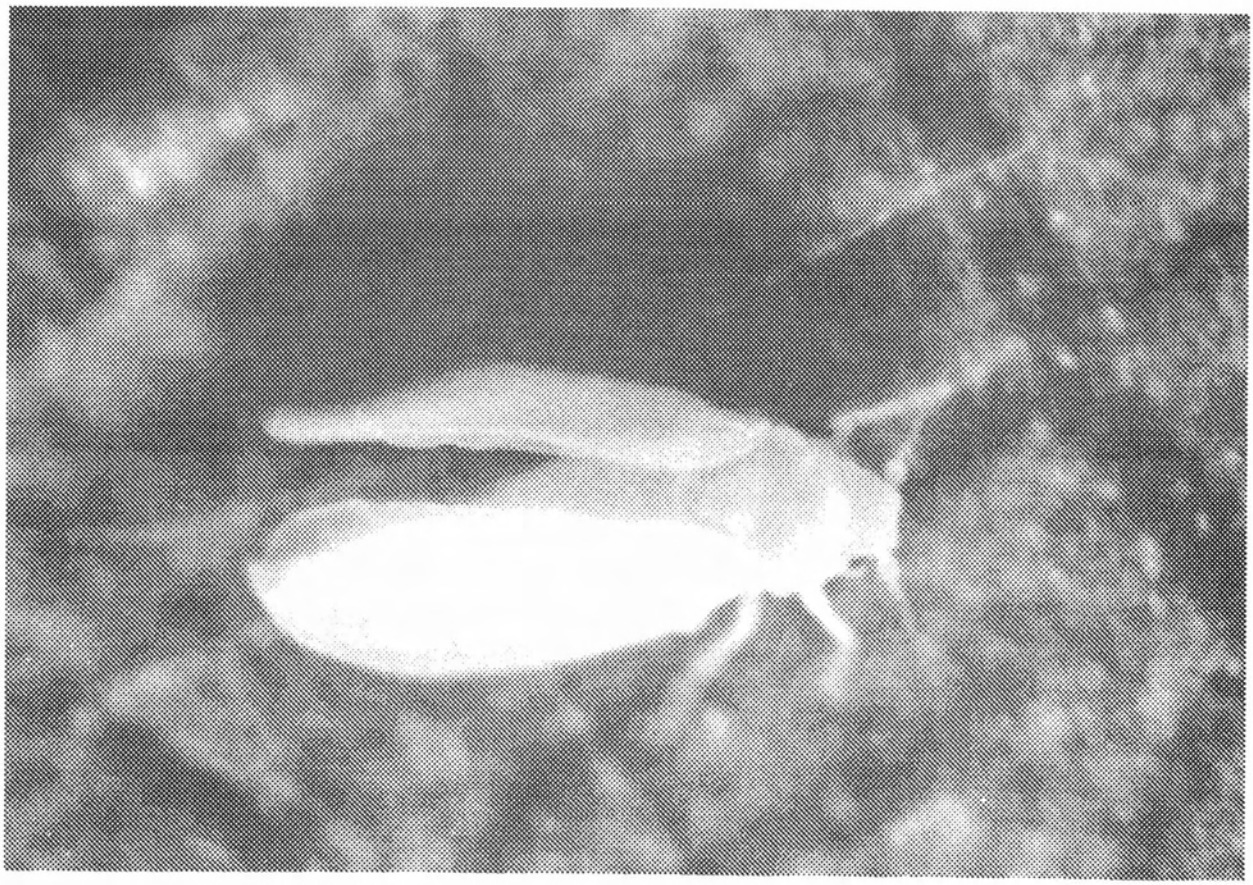

The sweetpotato whitefly, *Bemisia tabaci*

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THE POINSETTIA WHITEFLY PROBLEM

Over the years, the major emphasis of CPPDR has been focused on new pest introductions. The Entomology section has not been particularly involved in mentioning local outbreaks of destructive endemic insects because often the staff is far removed from the actual problem, because specimens of the pest involved may not necessarily be sent to the identification laboratory and therefore we often are not particularly aware of local problems, and issues of CPPDR are not often published in a timely enough manner to alert regional growers and advisors of possible pest problems anyway. A typical example has been the sweetpotato whitefly, *Bemisia tabaci* (Gennadius), which had been a serious pest in the desert valleys of California, particularly in 1981. However, we now have apparently a new pest introduction in terms of a new strain or possibly a sibling species of the sweetpotato whitefly into the desert valleys, with severe economic effects.

Major and catastrophic changes have occurred in the status of the sweetpotato whitefly in the desert valleys of southeastern California. The so-called "poinsettia strain" of this whitefly was found infesting winter vegetables (particularly cole crops) in the Imperial Valley earlier in the year. This is a phenomenon that previously had not been noted with the old "cotton strain." Populations maintained high levels through the winter and immediately attacked young crops of almost every kind as they emerged from the ground. Many fields of melons and cotton never produced a crop and were disced under. Many alfalfa fields had high populations and large amounts of honeydew hampered cutting and baling operations. Heavy populations were also noted in the Palo Verde Valley of Riverside County, and by summer's end, grape and citrus orchards had been infested in the southern parts of the Coachella Valley in Riverside County.

Sweetpotato whitefly has been in California at least since 1928, when it was found infesting cotton at Calipatria, Imperial County. The species began to develop large populations on cotton starting in 1975, and in 1981 is said to have caused as much as $100,000,000 in losses in the Imperial Valley to the fall lettuce and melon crops due to extremely high populations of whiteflies and high incidences of whitefly-transmitted virus diseases.

The poinsettia strain was first noted in Florida greenhouses in 1985, and in 1986 devastating populations occurred there, not only in the greenhouses, but in outdoor gardens and vegetable cropping situations as well. With its arrival in California last fall, we are now seeing this nearly total devastation of crops of all kinds in these areas in just one season. Major affects on the economy of the infested areas is expected, as well as shortages of winter vegetables for much of the nation as a whole. In the meantime, scientists from many areas of the country and the world are beginning to search for answers that will lead to the eventual solving of the problem. Numerous articles are scheduled to be published soon outlining the problems and possible solutions. An article is scheduled in the November-December issue of California Agriculture, and a synopsis prepared by CDFA is scheduled for publication in the Pan-Pacific Entomologist early this next spring.

The following report is part of a USDA-sponsored national steering committee report which is being developed to promote continuing research toward solving the sweetpotato whitefly problem. The excerpts included here are but a part of the total report and are intended here only as a historical overview of the entire problem. The above mentioned articles can be consulted for further information about research that is currently being done or planned in the future.

A 5-YEAR NATIONAL RESEARCH AND ACTION PLAN FOR DEVELOPMENT OF MANAGEMENT AND CONTROL METHODOLOGY FOR SWEETPOTATO WHITEFLY, Bemisia tabaci (GENNADIUS) —[in part]

The sweetpotato whitefly (SPW), *Bemisia tabaci* (Gennadius), also known as the cotton, cassava and tobacco whitefly, was first described as *Aleurodes tabaci* from tobacco in Greece in 1889. SPW is a serious pest of cultivated crops in South and Central America, the West Indies, Africa, Asia, and southern Europe. The SPW was recorded in Florida from sweetpotato plants as early as 1894. It was collected from weeds in Texas in 1946, on cotton in 1959, and on sweetpotatoes in Georgia in 1950. Large populations in Florida were not reported until massive outbreaks occurred in greenhouse poinsettia crops in 1986. In 1987-88, outbreaks were widely reported in Florida field tomato crops as well. The Florida population of whiteflies has proven to be distinctly different from the southwestern U.S. population. SPW is now a major pest of tomato, cole crops, cucurbits, and many different ornamentals in Florida. The subtropical climate allows year-round populations of whitefly to persist on over 130 species of plants in Florida, including native plants, weeds, landscape ornamentals, bedding plants, and vegetables. It has also been reported from citrus, peanuts and sesame.

