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Page

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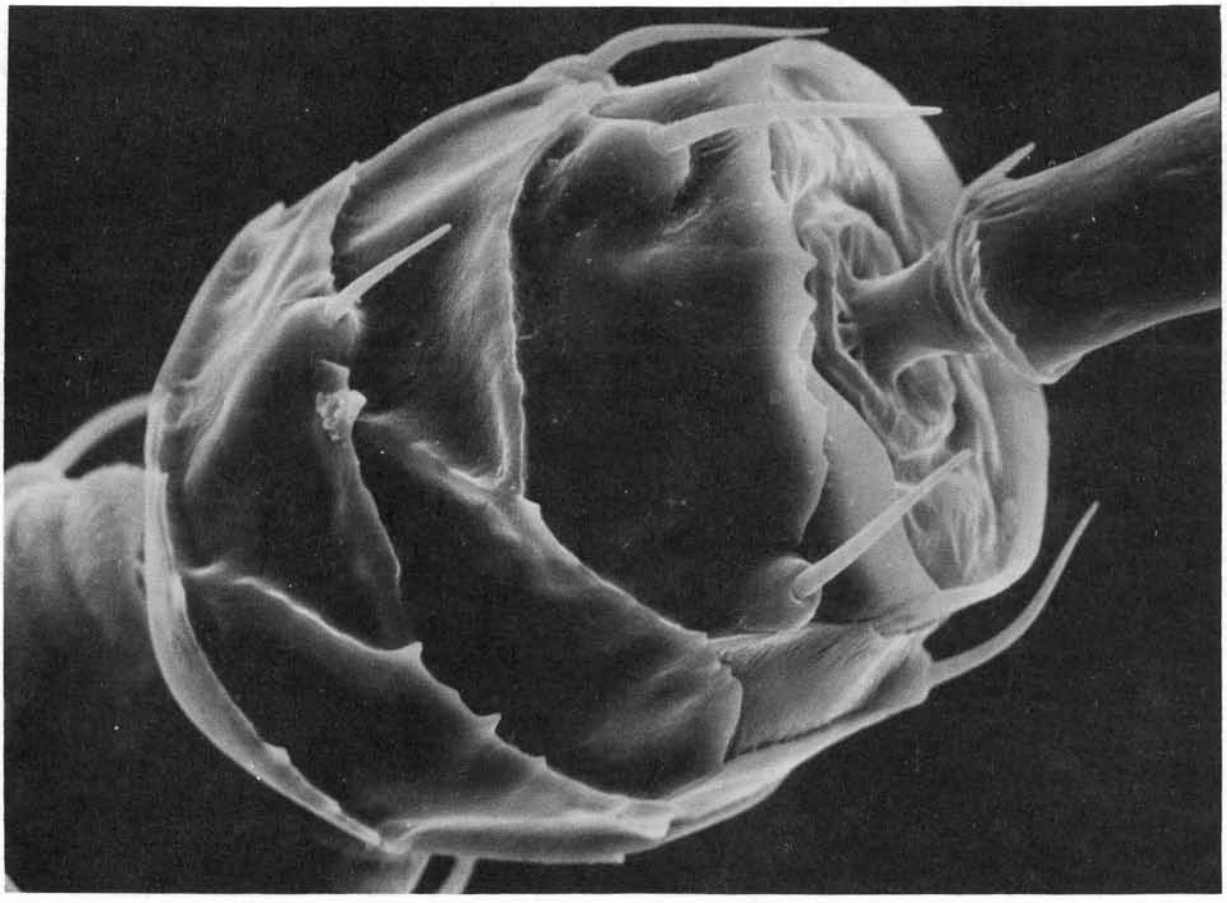

SCANNING ELECTRON MICROGRAPH OF THE SECOND ANTENNAL SEGMENT OF THE GREENHOUSE THRIPS, *HELIOTHRIPS HAEMORROIDALIS*

ELISA, A NEW TECHNIQUE FOR PLANT DISEASE DETECTION

D.C. Opgenorth

ELISA is an acronym for "enzyme-linked immunosorbent assay", a new serological testing method which was introduced into the field of plant pathology in 1977. It has been applied to the detection of viruses, bacteria, and mycoplasma-like organisms in plant tissue. The CDFA plant pathology laboratory is now equipped to use this technique routinely for certain diagnostic tests.

The ELISA test which our laboratory is now employing is called the double antibody sandwich method. Tests are done on plastic plates having 96 small wells in a 12 x 8 array. In each well a small amount of antiserum (specific for the virus to be determined) is allowed to incubate and become attached to the bottom of the well (Fig. 1). The wells are then washed with a salt or buffer solution to remove excess antiserum. A one in ten dilution of macerated tissue from a plant suspected of having a virus infection is then placed in a previously coated well. If the virus is present, a specific reaction takes place and the virus (antigen) is selectively bound to the antiserum (antibody) already on the bottom of the well (Fig. 2). Washing with buffer removes the excess plant material from the test well.

To determine if virus was present in the sample, a second layer of antiserum is added; this antiserum has been linked to an enzyme. If virus is present in the test well the antibody-enzyme conjugate will bind to it (Fig. 3). Washing with buffer removes the excess antibody-enzyme conjugate. At this point a clear substrate solution is added which develops to a straw yellow in the presence of the enzyme (Fig. 4). Presence of the enzyme indicates the presence of the virus in the sample. A quantitative determination can be made by using a colorimeter. The greater the virus concentration in the initial sample, the greater the color intensity (absorbance).

While the ELISA method seems rather involved, it can be performed rapidly and reliably in a laboratory environment. ELISA technology has several advantages over conventional detection methods, especially for plant viruses. Testing can be done in one day rather than waiting weeks or months for symptom development after inoculation of indicator plants. The tests are repeatable, reliable and in most cases quantitative. Serological testing has been shown to have high specificity. Amounts of virus have been detected at very low levels, in the nanogram range. The reagents to do the testing are relatively inexpensive.

In the CDFA laboratory, ELISA is currently being used to detect potato viruses A, M, S, X, Y, and leafroll (PLRV). In the near future we expect to work with stone fruit and grapevine viruses. As new antisera are prepared and other testing procedures are developed, we expect that ELISA will become a standard technique for detection of many plant disease agents.

