

CALIFORNIA DEPARTMENT OF PESTICIDE REGULATION  
1996 Pest Management Grants  
Final Progress Report  
April 1997

Project Title

PROJECT SPORECAST

The Development and Implementation of a Computerized Weather Station Network for Powdery Mildew Disease Risk Assessment and Frost Forecasting in the Temecula Valley Wine Country.

Conducted by:

Temecula Vintners Association  
Temecula Winegrape Growers Association

Project Management by:

San Jacinto Basin Resource Conservation District

CALIFORNIA DEPARTMENT OF PESTICIDE REGULATION  
1996 Pest Management Grants  
Final Progress Report: Project Sporecast  
Temecula Winegrape Growers Association  
April 1997

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**CALIFORNIA DEPARTMENT OF PESTICIDE REGULATION**  
**1996 Pest Management Grants**  
**Final Progress Report: Agreement No. 95-0244**  
**April, 1997**

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**Project Title:** PROJECT SPORECAST -- The Development and Implementation of a Computerized Weather Station Network for Powdery Mildew Disease Risk Assessment and Frost Forecasting in the Temecula Valley Wine Country.

**Final Progress Report Summary**

Under the auspices of a DPR grant awarded in March, 1996 to the Temecula Valley Vintner's Association, a transceiver/computer base station and radio-telemetry weather station network was installed in the Temecula Valley wine country. The purpose of the network is to test, refine, validate and fully implement a model which assesses daily the risk of powdery mildew infection in wine grapes and adjusts the application interval of control measures dependent on the daily value of the model's risk index. The objective of the program is to maintain effective control of powdery mildew while minimizing the application of fungicide and associated environmental loading in the critical Santa Margarita watershed. The system is also integral to a frost forecasting and damage suppression program implemented in March, 1997. The project serves 35 member growers of the Temecula Winegrape Grower's Association who farm over 2800 acres of vines over the 50-square miles of rolling hills which comprise the Temecula wine grape growing region.

Four weather stations, the base station and antenna were installed and fully operational by April 17, in vineyards selected as representative of valley microclimates. A fifth station, purchased with private funds, was added to the network in early May, while a sixth station was rotated among member vineyards at two-week intervals to establish which of the project weather stations was most representative of other vineyard locations in the valley. A seventh station was used as a radio relay site to test the feasibility of expanding the network to a neighboring growing region.

Grower hosts of project stations agreed to set aside adjacent plots for comparison of traditional calendar-based (grower standard) vs project model treatments. The plots were scouted weekly for mildew incidence and severity from April 17 through July 16 when the grapes were no longer

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considered mildew vulnerable because of their maturing sugar content and after which mid-summer heat suppressed the mildew risk index to minimum values. Depending on grower preference, the daily mildew pressure index for all project stations was reported to all members by FAX or toll-free phone line. Growers received ongoing training in model interpretation and appropriate adjustment of treatment application intervals throughout the growing season. Most growers applied Thiolut during the most vulnerable early season weeks and Rubigan toward the end of the vulnerable season. One grower opted for dusting sulfur throughout the treatment period with the exception of an initial application of Thiolut.

The 1996 growing season was characterized by periods of high mildew pressure repeatedly broken by mildew inhibiting heat waves. Mildew pressure was observed to increase from west to east (fog related) and from south to north (temperature related). Although 1996 could not be characterized as a season of sustained high mildew pressure, test plot growers collectively saved two spray applications (26 model vs 28 calendar) while maintaining effective mildew control. The vineyard with the largest acreage enjoyed the greatest savings (6 model applications vs 11 calendar-dictated applications) without compromising mildew control. The model actually increased applications over the calendar system (5 vs 3 and 7 vs 6) on two vineyards. On the latter vineyard, the model program gave protection for 30 days longer than the grower standard program. Mildew *did* appear in this grower's standard treatment block on July 8 while it did not appear in the model treatment block indicating the extra treatment was both appropriate and effective. On the former vineyard (5 model vs 3 calendar treatments), mildew was not present in either block of Merlot. Merlot is less susceptible than Chardonnay, thus it was possible to stretch the intervals even more than what the model estimated during periods of low pressure. Varietal differences are not now a factor in the PM model. On the fourth vineyard there was no difference in the number of applications and mildew did not appear in either plot except in a few border vines with poor spray coverage due to obstacles. Although no comparison plots were set out on the fifth vineyard (due to the lateness of station installation), the relative number of grower standard sprays (9) was compared to the number of sprays suggested by the model (5) after probe installation. Although this vineyard was not scouted for project purposes, the vineyard manager did encounter some transient mildew in traditionally sensitive areas.

