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Editors

IN THIS ISSUE

Management of Grape Mealybug *Pseudococcus maritimus*, in San Joaquin Valley Grape

The Information Superhighway - Hype or Help To IPM Practitioners?

IPM News From The National Scene - Mike Fitzner, IPM Program, CSREES USDA

Weed Species Controlled With Fabric Mulches

Abstracts

ARTICLES

MANAGEMENT OF GRAPE MEALYBUG, *PSEUDOCOCCUS MARITIMUS*, IN SAN JOAQUIN VALLEY GRAPES, Walt Bentley, UC Kearney Agricultural Center

Over the last decade grape mealybug (*Pseudococcus maritimus*) has reemerged as a primary pest in table, wine, and raisin grape production in the San Joaquin Valley. While other grape growing areas of the state have also had mealybug problems, these involved other species. Grape mealybug outbreaks in the San Joaquin Valley were

thought to be a result of directing insecticides at other pests which indirectly disrupts the biological control of mealybug. However, many researchers and pest control advisors have begun to question the idea of disrupting biological control by insecticide application as the reason for the recent resurgence of this pest. Parasites and predators are very important in lowering the numbers of grape mealybug, but they have not always provided adequate control, even under organic growing conditions.

The presence of ants, which tend mealybugs for the sweet excretions they produce, has greatly confused the issue of biological control of grape mealybug. Work is being continued on ant management to clarify their role in biological disruption of grape mealybug parasites.

University of California and the United States Department of Agriculture cooperating

Cooperative Extension • Agricultural Experiment Station • Statewide IPM Project

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Recent research has shown the importance of integrating effective insecticide application, at proper timing, with native parasites of grape mealybug. In a series of tests performed in Kern county, applications of chlorpyrifos (Lorsban®) at or just before budbreak have proven quite effective in reducing infestations. This reduction in infestations has occurred without the secondary problems associated with broad spectrum sprays applied during the growing season. Secondary problems include the development of webspinning spider mites and direct elimination of the most important grape mealybug parasitoid, *Ascerophagus notativentris*. Two examples of field trials where dormant applications of insecticides have been applied that reduced infestation are presented in tables 1 and 2 below.

Table 1. Effects of various insecticides applied to Thompson seedless grapes for grape mealybug infestation at harvest, 7/26/94, Bakersfield, CA.

Material ¹	Rate/Acre	No. Bunches	
		Rating/ infested/30	Infested Bunch ²
Lorsban 4E HF®	4 pt	0.7	2.4
Lorsban 4E HF®	8 pt	0.7	1.0
Guthion 2E®	4 pt	16.3	1.9
Pennacp M®	8 pt	10.0	1.4
Untreated		26.7	2.1

¹Treated 3/27/94, 3 replications of 120 vines. Evaluation based on examination of 1 bunch in contact with primary arms on each of 90 vines per treatment at harvest.

²Rating on a 0-5 scale. 0= no infestation, 5= severe infestation.

Table 2. The effects of various insecticides applied to Ruby seedless grapes on grape mealybug infestation, 7/19/94, Bakersfield, CA.

Material ¹	Rate/acre	No. Bunches Infested/30 ²	Rating/ infested bunch ³
Lorsban 4E-HF + Volck Oil	8 pts+2 gal	12.0a	1.4
Lorsban 4E-HF + Volck Oil	4 pts+2 gal	12.8ab	1.5
Lorsban 4E-HF	8 pts	13.2ab	1.4
Pennacp M + Volck Oil	8 pts+2 gal	17.0abc	1.5
Pennacp M	8 pts	19.0abcd	2.2
Lorsban 4E-HF	4 pts	19.8bcd	1.7
Guthion 2L	4 pts	23.5cde	1.9
Guthion 2L + Volck Oil	4 pts+2 gal	24.5de	2.1
Volck Oil	2 gal	25.5de	2.1
Untreated		27.8e	1.7

¹Applied in 200 gpa at 3 mph on March 21, 1994 to 4 replicates of 200 vines.

²Treatments followed by the same letter not significantly different (P>0.05), Duncan's New Multiple Range Test. Evaluation based on examination of 1 bunch in contact with primary arms on each of 120 vines per treatment at harvest

³Scale from 0 - 5. 0= no infestation, 5= severe infestation.