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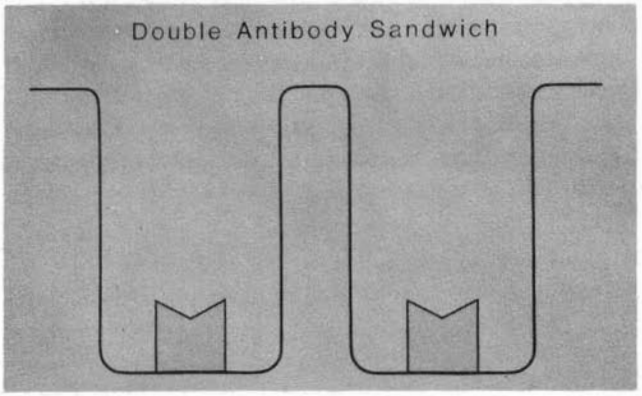

Fig. 1

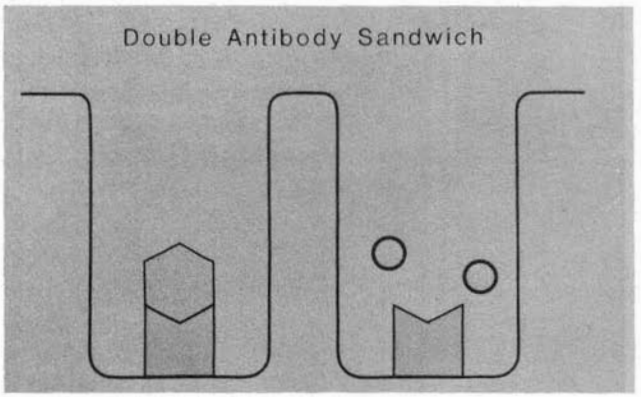

Fig. 2

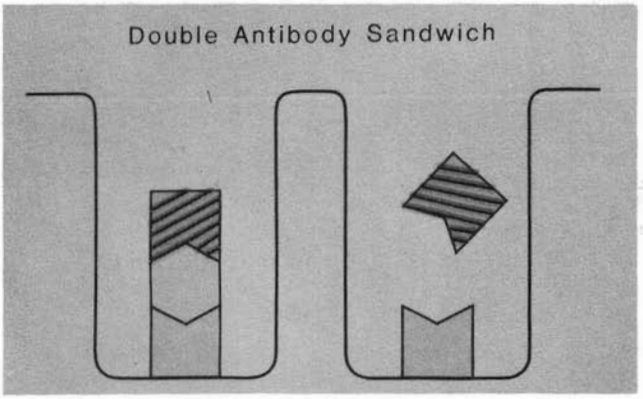

Fig. 3

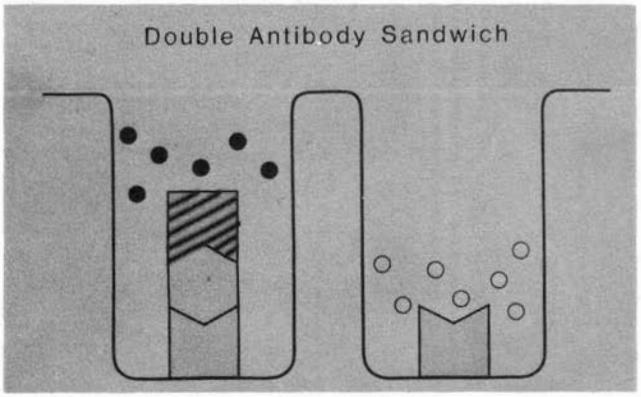

Fig. 4

Calif. Pl. Dis. Vol. 3, No. 1: 1-22 was issued on January 27, 1984.

ROSE ROSETTE DISEASE IN SAN DIEGO COUNTY

Ken Sims

A severely rosetted hybrid rose specimen was submitted to the San Diego County laboratory in the spring of 1983 by District Biologist Steve Desserich. The specimen was brought to his district office by a concerned homeowner living in Vista, California. Subsequent investigation revealed that 6 plants of 20 were affected to varying degrees. No herbicides or other chemicals had been used which could account for the symptoms. The plants were several years old and had shown normal growth in prior years. The actual source of plants could not be determined.

Similar symptoms had been reported previously from northern California on wild rose and from the Midwest on wild and hybrid rose.

Symptoms on plants at the Vista site varied from severe stunting, rosetting and yellowing of developing growth on several plants to a mild rosetting and stunting of portions of other plants. The disease as reported in northern California and the Midwest is believed to be due to a virus vectored by an eriophyid mite, *Phyllocoptes fructiphilus*. Numerous rose rust mites, *Callyntrotus schelectendali*, were found on the Vista plants, but no *Phyllocoptes* sp.

Dr. Dennis Mayhew, CDFA Plant Pathologist, reported that the roses were apparently affected with the rose rosette disease. As in other reported cases, the transmissible agent was not found in electron microscope preparations. This is the first report of this disease in southern California and the first report on hybrid roses in the State.

All affected plants were removed and destroyed.