The SPW has become of increasing importance since the early 1980's in cotton production systems in Arizona and California, as well as in cultivated vegetable crops. The first SPW were collected from cotton in the United States at Gila Bend, AZ in 1926, followed by collections at Calipatria, CA in 1928, and a number of other California locations from cotton during the years 1950 to 1954. SPW studies from 1962 to 1965 in southern California cotton indicated that SPW did not usually cause economic damage. But, when economic populations did occur, they usually developed following insecticide application, suggesting that natural control factors played an important role in regulating whitefly populations.

The epidemic outbreaks of the SPW in Arizona and California beginning in the early 1980's, as well as those in Texas in 1988 and in Florida in 1987, remain unexplained, but a number of contributing factors have been suggested. Increasing populations in 1981 were followed by several warm winters. Under mild winter conditions, the SPW could have invaded and adapted to more northerly habitats than its normal world-wide distribution between the 30° parallels. Additionally, increased survival of many frost-susceptible weeds may have occurred, greatly expanding SPW overwintering host sites. Also, increasing SPW populations occurred coincidentally with the increasing use of pyrethroid insecticides in the late 1970's. Other possibilities include high overwintering survival on "stub" cotton that was an accepted cotton culture in Arizona between 1978 and 1982, and the development of insecticide resistance. Similar explanations have been reported for the increasing SPW problem throughout the world and other areas in the United States.

The SPW has also become an important pest in the northeast U.S. where it is found infesting greenhouse grown ornamentals in several states. In New Jersey, it is estimated that crops in 80% of the commercial greenhouses were infested by the pest with costs for control and damage again ranging in the millions of dollars. The greatest use of pesticides (on basis of lbs/unit area and frequency) occurs in the greenhouse industry. This results in the greatest pressure for development of resistance of any industry. Many pesticides are registered first on ornamentals,

and significant tolerance by *Bemisia* has developed to some chemicals before they are available for use on other crops. The widespread shipment of ornamentals threatens to distribute these populations around the country.

The considerable circumstantial and factual evidence available suggests that some combination or all of these factors have contributed to the complexity of the SPW problem. The biological adaptability of the SPW is very evident from its long list of host plants and occurrence of biotypes.

Economic losses in cotton, ornamental, and vegetable crops can result from direct feeding damage and reduced yield, lint contamination with honeydew and associated fungi. The SPW is also a vector of cotton leaf crumple, cotton leaf curl, and infectious yellows and squash leaf curl, affecting a wide range of cultivated vegetable crops. Dollar losses have exceeded $200 million annually nationwide. In addition, there are new diseases such as irregular ripening in tomatoes, and squash silverleaf, that were first reported in Florida but are now observed elsewhere. In the Florida tomato industry alone, it is estimated that this pest did $30 million in damage in 1988. In the Rio Grande Valley of Texas, the SPW is now heavily infesting over 100,000 acres of cotton and in 1991 was estimated to cause losses of roughly $80 million. Coupled with losses caused in fruit and vegetable production, the 1991 losses to the Rio Grande Valley are now estimated to exceed $100 million (Rio Grande Valley SPW Task Force). Similar losses have been reported from other cotton and vegetable production regions throughout the area of SPW infestation.

A cooperative effort involving USDA agencies (ARS, APHIS, CSRS, AND CES), state agricultural experiment stations, and cotton, vegetable, ornamental and nursery crop industry representatives is being undertaken to formulate cooperative programs, identify priority research areas, avoid duplication of effort and maximize use of existing resources. The cooperative effort will also identify high priority areas of additional needed research.

The SPW has been reported from 500 host plants worldwide. Additional hosts have been reported in the United States. The diversity of cultivated and weed hosts increases the complexity of the problem by intercrop movement, increased host biomass and constant source of host material for reproduction and survival. The typical annual sequence of cultivated crops grown in the Southwest, the Rio Grande Valley, Texas, and Florida, affords the SPW a source of food, shelter and reproductive substrate throughout the year by inter- and intra- crop movement.

Development on cotton from egg to adult occurs in less than 17 days at 30°C. Females lay approximately 100 eggs and live 8 to 10 days. Parthenogenic reproduction occurs. Unmated females produce males only. Reproductive potential varies on different host plants. There is increasing evidence that at least 2 biotypes exist with different biological characteristics and varying vector efficiency. SPW infestations in cotton fields are initiated during May or earlier in the year when adults move from overwintering hosts and/or other cultivated hosts. Populations of immature SPW develop slowly through June and early July, expand rapidly in late July and August, reaching peak numbers in September, declining thereafter until the crop is harvested. The pattern of SPW population dynamics in cotton from August through September is typically characterized by exponential growth.

During the winter months, SPW populations are generally at their lowest point. Immature stages, SPW adults, and parasites are found on *Malva parviflora* L. as well as *Helianthus annuus* L., *Convolvulus arvensis* L., and *Lactuca serriola* L. Cultivated crops grown in winter months in the southern U.S. which are hosts include tomato, *Lycopersicon esculentum* M., carrot (*Daucus carota* L.), broccoli (*Brassica oleracea* L.), squash (*Cucurbita* spp.), eggplant (*Solanum melongena* L.), guar [*Cyamopsis tetragonoloba* (L.) Taub.], guayule (*Parthenium argentatus* A. Gray), alfalfa (*Medicago sativa* L.) and lettuce (*Lactuca sativa* L.), as well as various cole crops.

High reproductive rate and multiple host sequences provide optimal conditions for SPW population development. The varied habitats, seasonal population development and intra- and inter-crop and wild host movement present an extremely complex and difficult challenge requiring new and innovative approaches for formulating control and suppression methodology.

Several SPW vectored viruses have been identified and others appear to exist. Additionally, a diversity of plant host reservoirs have been found and studied. At least two SPW biotypes have been identified with greatly different biological characteristics. Resistance to most classes of existing chemical insecticides has been demonstrated. Biotypic variation has been shown in SPW found in Texas, Arizona, California, Florida, and the Caribbean basin. Two recently reported vegetable crop disorders have been attributed to physiological differences associated with one SPW biotype. Squash silverleaf (SSL) and tomato irregular ripening (IRR) are both associated with the feeding of one SPW biotype. This biotype appears to contain unique nucleic acid in the form of double-stranded RNA (dsRNA) and there appears to be a relationship between the expression of dsRNA in the SPW and the ability to induce SSL. A search for insect viruses in the SPW yielded no concrete evidence for a virus whose replication would generate dsRNA. Electron microscopy has not revealed any virus or virus-like agents in plants affected with SSL. To date, all laboratory and field data suggest that SSL and IRR are phytotoxic effects associated with a specific SPW biotype. Translocatable factors responsible for the systemic effects of the phytotoxemia may originate from host-parasite interactions, as opposed to actions of the insect alone. Isozyme heterogeneity, alterations in carbohydrate chemistry, and differences in digestive physiology also indicate biotypic variation in the whitefly population.