Several important points can be made from these two studies, both of which had serious grape mealybug infestation. First, delayed dormant applications of either Lorsban or Pennacp provided significant reduction of grape mealybug populations at harvest. However, they did not eliminate the problem, requiring preservation of resident populations of *Acerophagus notativentris*, to provide for additional control.

The next important point relates to the poor performance from the application of Guthion. Guthion has been the primary insecticide used for managing grape mealybug. Clearly it is failing, as many grape growers and pest control advisors have found. Besides being more effective, Lorsban and Pennacp are both category 2 materials making them more preferable than the category 1 Guthion.

The need to include a dormant oil with the applications is not clear from the results shown in Table 2. Lorsban applied without oil performed quite well in the work done

on Thompson seedless. In the Ruby seedless trial, overall chemical control with Lorsban was less effective than in the Thompson seedless trial. Also in the Ruby seedless trial the inclusion of oil did not significantly increase control. Adequate control has been achieved without the inclusion of oil.

Finally, in observing vineyards where applications for grape mealybug occur after the bunches come in contact with the vine, control has been very poor. This involves the inability of the insecticide to penetrate into the bunch and achieve contact with the pest. The beneficial, *Ascerophagus notativentris* and other parasitoids are eliminated because of these sprays.

High rates of Lorsban applied to Thompson seedless vines after bud break have shown reduced yields as can be seen in Table 3 below.

Table 3. Effects of various insecticides applied to Thompson seedless grapes on grape mealybug infestation at harvest, Bakersfield, CA.

Material ¹	Rate/Acre	Cluster/vine
		3/27/94
Lorsban 4E HF	4 pt	20.2
Lorsban 4E HF	8 Pt	13.8
Guthion 2E	4 pt	25.2
PennCap M	8 pt	18.6
Untreated		25.1

¹Treated 3/27/94, 3 replications of 120 vines

The application in this trial did occur well after bud break and shoot growth on some vines was approximately four inches. All vines showed bud break when the insecticides were applied. Currently, the labeled rate for Lorsban, when targeting grape mealybug, is 4 pt. per acre. Lorsban is not registered for use on vines after budbreak.

In summary, PCAs managing vineyards which have had a serious infestation of grape mealybug should consider a dormant application for control. In Thompson seedless and Flame seedless varieties, this application timing has proved quite effective in reducing infestation without triggering secondary pest outbreaks. No other in season application for mealybug should be needed. The sprays applied during the summer, after bunches have contacted the vine, have resulted in continued and severe infestation by grape mealybug. With late harvested varieties, such as Ruby seedless, infestation has been reduced with dormant sprays, but significant amounts of unmarketable fruit can still remain.

THE INFORMATION SUPERHIGHWAY - HYPE OR HELP TO IPM PRACTITIONERS?

Peter B. Goodell, U.C. Kearney Agricultural Center

Presentation to Association of Applied Insect Enologists
State Conference - 1/29/96

Much has been said and written about the expanding sources of new information on the INTERNET, the information superhighway. What value can the INTERNET be to the IPM practitioner in their daily business? There are several clear advantages to being connected to the worldwide information resources:

- Easy access to a wide variety of information resources anywhere in the world
- Timely access to other professionals around the world
- Speed of communication
- Ability to mine information about a specific problem
- Ability to communicate with individuals with similar interest, regardless of location
- Improved ability to react quickly to developing situations which affect your profession

The INTERNET is not a single entity but a collection of computer networks around the world. The comparison to a superhighway is very appropriate; highways provide access to places, where you go or why you are going is left to the individual. Useful functions on the INTERNET include:

- World Wide Web (WWW) - Next to e-mail service, this is the most recognizable INTERNET activity. Web sites are locations on computers where information from that site is displayed. One moves through the web using some browser, a program designed to handle graphic and text. The ease of use of browsers is one of the major revolutions on INTERNET and a chief cause of its intense popularity. Netscape is only one commercial browser available. The value of the web is its ease of use and the many links embedded in it. One location can point to another which leads to yet another, all providing more depth to the topic of interest.
- Email - The electronic mail service which allows easy transmission of text anywhere in the world. Very valuable for quick replies and forwarding of information of interest to others. Allows flexibility in moving whole documents such as spreadsheets or data bases.