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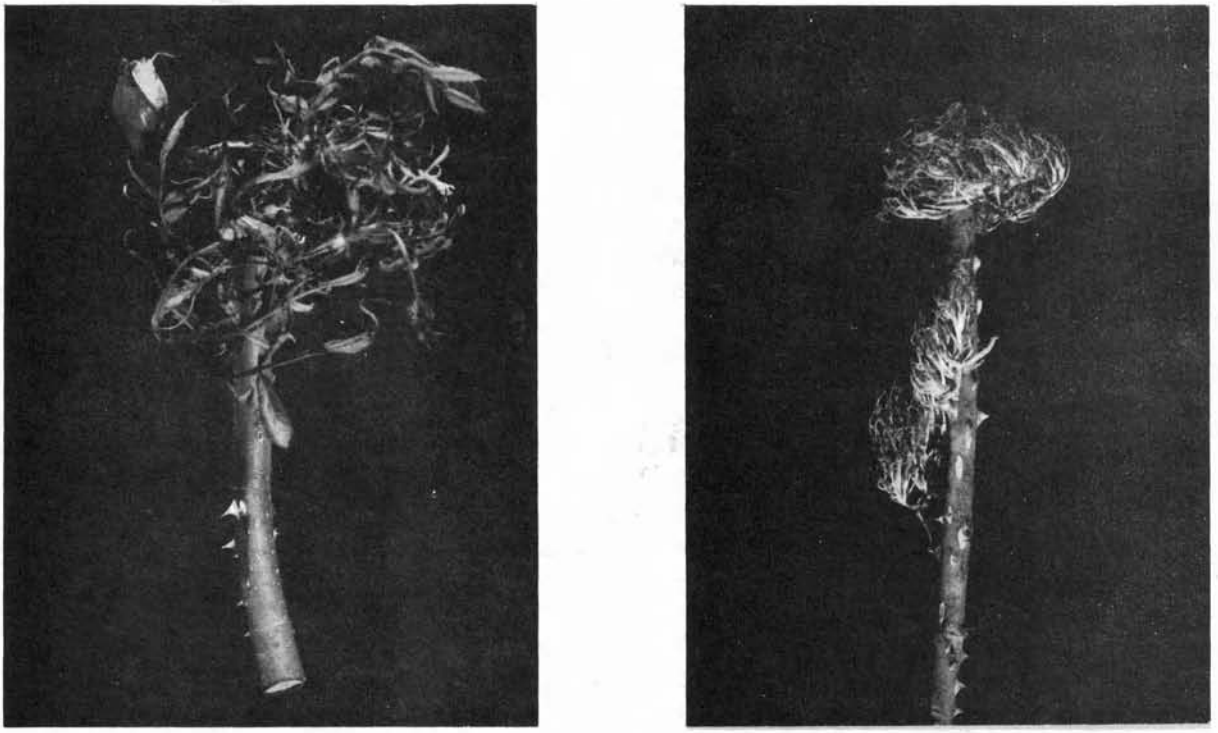

Symptoms of rose rosette disease on hybrid rose canes in San Diego County.

Correspondence should be addressed to the appropriate member of the editorial staff of the California Plant Pest and Disease Report (C.P.P.D.R.):

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Entomology Highlights

Yet another fruit fly has shown up in California! This time it is a species near the Caribbean fruit fly, a close relative of the Mexican fruit fly.

Caribbean fruit fly, *Anastrepha suspensa?* -(A)- One specimen (still alive when found on the sticky trap) has been collected near Kensington, a small suburb of San Diego, in a combination Jackson sticky trap. It should be noted that the *Anastrepha* group of fruit flies usually are attracted to a McPhail trap, although this particular fly chose the Jackson trap about 20 ft away. The following report by John Pozzi supplies pertinent data:

> "An *Anastrepha* species suspected to be *suspensa* (Caribbean fruit fly) has been trapped in the city of San Diego, San Diego County. State Systematic Entomologist Karen Corwin will not be able to make a positive specific identification unless more specimens are found because of the morphological variability among these flies. Caribbean fruit fly has never been trapped in California.
>
> The find was made by Agricultural Technician Aide Belinda Moss on 12/13/83, while servicing a Jackson trap baited with "combination lure" (cuelure + methyl eugenol) and placed in a tangerine tree. In addition, no finds were made in a McPhail trap that was in an orange tree approximately 20 feet away.
>
> County and State personnel are increasing McPhail and Jackson trap densities to a minimum of five per square mile in the immediate nine square miles around the find."

Mexican fruit fly, *Anastrepha ludens* -(A)- Flies and larvae continue to be found near the original site at Huntington Park, Los Angeles County. A total of 79 flies have been trapped between November 5 and December 20, bringing to 166 the total trapped in the area. Also, 8 larval infestation sites have been found, mostly in grapefruit. Flies have been trapped on a total of 53 properties in the Huntington Park area. Some of the detection personnel involved in making these finds were Adams, Amayo, Azhar, Buckley, Cabreira, Cassidy, Davis-Robbins, Galman, Inocencio, Kermode, Looram, Medina, Nelson, Peterson, Quintanilla and Sullivan.

Oriental fruit fly, *Dacus dorsalis* -(A)- Since October 28, 4 more Oriental fruit flies have been trapped in California bringing the total to 14 flies for 1983. The following report by John Pozzi outlines the finds:

> "Oriental fruit fly (OFF) has been trapped at a third location in Los Angeles County. The fly was a male, and was found in the city of Los Angeles near Hollywood. County Trapper Vincent Gerlach made the discovery on 11/7/83, while servicing a Jackson trap that had been placed in an orange tree along St. Andrews Place. The find is approximately 20 miles from Valinda and Artesia where OFF had been trapped earlier this year.
>
> County personnel are increasing OFF/Jackson trap densities in an 81 square mile area around the find.

A fourth male Oriental fruit fly (OFF) has been trapped in Santa Clara County. The latest find was made on 11/10/83 in Saratoga, and is approximately 1-1/2 miles south of one trapped earlier this year. State Trapper Dave Soares made the discovery while servicing an OFF/Jackson trap that had been placed in a lemon tree.

A male (OFF) was trapped for the first time this year in San Diego County. The discovery was made on 12/01/83 by County Trapper Cathy Neville while servicing a Jackson trap in an orange tree along Marlborough Drive in the city of San Diego. In response to the find, trap densities in the immediate 81 square mile area around the find are being increased to five per square mile.

A second male (OFF) was trapped in San Diego County. The find was made in the city of San Diego and is approximately three miles northeast of one trapped earlier this year in that city. County Trapper Belinda Moss made the discovery while servicing an OFF/Jackson trap placed in a Kaffir plum tree along Calvin Way.

OFF/Jackson trap densities are being increased to five per square mile in the 81 square mile area around the second find that was not included in 81 square miles around the original find."

Summary - 1983 Oriental Fruit Fly Finds

County	Trapped
Los Angeles	3
Orange	1
San Diego	2
San Mateo	3
Santa Clara	4
Ventura	1
Total	14

Apple maggot, *Rhagoletis pomonella* -(A)- One new locality, Hornbrook, Siskiyou County, has been added to the long list of known locations already found infested by this pest in 1983. The Hornbrook specimens were larvae and pupae found in hawthorn fruit by Larry Bromson and Don Shaw on November 2.

Gypsy moth, *Lymantria dispar* -(A)- One adult moth and empty pupal and larval skins from a new property have been collected since our October 27 summary. The following report by John Pozzi outlines the two finds:

"The number of gypsy moth adults detected in California has risen to 179. The latest one was trapped near the city of Cobb in Lake County. The discovery was made by Agricultural Biologist Christopher Twohy on 11/04/83 while removing a gypsy moth trap from a limited access area of the County. Next season, additional gypsy moth traps will be deployed at the protocol level.