Conventional chemical control is difficult to achieve because of the distribution of the immature forms solely on the underside of leaves, with older larvae and pupae located lower in the plant canopy. The diversity of the cultivated and weed host plants attacked contribute to the problem. Although a number of insecticides have effectively controlled SPW in the past and several new materials appear promising, including systemics, the resistance phenomena suggests that their efficacy will be of limited duration. Resistance monitoring and insecticide resistance management systems must be implemented to extend the effective life of existing and new materials. At present, knowledge of the genetics and mechanism(s) of resistance is limited. This information is essential for the development of insecticide alternative use patterns as well as finding new materials with different modes of action.

The role of natural enemies in regulating SPW populations is not well understood. Reports of natural enemy population regulation and suppression have been variable. Characteristically low levels of parasitism and predation occur early in the season and increase in conjunction with the SPW population. Reported parasites are in the genera *Eretmocerus*, *Encarsia*, and *Pteroptrix*.

Assessment of parasite and predator activity is complex and variable, depending on the plant substrate. Most natural-enemy records pertain to cotton with information on other cultivated and weed hosts.

Many predators have also been identified (in various families of Hemiptera, Coleoptera, Diptera, Neuroptera, and Acari). Pathogenicity to *Bemisia* has been demonstrated with four fungal pathogens (*Verticillium lecanii*, *Paecilomyces fumosoroseaus*, *Aschersonia aleyrodis*, *Beauveria bassiana*).

Many species of SPW parasites are undescribed, and specimens of described species (especially those in the genus *Encarsia*) often can be determined only tentatively. The taxonomy of SPW parasites will have to be greatly improved if a national biological control program is to proceed efficiently.

Cultivated crop growing sequences in southern agroecosystems favor continuing sources of host material for SPW reproduction and can be a source of early-season infestation. Cotton plantings adjacent to or in close proximity to spring planted melon, squash and/or watermelon fields developed the earliest SPW infestations, whereas late summer and fall vegetable crops are infested from late-season SPW populations on cotton. Post harvest practices in Florida vegetable crops also favor whitefly migration to new crops.

Varietal resistance may have considerable potential as an integrated pest management component for suppression of SPW populations. No concerted plant breeding effort is currently being made in this area of research. However, numerous preliminary studies in cotton and vegetable crops suggest a wide range of SPW susceptibility to various plant types within each of these broad cultivated crop categories.

ENTOMOLOGY HIGHLIGHTS

NAME CHANGES

ORIENTAL FRUIT FLY, *Bactrocera dorsalis*, -(A)- The genus for the Oriental fruit fly has been changed from *Dacus* to *Bactrocera*. The change reflects research done in a taxonomic revision and also affects most other fruit flies formerly in *Dacus* and not of African origin such as the melon fly, *Bactrocera cucurbitae* and the Queensland fruit fly, *Bactrocera tryoni*. The study was done by Richard Drew, 1989, entitled "The tropical fruit flies (Diptera: Tephritidae: Dacinae) of the Australasian and Oceanian regions," in "Memoirs of the Queensland Museum," 26:1-521.

RATING CHANGES

BLUEGUM PSYLLID, *Ctenarytaina eucalypti* - The rating for this new California pest has been changed from "A" to "C" based on its widespread distribution. See story on page 43.

WAXFLOWER WASP, *Aprostocetus* sp. - This Eulophid gall forming wasp has been given a permanent rating of "B." The change from a "Q" rating is based on its limited distribution in California. See story on page 42.

SIGNIFICANT FINDS

MEDITERRANEAN FRUIT FLY, *Ceratitis capitata*, -(A)- No specimens of this serious fruit fly pest were collected in California during the period covered by this report. However, seventeen specimens have been collected in the Los Angeles area since October 1, 1991. Details of these finds will be included in the next issue of CPPDR.

MEXICAN FRUIT FLY, *Anastrepha ludens*, -(A)- There were five finds of this exotic pest between June and September 1991.

On June 26, CDFA trapper Marco Amaro found a sexually mature male Mexican fruit fly in San Diego. It was recovered from a McPhail trap placed in an orange tree.

On July 1, Los Angeles County trapper Javier Camberos detected a male Mexican fruit fly in a McPhail trap placed in a lemon tree. The specimen was a sexually mature male with an intact germarium. It was found along West Imperial Highway in Los Angeles County.

On July 16, Carolos Lopez found an unmated female Mexican fruit fly in a trap in San Diego.

On August 16, CDFA inspector Joe Hendrickson found a sexually immature female Mexican fruit fly in a McPhail trap that had been placed in a nectarine tree on Del Prado Drive in Los Angeles.

On September 11, CDFA trapper Miguel Garcia detected a male Mexican fruit fly in a McPhail trap placed in a peach tree in Inglewood, Los Angeles County.

ORIENTAL FRUIT FLY, *Bactrocera dorsalis*, -(A)- This year, there were 35 separate collections of this pest. The chart on page 40 summarizes the data from January to September 1991 for these finds.

QUEENSLAND FRUIT FLY, *Bactrocera tryoni*, -(A)- This serious fruit pest has been recently found in Orange County. On August 26, Mary Edgecomb detected one male Queensland fruit fly in Laguna Beach. The specimen was trapped in a Jackson trap placed in a guava plant. Trap densities were increased to protocol levels around this find. No additional flies were trapped.

The first North American find for this pest occurred in California on October 29, 1985. It was discovered by County Agricultural Technician Aide Tim Breuninger in La Mesa, San Diego County. The specimen was caught in a Jackson trap placed in an orange tree along Miramonte Street. In response to the find, fruit cutting in search of larvae was carried out within a quarter mile radius of the find, but the results were negative.

The Queensland fruit fly, in the genus *Bactrocera*, is very similar to other *Bactrocera* species, especially Oriental and melon flies. One noticeable difference is the light colored third abdominal segment in the Queensland fruit fly which does not occur in the other two. Also the basal cells in the front margin of the wings are darkened in the Queensland fly but clear in the other two.

The following economic summary about *B. tryoni* is taken from a pamphlet entitled "Major Fruit Flies of the World" by H.V. Weems, Entomologist for the Florida Department of Agriculture. This summary and an illustration of Queensland fruit fly can be found in CPPDR 4(5-6):164-165.

> The Queensland fruit fly occurs in climates ranging from temperate to tropical. Within its range, it is one of the most important pests with which pome and stone fruit growers have to contend, and at times it has been a very destructive pest of citrus. As many as 67 adults have been reared from one apple, and 40 larvae have been found in a single peach.
>
> Hosts: More than 100 species of fruits and vegetables, including grapefruit, sweet orange, Mandarin orange, sour orange, lemon, papaya, guava, mango, peach, mulberry, cashew, loquat, fig, plum, pear, nectarine, apricot, persimmon, apple, quince, sour cherry, tomato, cucumber, and blackberry. Bananas are said to be attacked only when overripe. Other fruits, such as grapes, are attacked only in peak years. Wild hosts include passion-flower, *Passiflora* spp., and the stoppers, *Eugenia* spp.
>
> Distribution: The Queensland fruit fly is distributed over about half of eastern Australia, including parts of Queensland, New South Wales, South Australia, and Victoria.
>
> Life History and Habits: Unlike several other important fruit fly pests, the Queensland fruit fly does not breed continuously, but passes the winter in the adult stage. The total life cycle requires two to three weeks in summer and up to two months in the fall. Four or five overlapping generations may develop annually.

GYPSY MOTH, *Lymantria dispar*, -(A)- There were seven finds for this pest from June through September 1991.

> On July 3, County Department of Agriculture trapper Johnny Davila detected a male gypsy moth (GM) in Pasadena, Los Angeles County.