The frost forecasting (Global Weather Connection) and damage suppression program was initiated in March, 1997 using a combination of once or twice daily faxed weather reports, toll-free hotline recorded alerts and pager alerts to communicate with growers. Project Sporecast weather stations were used for real time monitoring of vineyard conditions and for subsequent verification of forecast accuracy. The season's most severe frost (April 2-3) was successfully forecast as was the need for an early start to suppression measures (capacitance-type microsprinklers). Frost damage was successfully prevented where the misters were available for application. Adjacent areas without frost suppression equipment suffered significant frost damage.

Project participants and operators were provided with appropriate training in the new technology and a comprehensive, continuing IPM education program. Other project related developments included formal incorporation of the group, new research initiatives and a resurgence of community and industry involvement.

###

## RESULTS AND DISCUSSION

### I. Introduction

For purposes of this section, we have restated each program objective together with those objective-related activities which were to be completed during the first year of the program, as stated in the original application, including the Project Timetable. If the activity was completed as scheduled during year one, we have so stated while providing a citation of the original documentation for completion of the activity, either in the previously submitted Interim Progress Report, or in additional attachments appended here. If the activity was not completed or only partially completed, a discussion of the obstacles encountered is offered. In some cases, activities planned for the second or third year of the project were actually completed or at least initiated during year one. In such cases we have attempted to explain why certain activities were accelerated.

The scientific component of our Interim Progress Report, as submitted in November, has been revised with respect to format and expanded to include information that was not available for the Interim Report. This includes primarily information regarding the relative cost of spray materials as well as treatment costs (labor + equipment + fuel) for all project participants, including those with privately purchased project assets. See Appendix A.

Finally, there is a discussion regarding progress in group formation and community involvement as well as the status and future potential for Project Sporecast in light of the unanticipated termination of DPR Pest Management grant support.

### II. Performance Related to Objectives: Year One Activities

Objective 1.0: To develop and implement a local weather station network to acquire the data necessary to forecast the risk of powdery mildew infestation and frost damage.

**Scheduled Year One Activities (April 1, 1996-March 31, 1997):**

**1.1 Acquire, assemble, install, test and calibrate prototype weather station sensors, telemetry equipment and base station (months 1-3).**

*Completed ahead of schedule during first three weeks of April.*

**1.2 Identify potential weather station locations and microclimate areas (months 1-3).**

*Four project station were installed, calibrated and tested in April; a fifth was grower-purchased and installed in May, and; a loaner station was employed throughout year one to assess additional microclimate areas, the extent of each and their similarity to permanently established network stations. On the basis of the year's data, it appears that mildew pressures in the growing region may be adequately sampled with four stations (one grower-owned + three project stations for a reduction of one from first year status.*

**1.3 Identify grower cooperators in each microclimate area (months 1-3)**

*Completed as scheduled. Verification of the unique and discreet character of each of the areas was continuously documented during the year. (Documentation: Interim Progress Report, pages 4, 5.)*

**1.4 Temporarily position prototype station in each potential location (months 3-8)**

*Rather than rotate a single, prototype station from site to site, five permanent sites were established while microclimate areas were assessed with a roving station. Four of five permanent stations were sited by April 17, while the 5th proprietary station went on line May 9. The roving station has been used to examine additional areas with growers using the data to determine which of the five project stations best matches their particular microclimate. (Documentation: Interim Progress Report, pages 3-5).*