Cobb is approximately 15 miles south of Kelseyville.

Empty gypsy moth (GM) pupal cases, larval cast skins, and a dead larva were found on 11/28/83 in Los Altos, Santa Clara County. The finds were made on a Guadalupe Drive residence whose owners had moved from Massachusetts in 1982. State Agricultural Pest Control Specialist Jim Bombaci and Inspector Steve Klauer made the discovery while surveying properties in the vicinity where gypsy moth adults were trapped earlier this year."

Also, caged egg masses of gypsy moth have begun hatching in mid-December in the San Jose area.

Cotton boll weevil, *Anthonomus grandis* -(A)- High trap catches of this pest were made during early November, but cool weather is now causing a decline in trap totals. The following data recount the trap totals for 1983 as compiled by Tom Palmer in "Boll Weevil News" Vol. I, No. 19, December 21, 1983:

TRAPPING SUMMARY

(Cotton Growing Regions)

	BLYTHE		BARD		IMPERIAL	
Month	# Traps	Weevils Trapped	# Traps	Weevils Trapped	# Traps	Weevils Trapped
January	445	2,927	325	218	352	4
February	481	182	325	145	352	2
March	481	198	325	112	352	8
April	665	77	325	26	352	0
May	694	97	325	42	352	4
June	725	9	325	1	352	0
July	774	0	325	0	352	0
August	774	0	325	2	352	0
September	770	23	387	97	368	0
October	771	1,054	387	1,625	374	73
November	813	655	387	2,103	375	242
December						
12/02/83	813	(64)*	387	27	375	8
12/09/83	813	127	387	95	375	36
12/16/83	813	270	387	979	375	164

*Included in November Blythe totals

TOTAL (Since September)= 578

(Weevils Taken in Desert)

Month	IMPERIAL COUNTY	RIVERSIDE COUNTY
October	3,343	3,187
November	834	3,427
December (15th)	20	110

The following information, also taken from the December 21 report by Tom Palmer, is a summary of the Boll Weevil Science Advisory Panel Recommendations for control and eradication of this pest:

"The Boll Weevil Science Advisory Panel, which is chaired by Dr. Jim Brazzel, met on December 8, 1983 at El Centro. The panel restated its original concern that boll weevil eradication is only possible if all three political entities (Arizona, California, and Mexico) are actively involved in a regional eradication program. In view of the current boll weevil situation in the region, it appears that even suppression efforts will also require the active cooperation of Arizona. To that end, the panel made the following recommendations.

1. That Arizona and California cooperate on a plan along the Colorado River to suppress boll weevil populations.

2. That this plan include a spring suppression program of treatments of infested fields. The treatments will be either an organophosphate at five-day intervals to three to four sprays or Dimilin at seven-day intervals for up to six sprays with an organophosphate clean-up spray.

3. Sprays to begin when the cotton squares are just about big enough to support boll weevil.

4. In season boll weevil control to be left to the grower.

5. That both Arizona and California use the 1983 trapping plan used in southern California and that it be used throughout the winter and into April, 1984. This high density trapping (one trap/16 acres to one trap/80 acres) gives project personnel a good idea of boll weevil movement and will help pin-point fields that need spring treatments.

6. That a 75-day host-free period be used with plowdown by January 1, 1985 and no cotton planted before March 15, 1985. This should apply to all of southern California cotton and to Arizona cotton along the Colorado River. Plowdown must include a thorough destruction of bolls and stalks followed by burial. <u>This cultural practice is the most effective tool against boll weevil, and its active use will greatly help reduce boll weevil numbers</u>.

NEW STATE RECORDS

A mite, *Aleuroglyphus ovatus* -(D)- This fungus feeding mite was found for the first time in California recently. See the following report by T. Kono for details:

Aleuroglyphus ovatus (Troupeau), A Stored-Product Mite New to California (Acari: Acaridae).

Walt Johnson, Farm Advisor of Shasta County, observed large colonies of a mite in a 55 gallon drum of cattle feed composed of rolled oats, corn, alfalfa pellets, and molasses. Tokuwo Kono (CDFA) and Robert L. Smiley (USDA-ARS) identified the mite as *Aleuroglyphus ovatus* (Troupeau), new to California (83I16-43).

Aleuroglyphus ovatus (Fig. 1) belongs to family Acaridae, a group of mites commonly encountered in stored foods. It is an oval mite about a half millimeter long with glistening white body and reddish-brown legs and mouth parts. The body hairs are short except for those on the posterior end of the body, which are long.

According to Hughes (1961, 1976), *A. ovatus* has been found in bran, wheat, chicken meal, dried fish products, flour, and pollards. It has also been found in mice burrows, moles' nests, and broiler houses. Its life cycle takes 2-3 weeks at 23°C, 87 percent humidity when reared on wheat germ.

It is known that many species of mites found in stored foods feed on fungi rather than on stored foods. Pimental et al. (1960) showed that *A. ovatus* can be reared in a melon mutant strain of ascomycete, *Neurospora crassa* Shear and Dodge. Sinha (1966) found that *A. ovatus* is a mycophagous mite that thrived very well on *Nigrospora sphaerica* (Sacc.) Mason and *Trichothecium roseum* Link.

A. ovatus has been reported from England, France, Holland, Jugoslavia, Turkey, U.S.S.R., Japan, and U.S.A. It is probably cosmopolitan (Hughes, 1976).