Oriental Fruit Fly, *Bactrocera dorsalis*, -(A)- 1991 Collections

County	City	Date	#M/F/Stage	Trap	Host	Collectors
Los Angeles	Alhambra	6/7/91	1/0	Jackson	peach	De la O
San Diego	Lakeside	7/22/91	1/0	Jackson	peach	Rowin
San Bernardino	Upland	7/23/91	1/0	Jackson	lemon	Sarmiento
Los Angeles	Carson	7/25/91	1/0	Jackson	apricot	Camacho
Los Angeles	Carson	8/1/91	1/0	Jackson	peach	Epps
Alameda	Fremont	8/19/91	1/0	Jackson	peach	Bernardi
San Diego	San Diego	8/21/91	1/0	Jackson	orange	Avalos
Santa Clara	Santa Clara	8/28/91	1/0	Jackson	plum	McKean
San Bernardino	Ontario	9/20/91	1/0	Jackson	apricot	Almanza
San Bernardino	Fontana	9/24/91	1/0	Jackson	grapefruit	Almanza/Walker
San Bernardino	Ontario	9/24/91	1/0	McPhail	peach	Lopez
Los Angeles	Lakewood	9/24/91	1/0	Jackson	ornamental	Cardenas
San Bernardino	Ontario	9/24/91	1/0	Jackson	orange	Gaines
San Bernardino	Rancho Cucamonga	9/25/91	0/1	McPhail	pineapple guava	Almanza
Los Angeles	Altadena	9/25/91	1/0	Jackson	ornamental	Garcia
Los Angeles	Claremont	9/25/91	1/0	Jackson	lemon	Garcia
San Bernardino	Rancho Cucamonga	9/25/91	1/0	Jackson	orange	Almanza
Los Angeles	Los Angeles	9/26/91	1/0	Jackson	Strawberry guava	Green
San Bernardino	Upland	9/26/91	1/0	Jackson	fig	Stevenson
San Bernardino	Ontario	9/26/91	1/0	Jackson	orange	Gaines
San Bernardino	Guasti	9/26/91	1/0	Jackson	mulberry	Lopez
San Bernardino	Guasti	9/26/91	1/0	Jackson	avocado	Lopez
San Bernardino	Guasti	9/26/91	1/0	Jackson	orange	Lopez
San Bernardino	Guasti	9/26/91	larvae	--	peach	Ruiz
San Bernardino	Guasti	9/27/91	larvae	--	peach	Lopez-Ayala
San Bernardino	Upland	9/27/91	1/0	Jackson	peach	Stevenson
San Bernardino	Guasti	9/27/91	larvae	--	peach	Ruiz
San Bernardino	Ontario	9/27/91	1/0	Jackson	orange	Gaines
San Bernardino	Guasti	9/27/91	larvae	--	peach	Lopez-Ayala
San Bernardino	Guasti	9/27/91	larvae	--	peach	Scheiman
San Bernardino	Upland	9/28/91	1/0	Jackson	lemon	Harrie
San Bernardino	Rancho Cucamonga	9/28/91	larvae	--	lemon	Almanza
San Bernardino	Guasti	9/29/91	1/0	Jackson	apple	Crowley
Kern	Mt. Mesa	9/30/91	1/0	Jackson	pear	Lapp
Santa Clara	San Jose	9/30/91	1/0	Jackson	fig	Smestad

On July 22, CDFA inspector Bob Garagliano found GM in San Juan Capistrano, Orange County. The specimen was caught in a GM trap placed in a pear tree.

On July 26, County Department of Agriculture trapper Nancy Patterson found a male GM in Broderick, Yolo County. The GM was detected in a GM trap placed in a cottonwood tree near the city boat ramp.

Two GM finds occurred in Aptos, Santa Cruz County. County Department of Agriculture trapper Kim Doukas detected a trapped GM in Aptos on August 22 and another one on September 5. Both of the GM traps for these finds were placed in pine trees.

Santa Cruz County Department of Agriculture trapper Tricia Johnson found a GM on August 28 at Boulder Creek. It was found in a GM trap placed in an oak tree.

On September 6, CDFA trapper Patty Hannagan detected a trapped GM in Morgan Hill, Santa Clara County.

JAPANESE BEETLE, *Popilla japonica*, -(A)- There were seven finds for this pest during June through September 1991.

On July 2, a Japanese beetle was trapped in Oakland, Alameda County. County trapper Mark Gonsalves is credited with this find.

On July 9, State trapper Maggie Mills detected a Japanese beetle in a trap at Los Angeles International Airport (LAX).

On July 23, State trapper Constance Weiner detected a trapped Japanese beetle at Sacramento Metro Airport.

On August 6, two Japanese beetles were trapped at LAX by Leena Ogoke and Rick Sauber in Los Angeles County.

On August 20, State trapper Ogoke found a trapped Japanese Beetle at LAX. The trap had been placed near a lily of the valley plant.

On August 29, State trapper Rick Sauber found Japanese beetle while inspecting a trap in Hawthorne, Los Angeles County.

NEW STATE RECORDS

WAXFLOWER WASP, *Aprostocetus* sp., -(C)- The wasp, *Aprostocetus* sp., is a gall former on Geraldton wax flower. Monterey County submitted samples. It was tentatively identified to the level of a family which is typically parasitic to other insects. Dr. Hayden, University of California, Davis, who is a specialist on this group, helped get this identification to *Aprostocetus* sp. #1, an undescribed gall former specific to Geraldton wax flower. Both insect and host are native to Australia. The California Department of Food and Agriculture (CDFA) staff discovered that Geraldton wax flower is grown commercially in San Diego, Santa Barbara, and Monterey Counties for the florist trade. *Aprostocetus* sp. #1 is reported from these three counties as well. Samples have been requested for the official record. The Monterey County record is the only one submitted so far. Doug Barbe, our Branch Plant Taxonomist, has specimens of Geraldton wax flower collected from several southern California counties. The Geraldton wax flower is also planted outdoors as a drought tolerant plant.

Now that it is known that *Aprostocetus* sp. #1 is associated with a widely-planted host plant, but may occur only in three counties, it has been rated as a "B" pest.

A EUCALYPTUS PSYLLID, *Ctenarytaina* sp. undescribed, -(Q)- While conducting a survey for the bluegum psyllid, *Ctenarytaina eucalypti*, Orange County Entomologist Nick Nisson discovered this species infesting eucalyptus in Tustin, Orange County. This is a new California and North American record. The original collection was made July 22, 1991, and it was recollected at the same location on August 1. On August 31, it was collected in Prunedale, Monterey County by Extension specialist Bill Chaney and also on August 6 at Santa Cruz, Santa Cruz County by Chaney. These collections were new county records.

This psyllid is a member of a complex of species native to Australia. The newly-introduced bluegum psyllid is a member of this group. According to Keith Taylor, a specialist in this group of psyllids, there are about 20 more undescribed species in the complex. He states that it is very difficult to understand species limits, and it may be a long time before some of these will be described. The particular entity which is now in California is called "species H" by Taylor. In California, it has been called "species 4" because it is the fourth eucalyptus-feeding species to be introduced into California since 1983. These other species include the eucalyptus psyllid, *Blastopsylla occidentalis*, the bluegum psyllid, *Ctenarytaina eucalypti* and the tristania psyllid, *Ctenarytaina longicauda*.

This new psyllid has been found on several species of eucalyptus, but not on *Eucalyptus globulus*, the bluegum. It has generally been found on the same trees and in association with *Blastopsylla occidentalis*.