**1.5 Final selection of weather station sites (month 8).**

*Completed during the first growing season (months 1-5). The initial selection of sites was determined to be appropriate given area microclimates which were verified using the permanent weather station sites in conjunction with the roving loaner station. In addition, the powdery mildew pressure gradient, increasing from west to east and from north to south reinforced the T-shaped orientation of sites (east/west and north/south) as appropriate for representative coverage of the growing region.*

**1.6 Full integration and testing of the complete system (months 9-12).**

*Project stations were fully integrated and operational from April 17 with the system augmented by a fifth station after May 9. As this is written, the system continues in operation to support the 1997 growing season, courtesy of the Adcon Telemetry.*

*(Documentation: Interim Progress Report, pages 3-5).*

**Objective 2.0: To adapt, refine and validate for the local environment existing computer risk assessment models for powdery mildew and damaging frost incidents.**

**Scheduled Year One Activities:**

None of the activities related to this objective were scheduled for implementation during year one; however, it was felt that early implementation would strengthen the project in light of grower interest in and commitment to beginning the work of powdery mildew model validation. Accordingly, considerable progress in model validation did, in fact, occur during the first growing season.

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**2.1 Run weather station data against mildew and frost models (months 13-24).**

*The mildew model was in fact run during the first growing season (months 1-6) while the frost monitoring and protection program was implemented in project month 12 (March, or first month of second growing season).*

**2.2 Set up mildew monitoring blocks for calendar-based vs UC model preventive treatments (months 13, 14)**

*Completed during month 1, a full year early.*

**2.3 Sample vines for mildew incidence and severity (months 15-20 and 27-32).**

*Control and experimental plots at all project station sites were monitored weekly through July 15 of the first project year (months 1-4) when the vines were no longer considered vulnerable to mildew infection.*

**2.4/2.5 Refine/revise mildew model as necessary (months 20-32).**

*No attempt to refine or revise the model was planned for year one although growers did identify a perceived need to examine the effect, if any, of leaf wetness on the generation of mildew pressure indexes.*

**2.6 Validation/evaluation of revised model, if applicable (months 25-32).**

*This activity was not scheduled for the first year and was not considered appropriate unless and until any potential model revision had occurred.*

**2.7 Collect data, refine frost alert model (months 15, 16 and 22, 23)**

*Although not scheduled for the first project year, a frost monitoring and damage suppression program was implemented in March 1997 with Project Sporecast weather station data being used in part to generate and verify frost forecasts and alerts provided by a contract forecaster. During the months of March and April, growers receive daily a weather summary by fax or toll-free hotline each morning followed by a pager alert and updated fax report each p.m. when frost is forecast for the coming night. The alert includes the approximate time for initiation of frost suppression measures to assure effectiveness (see Appendix B-1). In addition, growers have been provided a graph to assist them in determining when to initiate suppression measures. The graph relates relative humidity, temperature and dew point at the time of initiation to the potential for effective vs ineffective interventions (see Appendix B-2)..*

**2.8 Validate refined frost model program (months 27, 28 and 34,35)**

*Although the frost forecasting/damage suppression program has been in effect for the last 30 days, preliminary results indicate the difficulty of frost forecasting for southern California in general and for the Temecula wine grape growing region in particular, where area microclimates may show a low temperature differential of as much as 12 F degrees on some nights.*

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Summary data for the month of March are presented as Appendix B-3 and indicate that our forecaster thus far has successfully forecast 38% of Valley frost events. Missed forecasts were generally by an average of 3 F degrees and five events have been forecast which failed to materialize. Only 3 of the 13 missed events occurred after bud break (March 10) indicating rapid improvement in relative forecast accuracy. The most significant frost event (the evening of April 2-3) was forecast well in advance and suppression measures, where applied, were very effective. The rapid improvement in forecast accuracy is attributed to the use of Project Sporecast weather stations for temperature verification and real time monitoring. A March 1996 frost event, similar to the 1997 event cited above, caused estimated yield reductions of up to 50% in some area vineyards so the frost forecasting program has already demonstrated its potential in the perception of area growers.