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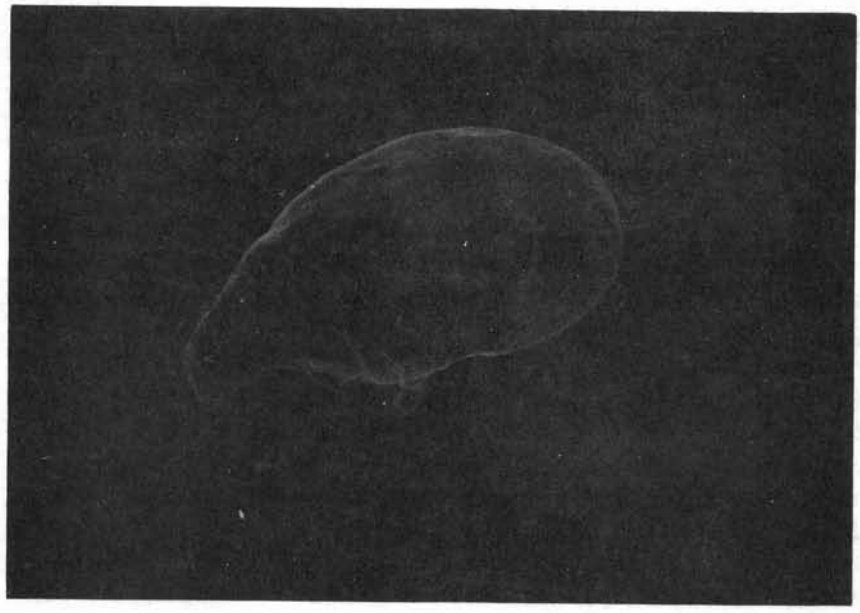

Fig. 1. Scanning electron micrograph photo of *Aleuroglyphus ovatus* (Troupeau) female.

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Miscellaneous Finds of Significance

Greenhouse thrips, *Heliothrips haemorrhoidalis* -(C)- This common, introduced thrips species has become a pest of Christmas trees. See the following report by T. Kono for more information:

Adams, Lippert, and Smith of the California Department of Forestry, and Struffenegger of the San Mateo Agricultural Commissioner's Office collected a species of thrips causing browning of leaves and leaf drop to Douglas fir and Monterey pine at a Christmas tree farm in Half Moon Bay. T. Kono of CDFA identified the thrips as *Heliothrips haemorrhoidalis* (Bouche), greenhouse thrips (83J28-16, 83J31-37).

This thrips is a pest of many greenhouse plants throughout the world. It is an out-of-doors pest in the tropical and semi-tropical areas of the world. Bailey (1938) mentioned that this thrips has about 100 host plants. The host plants are primarily greenhouse and ornamental plants. Crop plants such as citrus and avocados are badly damaged in Southern California. In Califonria, this is the first time that the greenhouse thrips has been reported as a pest of Douglas fir and Monterey pine Christmas trees. According to Struffenegger, 10 percent of the trees on the two-acre farm showed damage.

The larvae and adults of the greenhouse thrips feed on foliage and fruit of the host plants. Leaves that are severely injured become papery, wilted, and die. The surface of fruits that are attacked becomes brownish. The thrips also spots leaves and fruits with brownish or blackish excrement (Bailey, 1938).

All stages of the greenhouse thrips (egg, larva, prepupa, pupa, and adult) are found on the host plant. The female deposits her egg within the leaf tissue through an incision that she makes with her ovipositor. According to Bailey

(1938), the eggs hatch within 17 to 20 days. The larvae feed in colonies on the leaf surface for about 13 days. The larval stages are followed by the non-feeding pupal stages of about 5 days. The complete cycle requires 35 to 38 days. Each female can lay a maximum of 25 eggs. There are five to seven generations a year out-of-doors in areas with mild weather conditions. This thrips prefers cool, shady, fairly moist environmental conditions. Russell (1909, 1912) reported on the life cycle and described all the stages in the life cycle of this thrips.

In California this thrips was collected out-of-doors in the following counties: Alameda, Los Angeles, Mendocino, Monterey, San Diego, San Francisco, San Mateo, Santa Barbara, Santa Clara, and Sonoma (Bailey, 1957).

The adult female greenhouse thrips is about 1 1/2 mm long (Fig. 1). It has a blackish brown body with lighter colored posterior end. The surface of the body is adorned with large reticulations (Figs. 2, 3). The antennae are eight-segmented. The eighth antennal segment is long and slender (Fig. 4). No male has been found in California. According to Wilson (1975), "*Heliothrips* is a distinct tropical genus but is unusual for the Terebrantia in having a species complex (*haemorrhoidalis* group) in which the females appear to be indistinguishable and males are necessary for confirmation of the species."

Struffenegger recommended diazinon for the control of this thrips.

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Scanning Electron Micrographs of the
Greenhouse Thrips, *Heliothrips haemorroidalis*

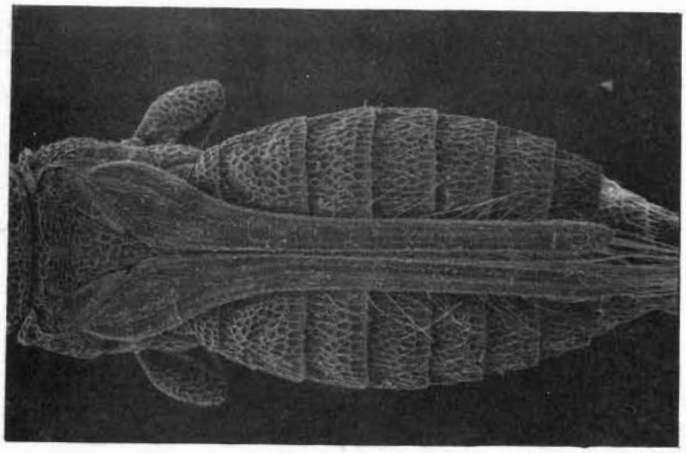

Fig. 1. Adult female.

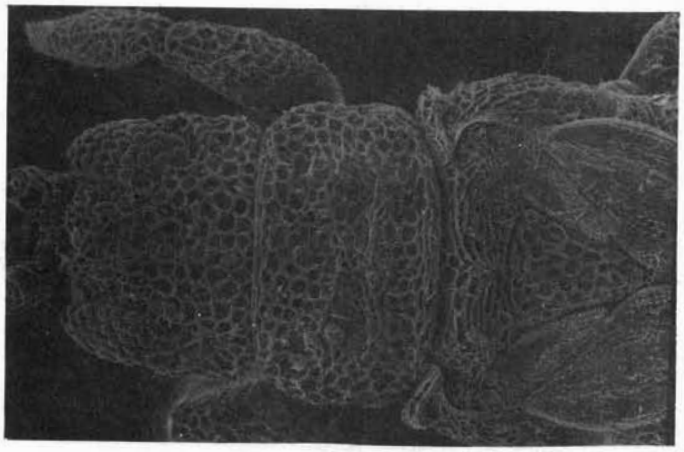

Fig. 2. Head and thorax of adult female showing large reticulations.