Since this species is undescribed, no illustrations of its characteristics will be given here. It differs from the other *Ctenarytaina* species in California by being orange-yellow in color rather than mostly black. The male genital capsule has a very long, narrow extension on the proctiger and the claspers are much larger and more spinose than in the other two California *Ctenarytaina* species. Morphological illustrations of the other species will be found in CPPDR 6(3-4):39, 1987 for *C. longicauda*, and CPPDR 10(1-2):7 for *C. eucalypti*.

Nothing is currently known about the economic potential of this species. It apparently has been in California for a time, considering the wide distribution in the State. Since the species appears to prefer flush growth of only a few eucalyptus species, it may not become a serious problem.

NEW COUNTY RECORDS

BLACK-TIPPED THRIPS, *Asprothrips seminigricornis* ,-(C)- This thrips was submitted to the laboratory for identification via O.L. Brawner, retired Staff Research Associate formerly with the University of California Riverside Citrus Experiment Station. The thrips were originally collected by a pest control advisor from a citrus grove near the South Coast Field Station, Irvine, Orange County, California.

This is a new county record. The species was previously collected in California only in San Diego at Balboa Park on *Pittosporum tobira* in 1964. The species was originally described as *Euthrips seminigricornis* by Girault in 1926 from Australian material. It was later described as *Scirtothrips antennatus* by Moulton in 1937 from panax hedges in Hawaii, and as *Asprothrips raui* by Crawford in 1938 from specimens in New York greenhouses.

In Orange County, the thrips had been collected from the fruit in association with two other thrips species, the citrus thrips, *Scirtothrips citri*, and the orchid thrips, *Chaetenaphothrips orchidii*. According to Nick Nisson, Entomologist at Orange County, this new thrips is causing a silver russetting on the fruit not unlike that caused by citrus rust mite. The thrips is found primarily on the north sides of trees and in other shaded locations, such as in trees adjacent to eucalyptus hedgerows. Seriousness of the injury is being evaluated. The possible economic potential of this pest is unknown at this time. Apparently it has not been mentioned in the literature as a pest of significance anywhere in the World. Figures 1 through 4 illustrate diagnostic morphology.

A EUCALYPTUS PSYLLID, *Ctenarytaina* sp. undescribed, -(Q)- New records include Orange, Monterey and Santa Cruz Counties. See article on this species under NEW STATE RECORDS.

ASH WHITEFLY, *Siphoninus phillyreae*, -(C)-This whitefly continues its northward migration. It has been found in nine new counties over the summer. The following list outlines the details of the new records and the map on page 46 shows the current distribution through September 30.

COUNTY	CITY	HOST	DATE	COLLECTOR
Tuolumne	Sonora	Ash	7/3/91	Chambers
Napa	Napa	Ash	7/10/91	Dannenberg/Anderson
Marin	San Rafael	Modesto ash	7/30/91	Crowder
Shasta	Redding	Ash	7/31/91	Moen
Lake	Kelseyville	Pomegranate	8/5/91	Tritchler
Calaveras	Angels Camp	Pomegranate	8/16/91	Paulsen
Mendocino	Ukiah	Raywood ash	8/31/91	Xerogeanes
Nevada	Grass Valley	Ash	9/5/91	Greggens
Tehama	Red Bluff	Ash	9/13/91	Stoffel/Neilson

BLUEGUM PSYLLID, *Ctenarytaina eucalypti* , -(C)- The bluegum psyllid was found in North America for the first time in January of this year [see CPPDR 10(1-2):5-7]. Not much was known about it at the time, and its potential economic effects could not be predicted. Initially, the new find was considered as a potential threat to eucalyptus nursery stock as well as commercial and ornamental plants, so the psyllid was given a "Q" rating, which requires eradicative action in nurseries. Officials in Monterey

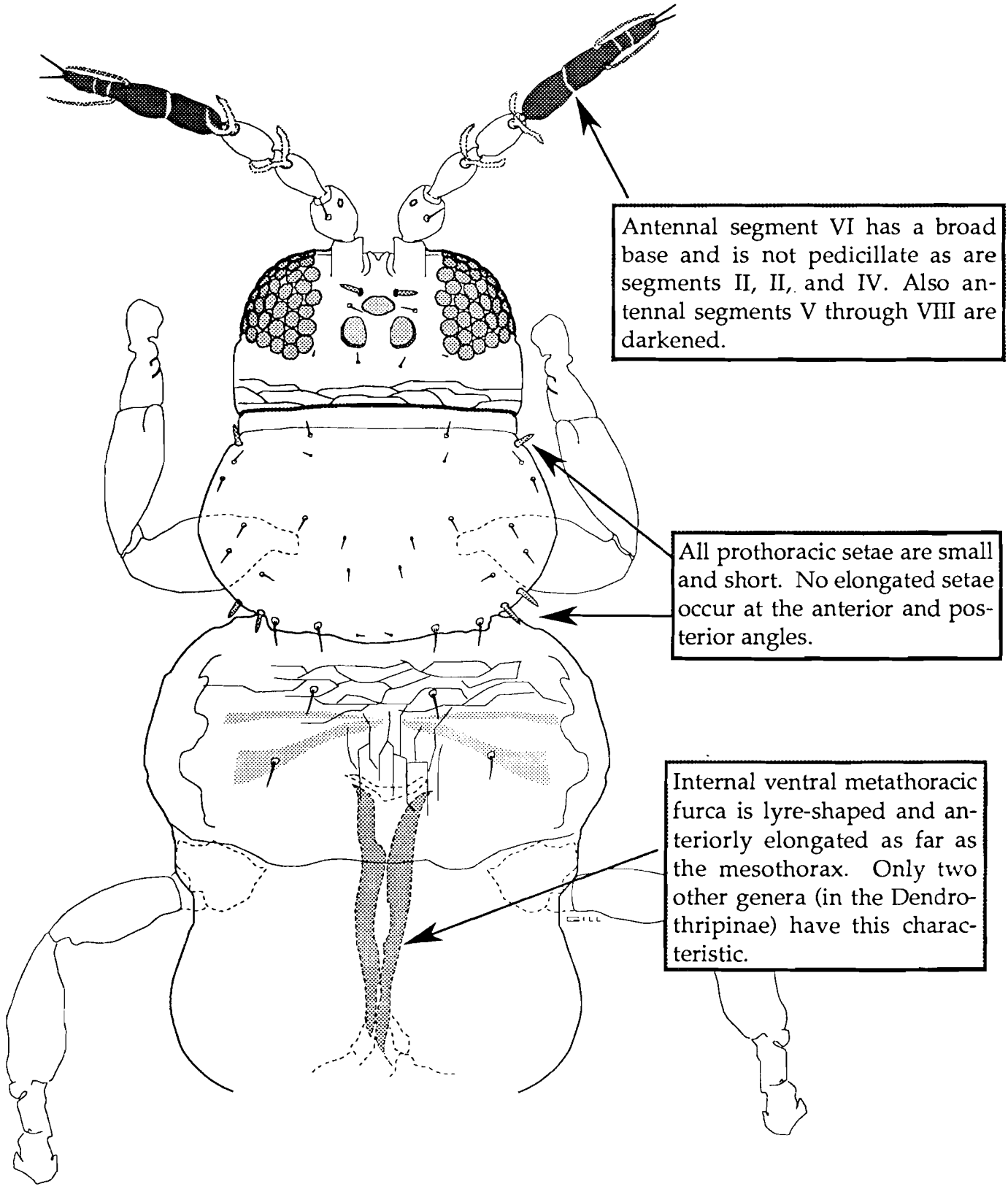

Figure 1. Head and thorax of *Asprothrips seminigricornis*, showing diagnostic morphological characteristics