- List servers - These are modified mail programs that act like a bulletin board for centralize discussion and information dissemination. Unlike bulletin boards, the information is delivered to your e-mail box.

Access to the INTERNET has become easier and less expensive. All major commercial servers such as America On-line, CompuServe, and Prodigy now have browsers for the Web. In addition, there are local providers who do not provide any service beyond a gateway to the INTERNET (or an on ramp to the information highway). A list of providers can be found at the following Web site, www.thelist.com/. This address is called a URL (universal resource locator). The http defines the location as hypertext transfer protocol (as opposed to other types) and the com refers to a commercial location as opposed to edu (educational), gov (government), or org (organization).

The following pages are WWW sites I have found useful. The list is not exhaustive but should indicate the volume of information already accessible to the IPM Practitioner.

IPM

UC Statewide IPM Project

www.ipm.ucdavis.edu

UC SAREP

www.sarep.ucdavis.edu/

National Integrated Pest Management Information Project at Colorado State University

www.colostate.edu/Depts/IPM/IPM.html

National Integrated Pest Management Network

ipm_www.ncsu.edu/main.html

Ministry of Environment, Lands & Parks, BC, Canada-WWW

www.env.gov.bc.ca/

Univ of Nebraska IPM Server

ianrwww.unl.edu/ianr/pat/ipmserv.htm

Center for Integrated Crop Protection

ipm_www.ncsu.edu/cicp/cicp.html

Center for IPM Newsletter

ipm_www.ncsu.edu/general/newsletter.html

National Biological Control Institute

www.aphis.usda.gov/nbci/nbci.html

Biological Control Home Page

www.nysaes.cornell.edu/ent/biocontrol/

ARS Bio Control Unit - Mission, Texas

rsru2.tamu.edu/bcpru/bcpru.htm

Biocontrol Information

ipmwww.ncsu.edu/biocontrol/biocontrol.html

International Organization of Biocontrol - Australia

www.dpi.qld.gov.au/iobc/wg.html

University of Wisconsin IPM

128.104.66.13/#IPM_Software

PestLinks

world.std.com/~copier1/pestlink

Resistant Pest Management Newsletter

www.msstate.edu/Entomology/EntHome.html

IPM Materials Database

www.entm.purdue.edu/ipmdb.html

Pesticides/Environment

EXTOXNET - EXTension TOXicology NETwork

sulaco.oes.orst.edu:70/1/ext/extoxnet

Kern County Agricultural Commissioner

chiba.netxn.com/~agcom15/

Environmental Protection Agency WWW Server

www.epa.gov/

California EPA

158.96.250.195/epa/

ISA Home Page

www.aginfo.com/

Agrichemical Properties

<ftp://asrr.arsusda.gov/pub/ppdb.common/>

Department of Pesticide Regulation WWW Server

www.cdpr.ca.gov

General Ag

Agriculture Online

www.agriculture.com/

Farm Journal

cgi.netscape.com/eng/mozilla/2.0/extensions/info.cgi?audio/voxware

World of Agriculture

www.agriculture.com/agworld/awhome.html

1995 Farm Bill

www.hillnet.com/farmbill

The International Arid Lands Consortium (IALC)

ag.arizona.edu/OALS/IALC/Home.html

American Crop Protection Associationwww.acpa.org/**Ag Markets**gopher://unlvm.unl.edu/11/markets**Western Region SARE Welcome Page**ext.usu.edu:80/wsare/**Cotton Newsletter Index**ag.arizona.edu/AREC/Cotton-Index.html**California Ag Codes**www.law.indiana.edu/codes/ca/codes.html**Ag-Net.com**www.ag-net.com/**Progressive Farmer Online**www.pathfinder.com/@@b@0J7ABncgIAQKMj/PF/**Welcome to Precision Agriculture**www.precisionag.com/**WHITEFLY Home Page**www.ifas.ufl.edu/~ent2/wfly/index.html