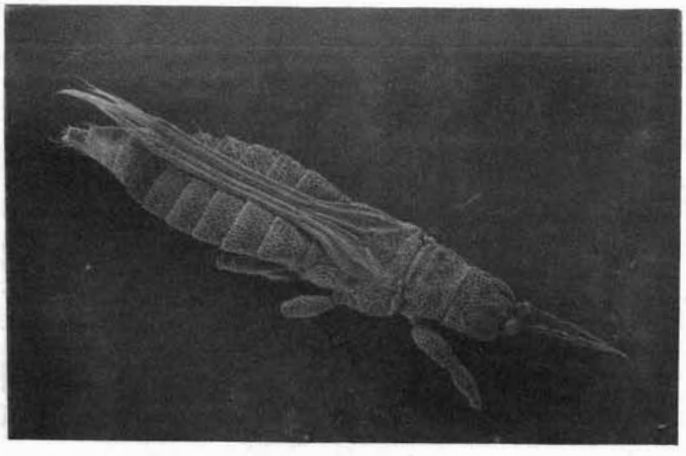

Fig. 3. Thorax and abdomen of adult female showing large reticulations and the forewings.

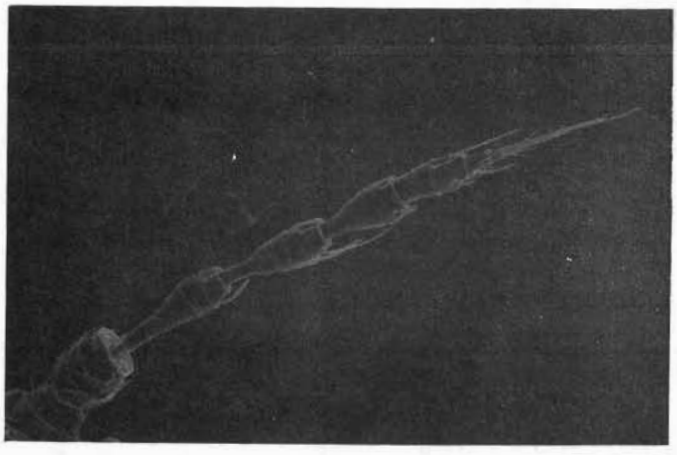

Fig. 4. Right antenna of adult female.

Quarantine and Exclusion
Pest Interceptions - Insects

Gypsy moth, *Lymantria dispar* -(A)- Four interceptions were made from October 25 to November 28 on furniture and household goods shipped from New York, Connecticut, and Massachusetts. Also, two larvae reared from caged egg masses were collected on November 5 and 15 (det. by T.D. Eichlin and R.E. Somerby).

The following species of "A" or "Q" rated pests were intercepted in quarantine during the month of November:

Rating	Species	Common Name	Origin	County	Host	Collector
A	*Pseudaulacaspis cockerelli*	Magnolia white scale	HI	V	Bird of paradise	D. VanEpp
			HI	V	Palm leaves, ginger, *Heliconia*	D. Mitchell/ D. VanEpp
			HI	V	Ginger, bird of paradise, Ti leaves, Anthurium	D. VanEpp
A	*Pulvinaria psidii*	Green shield scale	HI	LA	Ginger, orchid	P. Eisenhart
Q	*Siphanta acuta* (egg mass)	Torpedo bug	HI	PLA	Ti leaf	J. Henderson
Q	*Geococcus coffeae*	Soil mealybug	HI	SD	*Neanthe bella*	Boch
Q	*Malacosoma* sp. (pupa)	Tent caterpillar	MA	Tul	Lawn mower	R. Haines
			NY	STCL	Gas grill	C. Denny
Q	*Pheidole megacephala*	Big-headed ant	HI	V	Palm leaves, ginger, *Heliconia*	D. Mitchell/ D. VanEpp
Q	*Paratrechina* sp.	An ant	HI	V	Ginger, bird of paradise, Ti leaves	D. VanEpp

BORDER STATION INTERCEPTIONS

HICKORY SHUCKWORM	*Laspeyresia caryana*	-A-	92
EUROPEAN CORN BORER	*Ostrinia nubilalis*	-A-	9
TENT CATERPILLAR	*Malacosoma* sp.	-Q-	19
WOOLLY BEAR CATERPILLAR	Arctiidae	-Q-	9
GYPSY MOTH	*Lymantria dispar*	-A-	43
CALIFORNIA RED SCALE	*Aonidiella aurantii*	-B-	18
CHAFF SCALE	*Parlatoria pergandii*	-B-	36
ORIENTAL SCALE	*Aonidiella orientalis*	-Q-	4
PINK BOLLWORM	*Pectinophora gossypiella*	-A-	74
APPLE MAGGOT	*Rhagoletis pomonella*	-A-	63
A SNAIL	*Bradybaena similaris*	-B-	1
A MEALYBUG	Pseudococcidae	-Q-	2
A WEEVIL	*Curculio* sp.	-Q-	19
PECAN WEEVIL	*Curculio caryae*	-A-	30
AN OWLET MOTH	*Euxoa* sp.	-Q-	3
A BAGWORM	Psychidae	-Q-	1
WHITE-MARKED TUSSOCK MOTH	*Orgyia leucostigma*	-Q-	3
SUGARCANE BORER	*Diatraea saccharalis*	-A-	5
A PENTOTOMID	*Nezara viridula*	-Q-	1
WALNUT HUSK MAGGOT	*Rhagoletis suavis*	-A-	5
WALNUT HUST FLY	*Rhagoletis juglandis*	-A-	1
HOLLY LEAFMINER	*Phytomyza ilicis*	-B-	42
WHITE PEACH SCALE	*Pseudaulacaspis pentagona*	-Q-	1
A NOCTUID MOTH	Noctuidae	-Q-	3
TOWNSEND SCALE	*Abgrallaspis townsendi*	-Q-	1
A SOFT SCALE	*Pulvinaria* sp.	-Q-	1
A BAGWORM	Psychidae	-Q-	1
EASTERN TENT CATERPILLAR	*Malacosoma americanum*	-Q-	3
COTTON BOLL WEEVIL	*Anthonomus grandis*	-A-	2
AN OWLET MOTH	*Spodoptera* sp.	-Q-	1
A GRASSHOPPER	*Melanoplus* sp.	-Q-	1
A MIRID BUG	Miridae	-Q-	1
CHINCH BUG	*Blissus leucopterus hirtus*	-Q-	1
A TUSSOCK MOTH	*Orgyia* sp.	-Q-	1
PINE SCALE	*Chionaspis heterophyllae*	-Q-	1
A SLUG	*Veronicella floridana*	-Q-	1
A COCKROACH	*Cariblatta lutea*	-Q-	1
A TORTRICID MOTH	*Cydia* sp.	-Q-	1
GRAY SUGARCANE MEALYBUG	*Dysmicoccus boninsis*	-Q-	1
BLACK CHERRY FRUIT FLY	*Rhagoletis fausta*	-A-	1
A HACKBERRY GALL PSYLLID	*Pachypsylla* sp.	-Q-	1
A BARK BEETLE	*Araptus ?* sp.	-Q-	1
PURPLE SCALE	*Lepidosaphes beckii*	-B-	11
CAMPHOR SCALE	*Pseudaonidia duplex*	-Q-	1
HACKBERRY GALL PSYLLID	*Pachypsylla venusta*	-Q-	1
A CARPENTER ANT	*Camponotus* sp.	-Q-	1
CRAZY ANT	*Paratrechina longicornis*	-B-	1
AN ANT	*Pheidole* sp.	-Q-	1
SQUARE-NECKED GRAIN BEETLE	*Silvanus quadricollis*	-Q-	2
SWEET POTATO WEEVIL	*Cylas formicarius*	-A-	3
YANON SCALE	*Unaspis yanonensis*	-Q-	13