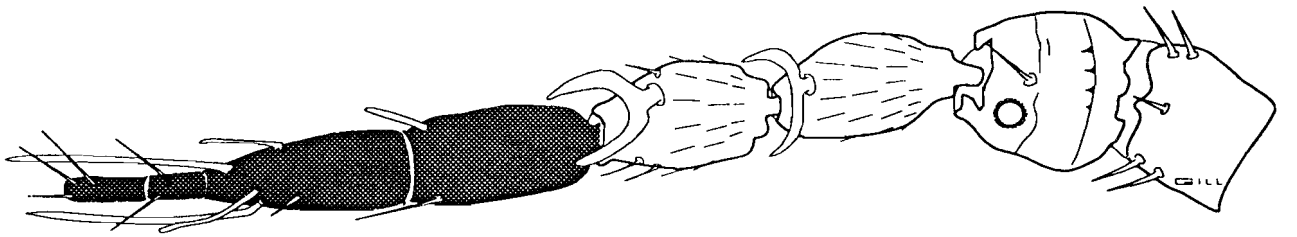

Figure 2. Antenna of *Asprothrips seminigricornis*, showing diagnostic morphological characteristics.

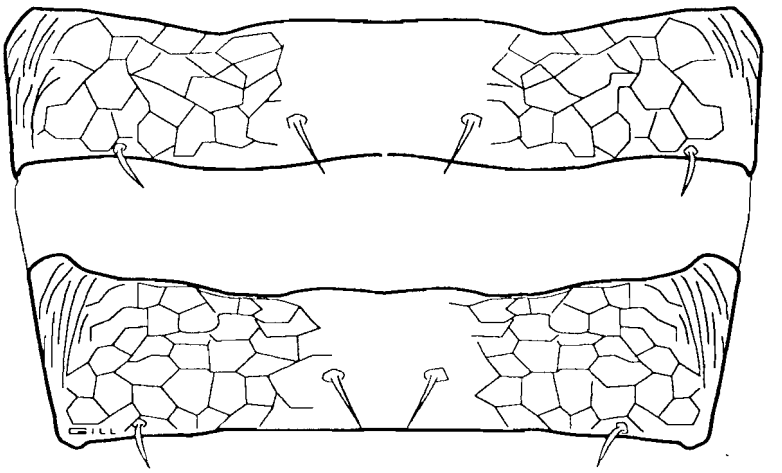

Figure 3. Abdominal tergites VI and VII of *Asprothrips seminigricornis*, showing reticulation pattern.

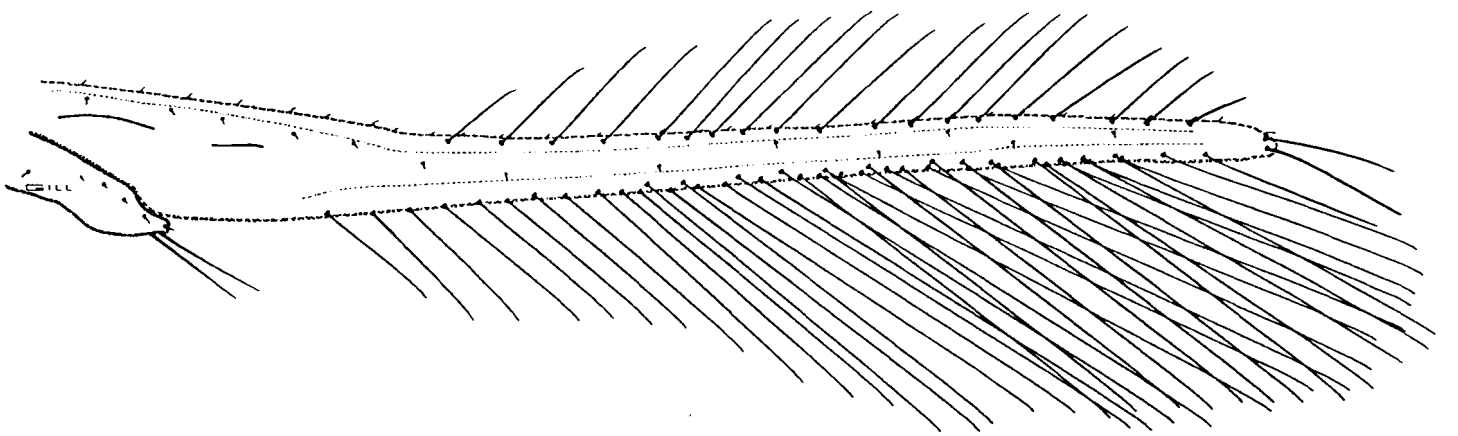

Figure 4. Wing of *Asprothrips seminigricornis*, showing setal patterns.

General Distribution of Ash Whitefly in California

Indicates infested counties

Revised
October 1, 1991

County, where the psyllid was first found, began noticing large nursery populations which were difficult to control and which were becoming a problem because of quarantine restrictions and nursery cleanliness requirements. The county asked for other counties to conduct surveys for the psyllid in an effort to determine its overall distribution in the State. As a result of these surveys, bluegum psyllid was found to occur in most coastal counties south of San Francisco. The following chart outlines the county records for this psyllid through September, and the map on page 48 shows the current distrubution by city and county.

COUNTY	CITY	DATE	COLLECTOR
Monterey	Prunedale	1/25/91	Tjosvold
San Benito	Aromas	6/12/91	Steeger
Santa Cruz	Watsonville	6/14/91	Perry
Los Angeles	Los Angeles	7/25/91	Garrison/Olson
Orange	Tustin	7/30/91	Nisson
Alameda	Oakland	7/31/91	Gonsalves
Contra Costa	Brentwood	8/6/91	Case
San Luis Obispo	Arroyo Grande	8/13/91	Landon
Santa Clara	Sunnyvale	8/7/91	Tassan
Solano	Rockville	8/8/91	Tassan
Santa Barbara	Santa Maria	8/26/91	Davidson
San Diego	Fallbrook	8/26/91	Muluneh
Ventura	Fillmore	9/23/91	Dimock

The psyllid appears to be restricted primarily to *Eucalyptus globulus* in California, a species that is grown extensively for the cut-floral markets. Growing grounds are in operation on a large scale near Watsonville in the Monterey-Santa Cruz area, with some fields also close-by in San Benito County, as well as in Fallbrook and other localities in San Diego County. The psyllid prefers the flush growth rather than the older leaves. Unfortunately, it is just this foliage which is most sought after in the floral trade, and the cultural practice is to keep the trees pruned back so that they produce large amounts of this juvenile foliage. Honeydew from the psyllid has posed problems in harvest situations, and it has caused some discoloration that is still visible even after the foliage has been glycerinized during the preservation process. Growers have asked for assistance in controlling this new pest, and as a result, specialists at the University of California Biological Control Laboratory in Albany will be searching for natural enemies for this species as well as other eucalyptus feeding psyllids and the eugenia psyllid. One scientist is currently in Australia for this purpose.

McKENZIE PINE MEALYBUG, *Dysmicoccus pinicolus*, -(C)- This mealybug is an uncommon pest of pines and other conifers in central California. Presently it is known from Alameda, Monterey, Sacramento, Santa Clara, Stanislaus and Sonoma Counties. It also occurs in central Nevada. On June 1, it was found for the first time in San Joaquin County. The collection was made on Monterey pine at Escalon by E. Gomez.