## **2.9 Frost Alert System Impact Evaluation (months 34, 35).**

Again, while this activity was not planned for the first year of our program, it was nevertheless implemented in March, 1997. The program has had a positive impact on grower preparedness for damaging frosts. Preliminary results indicate the use of Drip-In or Pulsator capacitance-type microsprinklers in conjunction with the initiation of frost suppression measures based on temperature/relative humidity/dewpoint relationships has actually been more effective than the use of conventional impact-type sprinklers for suppression. The microsprinklers provide better coverage of the foliage with less water demand per unit area allowing more frost sensitive areas to be covered because of the increased efficiency of water use. The region's largest growers are already planning to expand areas provided frost suppression coverage using the new system.

(Documentation of activities related to this objective was previously provided on pages 3-5 and Appendix A of the November, 1996 Interim Progress Report. Additional documentation includes the above related discussion items and the following: Appendix A: Updated Mildew Validation Report; Appendix B-1: Typical Daily Contract Frost Forecast/Weather Report; Appendix B-2: Evaporative Frost Suppression/Time of Initiation Graph, and; Appendix B-3: Frost Forecasting Monthly Performance Report.

**Objective 3.0: To ensure effective adoption of the new technology by providing local growers and pest advisors with the training and information necessary to access and successfully integrate weather station network output into local IPM programs.**

## **Related Activities**

### **3.1 Assess grower IPM practices: Grape IPM Survey (months 1, 2)**

Completed. The Grape IPM Survey was actually administered to growers in November 1995 at an IPM Innovators Workshop, in the early planning stages for Project Sporecast. Already in the possession of DPR, copies of the survey were provided to local growers and were used to identify early continuing education needs for year one and as the basis for a subsequent, more focused survey administered in September, 1996 (Interim Progress Report, Appendix D).

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**3.2 Evaluate non-point source pollution risk on participant grower vineyard operations: Farm-A-Syst (months 3-8).**

As indicated in our Interim Progress Report (page 7), the Farm-A-Syst assessment process could not be used because it had not been adapted for use in California as we had been led to believe (it had been partially adapted for use in assessing NPS issues related to animal waste). We did, however, begin this adaptation process in consultation and cooperation with DPR staff. Despite the lack of continuing project funds, we will attempt to complete adaptation of the assessment instrument/process under another project initiative.

**3.3 Training in network use/applications (months 9-14)**

Program base station operators and growers received all appropriate training during and before the first year of the project. Growers were introduced to the PM risk assessment model in November, 1995 (IPM Innovators Workshop). More detailed information was presented by Dr. Doug Gubler during the grower's annual Grape Day Technical Conference in January, 1996. Formal training in index interpretation and fungicide application alternatives was presented at a Grower's meeting on May 2, 1997 and August 5. Program operators received their training in the use of Adcon Advantage software and PM model application/interpretation during several sessions (April 2, 15, 16-18 and May 10). Refresher operator training, including training in the use of "virtual stations" was conducted prior to the current growing season in March, 1997.

**3.4 Implement Mildew/Frost Telephone Alert System (months 25, 26)**

The PM Index/Frost Alert Communication system was fully implemented during the first year of the project. Depending on preference, growers have access daily during the growing season to the PM index by fax or toll-free phone line. The same system is used for frost alerts (March/April) with the addition of a pager alert system for critical events.

**3.5 Local Training; Field Demonstrations, Association Meetings, Quarterly Newsletter (months 25-36).**

As reported above, the local in-service education program was fully implemented during the first year of the project through a monthly slate of grower association meetings including Grape Day 1997 on January 10 (see Agenda, Appendix C).

A Cover Crop Selection Questionnaire, courtesy of CERES Consulting, was provided to growers at the October 21, 1996 Association meeting, in conjunction with a presentation by Fred Thomas on Cover crop strategies (see Appendix D).