A TORTRICID MOTH	*Grapholitha* sp.	-Q-	2
AN ARCTIID MOTH	Arctiidae	-Q-	3
JAPANESE MEALYBUG	(?)*Planococcus kraunhiae*	-Q-	2
PINE TORTOISE SCALE	*Toumeyella parvicornis*	-Q-	1
NANTUCKET PINE TIP MOTH	*Rhyacionia* prob.*frustrana*	-B-	1

Arrowhead scale, a name change for a common armored scale insect: Yanon scale, *Unaspis yanonensis*, is commonly encountered in the northern border stations on unshu oranges coming into California from Asia via Washington and British Columbia. The common name yanon scale was used for this species in California for many years and was based on the specific scientific name. However, the common name arrowhead scale is being used by many Asian countries when referring to this species. It is probably best to begin using the same name in an effort to help standardize the common name system.

SAN JOAQUIN COUNTY BLACK LIGHT TRAP REPORT

DATE	11-29-83	12-5-83	12-5-83	12-5-83	12-11-83	12-13-
LOCATION	Roberts Island	Roberts Island	Manteca	Bellota	Bellota	Roberts Island
TEMPERATURE			33°			
ALFALFA LOOPER Autographa californica			N			
ARMYWORM Pseudaletia unipuncta			O	1	7	4
BEET ARMYWORM Spodoptera exigua			C			
BLACK CUTWORM Agrotis ipsilon	1	1	A	1	5	6
CABBAGE LOOPER Trichoplusia ni			T			
CLOVER CUTWORM Scotogramma trifolii			C			
CODLING MOTH Laspeyresia pomonella			H			
CORN EARWORM, (ETC.) Heliothis zea						
FALSE CELERY LEAFTIER Udea profundalis						
GRANULATE CUTWORM Feltia subterranea						
GRAPE LEAFFOLDER Desmia funeralis						
NAVEL ORANGEWORM Amyelois transitella						
OMNIVOROUS LEAFROLLER Platynota stultana						
PEACH TWIG BORER Anarsia lineatella						
ROUGH SKINNED CUTWORM Proxenus mindara						
SALTMARSH CATERPILLAR Estigmene acrea						
SPOTTED CUTWORM Amathes c-nigrum						
SUGARBEET WEBWORM Loxostege sticticalis						
TOBACCO BUDWORM Heliothis virescens						
VARIEGATED CUTWORM Peridroma saucia						
W.YELLOWSTRIPED ARMYWORM Spodoptera praefica						

SAN JOAQUIN COUNTY BLACK LIGHT TRAP REPORT

DATE	11-3-83	11-7-83	11-14-83	11-20-83	11-21-83	11-28-83
LOCATION	Robert's Island	Bellota	Robert's Island	Robert's Island	Manteca	Bellota
TEMPERATURE						
ALFALFA LOOPER Autographa californica						
ARMYWORM Pseudaletia unipuncta	24		3			
BEET ARMYWORM Spodoptera exigua	56	3				
BLACK CUTWORM Agrotis ipsilon	2	2	1			
CABBAGE LOOPER Trichoplusia ni				N	N	N
CLOVER CUTWORM Scotogramma trifolii				0	0	0
CODLING MOTH Laspeyresia pomonella						
CORN EARWORM, (ETC.) Heliothis zea				C	C	C
FALSE CELERY LEAFTIER Udea profundalis				A	A	A
GRANULATE CUTWORM Feltia subterranea				T	T	T
GRAPE LEAFFOLDER Desmia funeralis				C	C	C
NAVEL ORANGEWORM Amyelois transitella	1			H	H	H
OMNIVOROUS LEAFROLLER Platynota stultana						
PEACH TWIG BORER Anarsia lineatella						
ROUGH SKINNED CUTWORM Proxenus mindara						
SALTMARSH CATERPILLAR Estigmene acrea						
SPOTTED CUTWORM Amathes c-nigrum	2					
SUGARBEET WEBWORM Loxostege sticticalis						
TOBACCO BUDWORM Heliothis virescens						
VARIEGATED CUTWORM Peridroma saucia						
W.YELLOWSTRIPED ARMYWORM Spodoptera praefica						