Weather, traffic, emergencies

California Forecastsiwin.nws.noaa.gov/iwin/textversion/state/ca.html**Real time Radar views**rap.ucar.edu/weather/radar.html**Weather Information**rap.ucar.edu**Earthquake Info from the U.S.G.S.**quake.wr.usgs.gov**Journal of Extension**gopher://gopher.ext.vt.edu:70/11/joe**Florida Entomologist**www.fcla.ufl.edu/FlaEnt/Fehmpg.htm#accessing**Society of Nematologists**ianrwww.unl.edu/ianr/plntpath/nematode/son/sonhome.htm**California Highway Conditions**www.dot.ca.gov/hq/roadinfo/**Southern California Traffic Report**www.scubed.com:8001/caltrans/transnet**Emergency/Disaster Information System**gopher://oes1.oes.ca.gov:5555/11/edis

Land Grant - USDA Webs

Whitefly Research at the University of Arizonagears.tucson.ars.ag.gov/wcrl/wwghome.html**Entomology at Colorado State University**www.colostate.edu/Depts/Entomology/ent.html**NYSAES WWW Server**aruba.nysaes.cornell.edu:8000/**The TAMU/TAEX GN/Gopher/WWW Server**leviathan.tamu.edu:70/**CSREES Home Page**www.esusda.gov/**USDA Home Page**www.esusda.gov/usda/usda**FedWorld Beta Home Page**www.fedworld.gov/**AgriGator * Agricultural and Related Information**gmv.ifas.ufl.edu/WWW/agator/htm/ag.htm**AgriGator * Commercial Agricultural Sites -Univ. Florida**www.ifas.ufl.edu/www/agator/htm/agcommercial.Htm**Utah State University Extension Home Page**ext.usu.edu/**USDA Econ Reports**gopher://usda.mannlib.cornell.edu**APHIS Home Page**www.aphis.usda.gov/

Professional Societies

American Phytopathology Societywww.scisoc.org/**Ecological Society of America Home Page**www.sdsc.edu/1/SDSC/Research/Comp_Bio/ESA/ESAHome**Soil and Water Conservation Society**www.netins.net/showcase/swcs/**WSSA- Weed Science Society of America**piked2.agn.uiuc.edu/wssa/wssanetscape.htm**Entomological Society of America**www.entsoc.org

General Web Sites

Lists of lists - Excellent beginning point

www.llnl.gov/llnl/lists/lists1.html

The World-Wide Web Virtual Library: United Nations and other international organizations

www.undcp.or.at/unlinks.html

A Collection of Botany Related URLs: All Links

www.helsinki.fi/~rlampine/botany.html

The Smithsonian Institution Home Page

www.si.edu/

The Department of the Treasury

www.ustreas.gov:80/treasury/Home Page

CNN Interactive

www.cnn.com/

The List of INTERNET Providers

www.thelist.com/

IPM NEWS FROM THE NATIONAL SCENE - MIKE FITZNER, IPM PROGRAM, CSREES USDASummary of the Third National Integrated Pest Management Symposium/Workshop, February 27-March 1, 1996, Washington, D.C.

The Third National IPM Symposium/Workshop brought together more than 600 IPM researchers, extension staff, social scientists, private consultants, farmers, and other IPM stakeholders to discuss implementation of the USDA IPM Initiative. This was the most diverse group of participants ever assembled at an IPM symposium/workshop.

The conference was highlighted by three key sessions:

- 1) Putting Customers First. This session was keynoted by Deputy Secretary of Agriculture Richard Rominger who said "I don't think there is any issue that I deal with in this job that hits closer to home or better represents what I consider my life's work than Integrated Pest Management." The Deputy Secretary went on to discuss the administration's strong budgetary for IPM and the importance of involving farmers, consultants, and other IPM stakeholders in the priority setting process with USDA and the land grant universities. Representatives from the American Farm Bureau Federation, World Wildlife Fund, and commodity associations representing cotton, wheat, potato, corn, soybean, and apple, discussed the IPM

needs for their particular commodities. In addition, the president of the National Alliance of Independent Crop Consultants discussed implementing the national IPM goal from the perspective of crop consultants. Finally, presentations were made by a grower, processing industry representatives, and land grant university faculty on implementing successful IPM programs.