The first issue of the newsletter, planned for implementation in year three (month 25) was published over one year ahead of schedule in March, 1997 (see Vol.I; No.1, Appendix E).

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**3.6 Administer/Analyze User Benefit Survey (month 34).**

Although administration of this specific survey was not to be conducted until the third year of the project, economic data relevant to user benefits was compiled and reported in the PMAC Progress Report submitted as Appendix A with our October 1996 Interim Progress Report. That report has been augmented with additional information not available in October and is included here as Appendix A. In addition, early results of our Frost Forecasting/Damage Suppression program indicate that the system prevented significant damage during the frost event of April 2-3, 1997.

(Documentation: Interim Progress Report, pages 5-7 and Appendix C, and: this report including Appendices A and B1-B3).

**Objective 4.0: To use the momentum established by Project Sporecast as the basis for a continuing education program focusing on the research, development and adoption of locally effective IPM practices.**

**Related Activities**

In addition to training and presentations related to the primary program objectives involving PM risk assessment and frost forecasting and damage suppression, the following activities contributed directly to the achievement of this objective during the 1996/1997 project year:

**4.1 Continuing Education Program (Presentations/Topics Addressed)**

- \* Structure and Operations of the Lodi-Woodbridge Winegrape Commission (Mark Chandler)
- \* 1996 Agronomic Conditions for California Winegrape Growing Regions (Stan Gajarian)
- \* Project Sporecast Preliminary Results: 1996 Growing Season (Dr. Doug Gubler)
- \* Ecological Soil, Water and Canopy Management (Dr. Bob Bugg)
- \* CIMIS Basics and Irrigation Scheduling for Winegrapes (Jim Gilmore)
- \* Soil Moisture Monitoring Technology (Dr. Jewell Meyer)
- \* Grape Grower Organization Goals and Objectives (Patrick Gleason, AVF and Karen Ross, CAWG)
- \* Irrigation Scheduling Considerations to Optimize Yield, Control Salinity (Rudy Neja, UCCE)
- \* Vine Nutrient Assessment and Management (Dr. Mike Kilby)
- \* Cover Crop Management Techniques for Enhancing Natural Predator Control of Vineyard Pests: A Program Report (Dr. Mike Costello)
- \* Vineyard Spacing and Trellising Trends and Rootstocks for Premium Winegrapes (Dr. Andy Walker)

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- \* *Pre and Post Plant Detection of Soil Pests and Diseases and Procedures for their Control (Dr. Mike McHenry)*
- \* *Pierce's Disease and Grapeleaf Skelotonizer Biological Control in Vineyards (Dr. Alex Purcell)*
- \* *Pre-Emergent and Chemical Mowing of Weeds with Herbicides (Dr. David Cudney)*
- \* *Soil, Water and Plant Considerations in Planning and Establishing a Vineyard (Panel)*
- \* *Western Farm Services, IPM Services (Bill Glover)*
- \* *Frost Forecasting Considerations (Mr. Walt Bartlett, Retired Meteorologist).*
- \* *Computer Technology for Pest Management Conference (Program Manager attended)*
- \* *Irrigation and Nutrient Management Conference, Salinas (Program Manager attended).*
- \* *Microwave Technology for Monitoring Soil Moisture, Nitrates and Salinity (Dr. Dale Bardin, BBK Technologies)*

**4.2 New Initiatives**

- \* *National Association of Conservation Districts, National Irrigation Initiative: Submitted application for establishment of Temecula Winegrape Grower's Association Irrigation Water Management Cooperative, to capitalize on Project Sporecast infrastructure for purposes of IWM research (application still pending).*
- \* *California Department of Conservation: Resource Conservation Districts Grant Program. Submitted application for augmentation of Project Sporecast Network (not approved).*
- \* *American Vineyard Foundation; submitted application by Dr. Larry Williams, Kearney Ag. Center to conduct managed deficit irrigation trial in Temecula region. Approved for \$4800 for 1997.*
- \* *Statewide IPM Network; California PestCast Program: Applied for participation in the program and for acquisition of Project Sporecast base station equipment.*

*(Documentation: Interim Progress Report, pp.8-9 and Appendices D, E, F and G; this report, Appendices C, D and E).*

**Objective 5.0: To provide extended outreach regarding program progress and impact to other grower groups, interested community groups, public agencies and industries (months 25-36).**

Objective 5.0 Extended Outreach (cont.)