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SAN JOAQUIN COUNTY BLACK LIGHT TRAP REPORT

DATE	10/25/83	10/24/83	10/27/83	10/30/83	11/3/83	11/6/83
LOCATION	Bellota	Roberts Island	Manteca	Bellota	Manteca	Manteca
TEMPERATURE						
ALFALFA LOOPER Autographa californica	1				1	
ARMYWORM Pseudaletia unipuncta	14	16	25	22	20	61
BEET ARMYWORM Spodoptera exigua	11	9	111	37	108	146
BLACK CUTWORM Agrotis ipsilon	1	2	6	2	2	10
CABBAGE LOOPER Trichoplusia ni						
CLOVER CUTWORM Scotogramma trifolii						
CODLING MOTH Laspeyresia pomonella						
CORN EARWORM, (ETC.) Heliothis zea	1					
FALSE CELERY LEAFTIER Udea profundalis			6			
GRANULATE CUTWORM Feltia subterranea			21		5	12
GRAPE LEAFFOLDER Desmia funeralis						
NAVEL ORANGEWORM Amyelois transitella			4		10	2
OMNIVOROUS LEAFROLLER Platynota stultana						
PEACH TWIG BORER Anarsia lineatella			3			
ROUGH SKINNED CUTWORM Proxenus mindara						
SALTMARSH CATERPILLAR Estigmene acrea						
SPOTTED CUTWORM Amathes c-nigrum		1	2	6		
SUGARBEET WEBWORM Loxostege sticticalis						
TOBACCO BUDWORM Heliothis virescens						
VARIEGATED CUTWORM Peridroma saucia			2			4
W.YELLOWSTRIPED ARMYWORM Spodoptera praefica						

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SAN JOAQUIN COUNTY BLACK LIGHT TRAP REPORT

DATE	10/11/83	10/12/83	10/13/83	10/17/83	10/17/83	10/18/83
LOCATION	Roberts Island	Bellota	Manteca	Manteca	Bellota	Roberts Island
TEMPERATURE						
ALFALFA LOOPER Autographa californica			1	1		
ARMYWORM Pseudaletia unipuncta	8	6	23	14	8	29
BEET ARMYWORM Spodoptera exigua	57	48	98	55	35	120
BLACK CUTWORM Agrotis ipsilon			3		2	2
CABBAGE LOOPER Trichoplusia ni						
CLOVER CUTWORM Scotogramma trifolii						
CODLING MOTH Laspeyresia pomonella						
CORN EARWORM, (ETC.) Heliothis zea				2		2
FALSE CELERY LEAFTIER Udea profundalis	1	7	8	18	2	10
GRANULATE CUTWORM Feltia subterranea		1	17	13	2	
GRAPE LEAFFOLDER Desmia funeralis						
NAVEL ORANGEWORM Amyelois transitella			49	2		
OMNIVOROUS LEAFROLLER Platynota stultana						
PEACH TWIG BORER Anarsia lineatella			12	7		
ROUGH SKINNED CUTWORM Proxenus mindara	7	2		1		3
SALTMARSH CATERPILLAR Estigmene acrea						
SPOTTED CUTWORM Amathes c-nigrum		7	4	1	6	2
SUGARBEET WEBWORM Loxostege sticticalis						
TOBACCO BUDWORM Heliothis virescens						
VARIEGATED CUTWORM Peridroma saucia	2		1	1		
W.YELLOWSTRIPED ARMYWORM Spodoptera praefica						

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SAN JOAQUIN COUNTY BLACK LIGHT TRAP REPORT

DATE	9/26/83	9/27/83	9/26/83	10/2/83	10/4/83	10/2/83
LOCATION	Bellota	Manteca	RobertsIsl	Bellota	Manteca	Roberts Island.
TEMPERATURE		55 - 80°			57 - 86°	
ALFALFA LOOPER Autographa californica	1					2
ARMYWORM Pseudaletia unipuncta	4		2	7	4	4
BEET ARMYWORM Spodoptera exigua	117	228	101	29	75	122
BLACK CUTWORM Agrotis ipsilon	2			2		
CABBAGE LOOPER Trichoplusia ni		4				
CLOVER CUTWORM Scotogramma trifolii			2			
CODLING MOTH Laspeyresia pomonella						
CORN EARWORM, (ETC.) Heliothis zea	2	4	10		1	3
FAISE CELERY LEAFTIER Udea profundalis		1				2
GRANULATE CUTWORM Feltia subterranea						
GRAPE LEAFFOLDER Desmia funeralis						
NAVEL ORANGEWORM Amyelois transitella	1	236			77	3
OMNIVOROUS LEAFROLLER Platynota stultana						
PEACH TWIG BORER Anarsia lineatella		6			4	
ROUGH SKINNED CUTWORM Proxenus mindara	3	2	10	6		14
SALTMARSH CATERPILLAR Estigmene acrea						
SPOTTED CUTWORM Amathes c-nigrum	2				3	4
SUGARBEET WEBWORM Loxostege sticticalis				7		
TOBACCO BUDWORM Heliothis virescens	8	9		3	4	1
VARIEGATED CUTWORM Peridroma saucia		1		2	2	
W.YELLOWSTRIPED ARMYWORM Spodoptera praefica						

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SAN JOAQUIN COUNTY BLACK LIGHT TRAP REPORT

DATE	9/11/83	9/14/83	9/12/83	9/18/83	9/19/83	9/19/83
LOCATION	Bellota	Manteca	Roberts Island	Bellota	Manteca	Roberts Island
TEMPERATURE					61° - 90°	
ALFALFA LOOPER *Autographa californica*						
ARMYWORM *Pseudaletia unipuncta*	1	3		1		
BEET ARMYWORM *Spodoptera exigua*	58	104	16	83	88	32
BLACK CUTWORM *Agrotis ipsilon*	3	2		2	3	
CABBAGE LOOPER *Trichoplusia ni*						
CLOVER CUTWORM *Scotogramma trifolii*						
CODLING MOTH *Laspeyresia pomonella*						8
CORN EARWORM, (ETC.) *Heliothis zea*		3			1	
FALSE CELERY LEAFTIER *Udea profundalis*						
GRANULATE CUTWORM *Feltia subterranea*					1	
GRAPE LEAFFOLDER *Desmia funeralis*		8			6	
NAVEL ORANGEWORM *Amyelois transitella*		154			176	
OMNIVOROUS LEAFROLLER *Platynota stultana*						
PEACH TWIG BORER *Anarsia lineatella*		18			13	
ROUGH SKINNED CUTWORM *Proxenus mindara*	3		184	2		100
SALTMARSH CATERPILLAR *Estigmene acrea*	2		16			
SPOTTED CUTWORM *Amathes c-nigrum*	1					4
SUGARBEET WEBWORM *Loxostege sticticalis*						
TOBACCO BUDWORM *Heliothis virescens*						
VARIEGATED CUTWORM *Peridroma saucia*	1				3	
W.YELLOWSTRIPED ARMYWORM *Spodoptera praefica*	4					

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