- 2) Assessment of Economic, Environmental, Public Health, and Social Impacts of IPM. This session was keynoted by Dr. Karl Stauber, Under Secretary of Agriculture for Research, Education, and Economics, who said that achieving the goal of implementing IPM practices on 75 percent of the nation's crop acres by the year 2000 will require "a coordinated set of strategies to engage disciplinary, biological and social sciences, and the forging of new interdisciplinary alliances." He emphasized the importance of accountability and complimented IPM for taking a proactive role in assessing impacts attributable to public sector investments. This presentation was followed by presentations on methodologies available to IPM teams to assess the economic, environmental, public health, and social impacts of IPM adoption.
- 3) Focusing on the Future. At this session, political and budgetary issues affecting IPM were discussed by USDA and EPA administrators, land grant university leaders, and representatives from Congress. Speakers emphasized that by directly asking farmers, consultants, and other stakeholders to help set priorities they achieve ownership as conceived by the founders of the land grant university system. It was stressed that only by reestablishing this social contract, and coupling it with a meaningful accountability system, can we regain the trust and support necessary to maintain public investments in IPM research, extension, and education.

At the IPM Symposium/Workshop, there were 23 workshops covering team building, assessment, commodity IPM implementation, IPM teaching, technology transfer, biological control, management of pesticide resistance, pesticide applicator training, IR-4, NAPIAP, areawide IPM, communication, and the new pest management decision support system. There were 162 posters and 21 selected papers presented during the workshop. In addition, regional and national extension and research IPM committees, as well as NAPIAP and EPA committees, to plan regional and national activities to achieve the IPM implementation goal.

A proceedings consisting of presentations, workshop conclusions, selected papers, and abstracts will be published in late Spring 1996.

USDA IPM Coordinator

Barry Jacobsen plans to extend his service as USDA IPM Coordinator until July 1, 1996. Barry's service in this position for the past year is one of the best things that has happened in the IPM arena for a long time. He has made a lot happen. The position was designed to rotate so that we can continually infuse new perspectives and ideas into the IPM Initiative--ideas from the various disciplines, commodity and program areas, and regions of the country. In addition, it is hard to find someone who will willingly work in Washington, D.C. for more than a year at a time! The search for Barry's successor is now underway.

Program Evaluation And Accountability

There are growing pressures from (Congress, OMB, USDA) to tighten-up management of federally-funded programs. This issue is much more complex when it involves partnerships such as that between CSREES and the land grant university system.

GPRA. The Government Performance and Results Act (GPRA) has not gone away (and most likely will not). Although there have been federal evaluation/accountability initiatives in each of the past four decades, GPRA is somewhat unique: 1) It is a law, passed in 1993 (other initiatives were presidential directives, which generally do not endure); 2) Budgets are currently level or decreasing, thus more competitive; and 3) The public views government and expenditures of public funds much differently--there is a trust and performance deficit.

GPRA provides the public sector with an opportunity to address this problem--we need to take advantage of it. The goal: Wise and economical use of federal resources by improving efficiency and effectiveness. GPRA has three major components: planning, measurement, and managerial accountability. CSREES and the land grant system have formed a joint council to guide this process. At this point, the focus is on broad goals and outcomes from federal investments in research, teaching, and extension. The GPRA Council has decided that we will report to congress on 3-5 major overall items. It is still unclear how individual line items in CSREES budget will be handled under GPRA.

The GPRA pilots started by the (former) Extension Service in 1995 have been discontinued. These pilots involved IPM and four other programs, and were conducted in seven states. The seven states were given an option to continue reporting based on the GPRA pilot requirements, and all have decided to continue. A summary of the pilot data will be developed and shared with all IPM coordinators.

While a GPRA plan is completed for CSREES, the current CSREES planning and reporting cycle (fiscal 1992-96) for Smith-Lever 3(d) funds is being extended, and will end with submission of the annual report for fiscal 1997 (submission deadline November 1997). Extension IPM plans of work and annual reports submitted in November 1995 have been reviewed by CSREES, supplemented by ad hoc reviews by IPM staff within the university system. Review comments will be distributed during the first two weeks of March.

Farmer-identified Research And Extension Needs

The land grant system's State IPM Coordinators are bringing key individuals together to identify critical pest control problems in their state's primary production systems. Objectives: 1) Develop a clear set of the most important farmer-identified IPM research and extension needs for the primary agricultural production systems in the country; 2) Renew and strengthen partnerships with growers, consultants, commodity groups, government agencies, public interest groups, and others; and 3) Increase private and public sector involvement and interest in the future of IPM programs at the state and federal levels. This process will build and strengthen a constituency who understands the value of research and extension programs supported by USDA and land grant university system.