EUCALYPTUS PSYLLID, *Blastopsylla occidentalis*, -(C)- This psyllid was found for the first time in two adjoining counties during detection surveys for bluegum psyllid. Collections were made in Santa Cruz County at Santa Cruz on July 24 by Extension Specialist Bill Chaney and in Monterey County at Salinas on August 6 by County Entomologist Brad Oliver.

Distribution of Bluegum Psyllid in California

October 1, 1991

LIQUIDAMBAR SCALE, *Diaspidiotus liquidambaris*, -(C)- This unusual armored scale was found in San Diego County at Vista on September 19 by Ken Sims and David Kellum. The scales were infesting the leaves of *Liquidambar styraciflua.*

This scale insect was previously known from old records at Atwater, Merced County in May 1942; Riviera, Los Angeles County in June 1951; and Palo Alto, San Mateo County in August 1973. The Atwater infestation was on roadside trees that were apparently removed for a freeway expansion. The Riviera infestation was in a nursery and the trees were destroyed. The current status of the Palo Alto infestation is unknown at this time, but it is assumed that it is still active.

This scale insect is probably native to liquidambar in its endemic localities in the southeastern United States. The scale is unique among armored scales in that the feeding of the female nymphs on the undersides of the leaves causes an abnormal upwardly directed malformation that results in a dome-shaped pit gall. The adult females are usually found inside these pits with the scale cover partially or completely filling the gall chamber, depending on the depth of the gall. Often, the covers of male scales which have settled nearby are also drawn into the pit as it enlarges. In the infestations at Palo Alto and Vista, the infestation was moderate, with two or three pit galls per square inch of leaf surface. The leaves are disfigured considerably and the dorsal surface shows a necrotic spot over the gall as the leaf becomes older, but otherwise the potential for injury from this scale is unknown.

EXCLUSION

NURSERY SCALE DETECTIONS Several collections of "A" and "Q" rated scale insects were made in California nurseries during the period of this report. Eradicative action has been taken in all cases. The following chart outlines the finds:

Common name	Genus	Species	City	County	Date	Collector
Magnolia white scale	*Pseudaulacaspis*	*cockerelli*	Laguna Beach	Orange	5/23/91	Bennett
Magnolia white scale	*Pseudaulacaspis*	*cockerelli*	Laguna Beach	Orange	8/13/91	Bennett
Magnolia white scale	*Pseudaulacaspis*	*cockerelli*	Merced	Merced	9/26/91	Aguilar
Boxwood scale	*Pinnaspis*	*buxi*	Laguna Beach	Orange	8/13/91	Bennett
Aechmea scale	*Gymnaspis*	*aechmeae*	San Diego	San Diego	7/9/91	Kellum
Tropical palm scale	*Abgrallaspis*	*palmae*	San Diego	San Diego	7/9/91	Kellum

ANNONA SEEDBORER, *Bephratelloides* (*Baphrata*) sp., -(Q)- This phytophagous wasp, *Bephratelloides* (*Baphrata*) sp., was first intercepted in soursop, *Annona muricata*, from Mexico in 1963, and from cherimoya from Mexico in 1965. The species was again intercepted in soursop from Hawaii in 1987.

When first intercepted, the wasp was assigned a "C" rating although it was a quarantine interception and was known to be an agricultural pest in its endemic range. The correct rating of "Q" was assigned in 1987 to the Hawaiian interception.

Between 1965 and 1987, insect taxonomists decided *Baphrata* (rated "C" in 1963 and 1965) and *Bephratelloides* (rated "Q" in 1987) are synonymous and the latter name superceded the former.

Presently, cherimoya is not a major crop in California. The California Cherimoya Association is comprised of approximately 90 members of which perhaps 50-60 produce marketable amounts of fruit each year. Some of the larger growers and shipping groups export fruit to Japan and Europe. It is estimated that approximately 275-300 acres of commercial production exist at this time. The industry is developing as the product is well received in an expanding market. The protection of this market and the quality of the fruit produced are of concern to the industry and to the consumer.

The Annona seedborer is also known as the Annona wasp, chalcid wasp, and erroneously called "chalcid fly." This wasp is about one-third of an inch long, dark brown, and the adults can be seen during the hottest hours of the day resting in the canopy of the Annona trees or oviposting in the fruit.

The wasp selects one fruit for oviposition. She chooses a small one, from 1.4 to 4.8 cm in diameter. Having chosen the fruit, she inserts her ovipositor, and, on reaching an immature seed, lays one egg directly in the seed.

After the seed hatches, the larva and pupa complete their development inside the seed. In time, the adult will emerge from the seed, and chew its way out, creating a tunnel through the pulp. This tunnel provides entry for other insects and for microorganisms that further damage the fruit. Generation time from egg to adulthood is about 9 to 12 weeks; the adults rarely live beyond 15 days.

Peaks in the wasp population occur at the end of spring (May), early summer (June) and early fall in South Florida where bullocks hearts, sugar apples and atemoyas are grown. In general, the emergence of the first generation of wasps from *Atemoya* occurs about 12 weeks after initial fruit set. Most of the winter population of wasps are observed in bullocks heart, which is commonly grown in private gardens, nurseries and in botanical collections. From bullocks heart, the wasp will move to atemoyas and then to sugar apples. Infestation levels on sugar apples are higher during the summer than during spring months.

In recent years, it has become evident that fruit bagging when it is 1/2 inch in diameter provides good protection, at least for some home owners. No chemicals are registered for use to control the wasp in Florida, and few materials have been considered for registration.

SIGNIFICANT FINDS IN OTHER STATES

JAPANESE BEETLE, *Popillia japonica* , -(A)- One male specimen this serious beetle pest was captured in a trap at the Shadow Creek golf course in Las Vegas, Clark County, Nevada on July 2. A delimitation survey around the original find turned up seven additional specimens. The area is being trapped now according to protocol levels and both foliar and soil insecticide applications are being applied.

RED IMPORTED FIRE ANT, *Solenopsis invicta*, -(A)- This ant pest was collected from a nursery in Las Vegas, Clark County, Nevada on June 11. The ants were collected from a mint-apple jelly trap. The traps were a part of the U.S.D.A. Cooperative Agricultural Pest Survey (CAPS) program. The nursery was treated with a combination of pesticides at intervals after the find, and no imported fire ants have been found since.