The information obtained through this process will be used at the local, state, regional, and national levels. Many state IPM coordinators have said that, although deadlines were too short, the priority needs identification process has been an extremely valuable programming tool. If done properly, the priority setting process will help counties and states effectively allocate resources to the most important problems. At the regional level, the priority needs information will help in identifying opportunities for collaborative programming among states, and requests for proposals for the regional IPM research and extension grants programs will be emphasize the priorities identified through this process. At the federal level, the priority needs information will be used in congressional hearings on USDA's budget request for fiscal 1997, and will be used

to drive the allocation of other federal resources, both competitive and non-competitive. As of February 23, 1996, 36 states have submitted needs information on 63 different commodities.

The priority needs identification process will remain an ongoing part of the IPM Initiative. Priority needs will be addressed through research and extension efforts, and new needs will emerge. States will have an opportunity to update and modify this information as the process proceeds.

UC's State IPM Coordinators are Pete Goodell and Frank Zalom.

WEED SPECIES CONTROLLED WITH FABRIC MULCHES

Timothy S. Prather, UCCE Statewide IPM Project

In recent years, growers have been converting from furrow to low-volume sprinkler irrigation to increase water-use efficiency. However, under frequent irrigations, soil-active herbicides are broken down rapidly through decomposition, chemical reactions, hydrolysis and microbiological activity.

As herbicides break down, weeds emerge and interfere with sprinkler operation and efficiency. Weeds such as spotted spurge and sprangletop can grow rapidly and reduce available moisture to the trees. Glyphosate is normally applied two to three times per year to control the emerged weeds around sprinklers or emitters. Weed fabrics may suppress weed growth around emitters, reducing the need for herbicides at the emitters. In landscape, these fabrics have been effective at preventing a number of weeds, including yellow nutsedge, from emerging (Derr and Appleton 1989; Martin et al. 1991).

Fabric mulches have suppressed weeds up to 95 to 100% in citrus and kiwi (Hembree 1995) and the fabrics were still in good condition after four years. These fabrics warrant additional studies given their potential for excellent weed control and persistent control. The purpose of this study was to document the ability of fabric mulches to control 11 weed species.

Methods

Weed seeds were sown into flats (Table) and the flats were placed into the ground, the top of flat level with the soil surface. Flats were covered by 1) Typar Weedex, a pressed fiber fabric, 2) Dewitt Pro 5, a woven fabric or 3) control with no fabric. The Typar Weedex fabric did not have a UV protectant coating so it was covered with 3 inches of

straw mulch. The Dewitt Pro 5 had UV protection so it was left exposed to sunlight. The experiment was arranged as a randomized complete block with three treatments and four blocks. Plants were counted emerged if they were visible on top of the mulch (emerged from the soil for the control).

Data were taken over a six week period, starting in October 1995 and ending November 1995. Soil surface temperatures were recorded every 1.2 hours. Plots were irrigated using a microjet system.

Results

Broad leaves did not emerge through either fabric. Germination was not eliminated since inspection of conditions under the mulch discovered germinated weeds.

However, the broad leaves were unable to grow through the mulch and they subsequently died. Grasses did not emerge from either fabric, but one yellow nutsedge plant did grow through the Typar Weedex fabric.

Surface soil temperatures were coolest under the Typar Weedex mulch and warmest under the Dewitt Pro 5 mulch. There was little fluctuation in temperature under Typar Weedex and the most fluctuation under Dewitt Pro 5. The lower temperatures under Typar Weedex were attributed to the straw mulch used to protect the fabric from UV light.

Cost of fabric is high initially. The cost decreases with smaller fabric sizes (Figure 3). The Dewitt Pro 5 fabric costs \$0.08 per square foot and estimates of labor for installation is \$40 per acre. The Dewitt Pro 5 has lasted five years under full sunlight (Hembree 1995), indicating that the 5 year cost (equivalent to herbicide costs) is realistic.

Drip and microjet irrigation result in a concentrated root mass that is more susceptible to weed competition. Fabric mulches are effective for controlling a number of weedy species. These fabrics would prevent weed competition and also eliminate obstructions to the sprinkler pattern. Higher temperatures in the fall to spring period should promote growth and development of young trees. Shading of the fabrics in summer should moderate or eliminate heating above normal soil temperatures. Cost is high initially, but is equivalent to herbicide after five years.

ABSTRACTS

Table 1. Weed species planted in the experiment.

Broadleaves	Grasses and Sedges
Prostrate knotweed	Annual ryegrass
Common mallow	Soft chess
Common lambsquarters	Barnyardgrass
Prickly lettuce	Annual bluegrass
Fiddleneck	Yellow nutsedge
	Purple nutsedge

Literature Cited

1. Martin, C.A., H.G. Ponder, and C.H. Gilliam. 1991. Evaluation of landscape fabrics in suppressing growth of weed species. *J. Environ. Hort.* 9(1):38-40.
2. Derr, J.F., and B.L. Appleton. 1989. Weed control with landscape fabrics. *J. Environ. Hort.* 7(4):129-133.
3. Hembree, K.J. 1995. Achieving successful weed control using various methods of applying Metham. *in* 47th Annual Calf. Weed Science Soc. Proceedings. pp 107-109.

(Figure not available)

Figure 1. Broad leaves were controlled by both weed fabrics.

(Figure not available)

Figure 2. Grasses and sedges were controlled by weed fabrics.

(Figure not available)

Figure 3. Cost of three fabric sizes (measured in feet).

(Figure not available)

Figure 4. Surface soil temperatures.

COTTON BELTWIDE MEETING, Nashville, TN Jan 8-12, 1996

Cotton Aphid Response To Pesticides In San Joaquin Valley Cotton

Beth Grafton-Cardwell and Peter Goodell, U.C. Kearney Agricultural Center

Cotton aphid, *Aphis gossypii*, densities reached damaging levels from mid-July through August 1995 in the 15 San Joaquin Valley, CA fields sampled. Most growers responded by applying mixtures of pesticides for aphid control two to four times during the season. In many fields, pesticides were efficacious for only 10 days. Petri dish pesticide bioassays were conducted to evaluate whether part or all of the poor efficacy was due to pesticide resistance. Cotton aphid resistance to Capture was most common followed by Lorsban and Thiodan. Several results of the study suggest that poor field efficacy was not due to insecticide resistance alone. Many aphid populations exhibited susceptibility to the pesticides, yet control did not last more than 2 weeks. Many of the aphid populations had lower levels of resistance in the pesticide bioassay a few weeks after they were selected with the same pesticide in the field. The general trend was for aphid populations to show decreased levels of resistance as the field season progressed, independent of pesticide selection. These results suggest that factors such as aphid physiology and/or aphid movement between fields are as important as pesticide resistance in influencing the efficacy of pesticide treatments.

WESTERN ORCHARD PEST & DISEASE MANAGEMENT CONFERENCE, Portland, OR, January, 1996

Chemical Control of San Jose Scale

R. E. Rice and R. A. Jones, U.C. Kearney Agricultural Center

Buprofezin (Applaud[®]), a new insect growth regulator (IGR) insecticide, was field tested at the Kearney Agricultural Center in 1995 for control of San Jose scale (SJS). This chemical is not yet registered in the U. S. It has shown high levels of activity against homopterans such as leafhoppers, whiteflies, and scales in other areas of the world. It is highly selective for Homoptera and has shown no activity on Lepidoptera (moths), Diptera (flies), or

Hymenoptera (wasps). It has shown some effect on coccinellid beetles and some species of mites.

Applaud[®] was applied on May 4, 1995 by handgun to mature Fairlane nectarines at 1.0 lb. ai and 1.5 lb. ai per acre, using six single tree replicates per treatment. Three gallons of mixed spray at 200 psi were applied to each tree (replicate) which was equivalent to 360 gpa. This spray volume provided total wetting of leaves, twigs, and bark. Six Fairlane trees in the same orchard were left as untreated checks. Application was to be timed against first generation crawlers at ca. 500 D° after male biofix, and just prior to or at expected peak crawler emergence. The material was actually applied at 532 D° after biofix, about three days later than desired. Treatment efficacy was determined in three ways: percent scale infested fruit at maturity; collection of SJS crawlers on sticky tapes (two/rep); and collection of male scale on pheromone traps (one/rep).