CHERRY BARK TORTRIX, *Enarmonia formosana*. This pest was recently discovered in large numbers in British Columbia, Canada and later it was found in adjacent Washington [see CPPDR 9(5-6):170-172, 1990]. Thorough surveys in the state of Washington have produced data which indicates the size of the infestation in the area. The following information is excerpted from a report prepared by Eric LaGasa, Washington State Department of Agriculture Chief Entomologist:

> The first U.S. detection of *E. formosana* was reported by WSDA on March 29 of this year. The find was a larval collection from an ornamental cherry tree at Blaine, Whatcom County, Washington. Agriculture Canada reported *E. formosana* in 1990 from at least nine sites in British Columbia's Fraser Valley.
>
> *E. formosana* feeds on the bark and sapwood of a variety of plants of the family Rosaceae including *Malus* (apple), *Prunus* (cherry, peach, plum, apricot, nectarine, and almond), *Pyrus* (pear), *Pyracantha* (firethorn), *Sorbus* (mountain ash), and *Cydonia* (quince). Infested hosts identified in Washington to date (via larval collections) have been mature cherry and apple trees.
>
> In 1991 WSDA and USDA, APHIS, PPQ cooperated in a CBT survey of western Washington and portions of eastern Washington. Pheromone traps were placed from May 13 to Sept. 11.
>
> In general, current CBT distribution encompasses the Puget Sound region. The highest population levels occur in counties bordering on Canada, decreasing in counties to the south. The catch pattern clearly indicates natural spread of the pest, with no outlying catches elsewhere in the state.
>
> Adult flight was detected (by the pheromone traps) from first trap placement in May until trap removal in September. Peak moth catch was in mid-August.
>
> Preliminary field observations of host trees in Whatcom County have corroborated the pheromone trap results, as a high percentage of cherry trees are clearly infested with CBT. Larval infestation is observable via small frass deposits present at the openings of larval tunnels. Most cherry trees in the county are severely stressed with widespread dieback, although it is not known what role CBT has in the situation. All trees in the area have suffered the last few years from exceptionally severe winter conditions, summer dought, and heavy early season winter moth defoliation. All infested hosts observed to date have been mature trees and include ornamental as well as fruiting cherry and apple varieties.

AFRICANIZED HONEY BEE, *Apis mellifera scutellata* hybrids -- Through September 30, APHIS and cooperating agencies have destroyed 257 swarms of this bee in south Texas. There have been two stinging incidents which occurred in the Rio Grande Valley.

A nine year old girl from Mercedes, Texas was stung 18 to 20 times while playing in her backyard where old beekeeping equipment was stored. Texas A & M Apiary Inspectors responded to the call, destroyed the swarm, and sent a sample to the Beltsville Laboratory where it was identified as Africanized.

A 65 year old man was stung over 300 times while he was clearing brush. The swarm of bees were nested in an old shack not far from where he was located. This was the most severe stinging incident caused by Africanized honey bees in the Rio Grande Valley of Texas.

Both of these Africanized honey bee victims were treated and recovered from the stings they suffered.

BORDER STATIONS

In situation after situation, it can be seen that many people are either unaware of quarantine regulations, or often try to circumvent the restrictions. This is true not only in the case of commercial commodities (several such episodes have been reported in this section before), but of personal possessions as well. The following example is further evidence that people don't change their ideas quickly:

> On August 4, Sunday night, Dorris AIS Sue Chapman discovered a ferret in an Idaho vehicle. Sue informed the driver that the animal could not enter the State and issued a rejection notice. The owner opted to "return the animal to Washington." A call was made to Hornbrook and Tulelake to watch for this vehicle, just in case! About midnight, Hornbrook PQS Russ Peffer noted the same vehicle entering the auto lanes. The owner's reported statement that they "would get this animal into California" provided some urgency to a thorough inspection. The removal of all luggage and packages from the back of the small truck turned up nothing. Russ began to believe that they really had "left the ferret in Ashland" as they claimed. In one last ditch effort Russ took the cover off of the compartment where the spare tire is kept. Alas, there was the ferret! The animal was confiscated (attempted entry after rejection) and the driver was cited. Fish and Game officials will board the animal until the case goes to court.

Whatever the circumstances, large amounts of quarantine materials are intercepted at our borders. The following list reflects the quarantine violations and prohibited pest rejections for the randomly selected week ending August 20 :

Border Station	Origin	Prohibited Material	Inspector
Alturas	Nevada	ferret	David Brear
Alturas	Oregon	meadow hay	John LeNeave
Blythe	New York	ferret	Linda Wadley
Blythe	Texas	oak firewood	Lance Ebert
Blythe	Florida	nursery stock	Bill Hinsley
Blythe	Florida	nursery stock	Ruben Armendariz
Blythe	Texas	field grown palms	Dariel Perez
Blythe	Texas	wheat straw debris	Rich Teskey
Blythe	Mexico	mangoes	Abe Sandoval
Hornbrook	Oregon	ferret	Don Middleton
Hornbrook	Washington	citrus trees	Bill Palmer
Long Valley	Oregon	ferret	Dave Gaona
Needles	Florida	HHGs/plants	Louis Vasquez
Redwood	Mexico	mangoes	Rick Steen
Truckee	Pennsylvania	ferret	Joe Lambirth
Truckee	Minnesota	gerbil	Dick Ward
Truckee	Montana	wheat	Chandra Rosier
Truckee	Nebraska	feed corn	Dan Rudolph
Vidal	Texas	empty truck (live ants)	Kristen Emino-Leach
Vidal	Texas	paper forms (live ants)	Robert Granger
Vidal	Alabama	print paper (live ants)	Linda Dupes
Winters	Florida	nursery stock	Mike Ebers
Yermo	Montana	barley	John Robles
Yermo	Montana	barley	Jill Clark
Yermo	Nevada	fruit trees	Ismael Palomo

PLANT PATHOLOGY HIGHLIGHTS

POWDERY MILDEW, a new disease of *Plumeria*, — Richard Tiffer, Plant Pathologist for Orange County Department of Agriculture, reports a new disease of *Plumeria rubra* called powdery mildew. Plumeria, an ornamental shrub, has been gaining popularity in Southern California. A very frost-tender plant, it produces beautiful and fragrant red to violet colored flowers from April to November which are up to two and a half inches across. The leaves are thick and fleshy, measuring up to 16 inches long. Specimens of these beautiful flowering shrubs are being widely grown and planted from San Diego to Santa Barbara. The list of known pests and diseases of *Plumeria* is relatively small, most of the recorded information originating from Hawaii or Florida.

Thus far, only the *Oidium* sp. stage has been observed for powdery mildew, but CDFA personnel are attempting to induce the sexual stage to form so that the fungus can be accurately identified.

POTATO VIRUS "Y", NECROTIC STRAIN (PVY-N)— The following report was circulated via the telemail network by M. Shannon for USDA, APHIS, and PPQ.

> "On September 24, officials with Agriculture Canada reported to the U.S. Department of Agriculture that Canada has intercepted PVY-N on potatoes coming from the United States. The alleged interception resulted from a routine audit of tablestock potatoes being imported into Canada from the United States. The information supplied by Agriculture Canada indicates that the imported red tablegrade potatoes were harvested and shipped from southern California.
>
> USDA scientists have agreed that the test data supplied by Canada appear to support the diagnosis of PVY-N in the sample. The Animal and Plant Health Inspection Service (APHIS), in cooperation with the California Department of Food and Agriculture (CDFA), is now investigating to determine the source of the infected potatoes. APHIS and CDFA will immediately conduct surveys in southern California to confirm or disprove that an infestation of PVY-N is present in the United States."

Previously, the disease was not known to be present in the United States. One possible infestation may have occurred in Florida several years ago. Florida has commonly used potato seed stock that originates out of New Brunswick, which may have been the source of that infection. The disease is known to occur in Prince Edward Island, New Brunswick, Nova Scotia, Quebec, and Ontario. Whether or not the infected potato fields, if any, that have been grown in California were planted from Canadian stock also remains to be determined. The history of the reportedly infected potatoes includes seed lots that were grown in Hamil Valley, Mono County; Stockton, San Joaquin County; and British Columbia, Canada.

STATE OF CALIFORNIA • DEPARTMENT OF FOOD AND AGRICULTURE

DIVISION OF PLANT INDUSTRY - ANALYSIS & IDENTIFICATION/BOTANY

DETECTION MANUAL
D. T. 6:37a
Revised 8/27/91