Mature nectarines were harvested on August 14 from all treatments. The results of the treatments on fruit infestation were: untreated check, 53.0%; 1.0 lb. ai/acre, 9.7%; and 1.5 lb. ai/acre, 14.1% infested. Damage reduction (control) with the 1.0 and 1.5 lb. rates were 81.7% and 73.4% respectively, which is considered very good given the high scale population pressure on these trees. Collections of SJS crawlers on sticky tapes showed excellent reductions in crawler populations for the season (second, third, fourth generations) through October 30, 1995. Total post-treatment crawler counts from May 8 through October 30 were 5,903, 379, and 211 in the check, 1.0 lb., and 1.5 lb. treatments, respectively. Differences in crawler counts were particularly noted during the third generation in August and September.

Collections of flying male scale collected on the pheromone traps showed no significant differences between trees or treatments from May 4 to October 30, probably due to males flying from outside the single treated trees in response to the pheromone in traps. This method of evaluating efficacy of scale controls should not be used unless larger blocks of contiguous treated trees are used.

Resistance in San Jose Scale to Organophosphate Insecticides

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Laboratory trials were started in 1994 at the Kearney Agricultural Center to evaluate the possible resistance of

San Jose scale (SJS) to chlorpyrifos (Lorsban), an organophosphate insecticide commonly used in dormant sprays in deciduous fruit orchards. Sources of SJS used in these tests were from a long-term laboratory colony (susceptible strain), a field colony from a stone fruit orchard at Kearney unsprayed for over 20 years, and two commercial orchards from the Reedley-Parlier area. Preliminary results from late 1994 indicated considerable differences in susceptibility among the four SJS colonies to chlorpyrifos (Fig. 1).

The results of these laboratory tests in 1994 show 100% mortality of SJS treated at 5.62 ppm when 24-48 hr. old (whitecaps), while one of the field collected strains of SJS showed only 76.1% mortality at 562 ppm chlorpyrifos.

A fresh supply of wild gourds was collected in October 1995, and additional replications and dose rates of chlorpyrifos against SJS are being tested at the present time. If continued testing in the laboratory continues to show the same trends in dose-mortality of SJS, it could be anticipated that significant levels of resistance to OP insecticides are present in field populations of San Jose scale.

(Figure not available)

Fig. 1. Mortality of San Jose scale on gourds at increasing concentrations of chlorpyrifos in laboratory trials.

Mating Disruption of Orchard Lepidoptera Using Sprayable Pheromone Dispensers

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Oriental fruit moth and peach twig borer pheromones were mixed in water emulsions of paraffin and commercial emulsifiers. The finished paraffin/pheromone emulsions were applied at OFM and PTB biofix to *Prunus* trees using a 1-quart Idico[®] stainless steel paint gun at application rates of 20-31 g a.i. pheromone/acre. Emulsion deposits dried within 2-4 hours; subsequent heavy rains and wind had no observable effects on the dried deposits.

The efficacy of mating disruption (MD) pheromones in paraffin emulsions on trap collections are shown in Figs. 1 (OFM) and 2 (PTB). The OFM formulations performed better than the PTB materials; fruit infestations at harvest reflected similar trends in MD efficacy (Table 1).

Table 1. Efficacy of mating disruption with pheromones applied in paraffin emulsion carriers.

<u>% Infested</u>				
<u>Fruit</u>				
Location	Crop	Treatment ¹	OFM	PTB
KAC 36	Peach	Check	3.5	3.1
MD	0.3	3.5		
Almond	Check	--	2.7	
MD	--	3.8		
KAC 74	Nectarine	Check	2.4	19.8
MD	0.4	15.0		
<u>SJS²</u>				
KAC 32	Nectarine	Check	19.8	
MD	26.1			

¹Two applications per season @ 20.0 - 31.0 gms. A.i./appl.

²One application @ 30.0 gms. a.i., March 6, 1995.

(Figure not available)

Fig. 1. Collections of male Oriental fruit moths in a stone fruit orchard treated twice with pheromone/paraffin emulsions.

(Figure not available)

Fig. 2. Collections of male peach twig borer moths in an almond orchard treated twice with pheromone/paraffin emulsions.