**Related Activities**

Although activities related to this objective were not planned for the project's first year, the following extended outreach initiatives were completed:

5.1 Presentation by Project Sporecast principal investigator, Dr. Doug Gubler, to regional chapter of Soil and Water Conservation Society re: Project Sporecast and the Powdery Mildew Risk Assessment Model (September 17, 1996).

5.2 In cooperation with DPR, an IPM Innovator Workshop for area avocado growers (November 7, 1996) was sponsored and co-hosted by the San Jacinto Basin Resource Conservation District (the Project Sporecast management agency). Information regarding Project Sporecast and the implications for avocado culture of remote weather monitoring systems was presented by Program Manager, Jim Gilmore of SJBRCD.

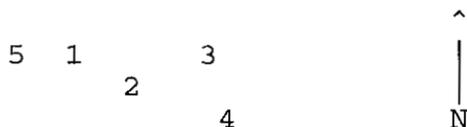
(Documentation: Interim Progress Report, pp 8-9 and Appendix H).

III. Pest Management Results

**Powdery Mildew Risk Assessment Model Validation**

Although local validation of the Gubler-Thomas Powdery Mildew Infection Model was not to begin until the project's second year, the weather station network, base station transceiver, network server and Advantage software were fully integrated and ready for implementation by the third week of the 1996 growing season. Accordingly, the decision was made to set up simple experimental plots for the side-by-side comparison of the effectiveness of grower standard vs model-controlled spray programs during the first growing season. It was felt that the phenologically late start date would have little detrimental effect on the quality of data to be collected. In addition, the opportunity to gain nearly a full season of grower experience in practical model application was compelling.

Five Adcon Telemetry weather stations were installed in the Temecula Valley Winegrape growing region. Four were included in side-by-side comparison plots from early April while the fifth station was purchased privately but was not installed until May 9. The growers standard spray program was applied to this fifth station block from bud break. Spary dates were recorded and compared from May 7 to model recommended dates for the block for purposes of theoretical comparison only since there was no plot set aside for the model-based spray schedule here. By number, the north/south, east/west orientation of the stations is as depicted below:



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**Powdery Mildew Risk Assessment Model Validation (cont.)**

Test blocks were split into two equal study areas of 6-18 full length vine rows, each plot containing half the rows. One plot received the grower's standard spray treatment while the other was treated according to the model generated spray schedule. The choice of treatment product was left to the grower, however the same product had to be used in each spray zone. Blocks were scouted for mildew using a sampling rate of approximately 1% of vines and berry clusters weekly from April 17 through July 16. Mildew incidence (percentage of infected vines sampled) and severity (percentage of leaf or berry area covered per total sampled area) was computed and recorded. The need to spray the model blocks was relayed by the base station administrator to the appropriate vineyard manager as model-generated alarms were noted. The owner/manager of Vineyard 4 accessed the information directly using his privately purchased Advantage software.

**Summary of Results**

	No. of Sprays		Mildew Infection		Date(s) Detected
	Standard	Model	Incidence	Severity	
Vineyard 1	6	7	14%(S)* 14%(S)	0.2% 0.1%	7/8/96 7/15/96
Vineyard 2	3	5	0%	0.0%	n/a
Vineyard 3	11	6	0%	0.0%	n/a
Vineyard 4	8	8	0%	0.0%	n/a
Vineyard 5	9	5**	not scouted		

\* = Standard block

\*\* = suggested by model program; block actually sprayed according to growers standard program because weather station not installed until May 9.

Grape powdery mildew pressure profiles indicated that mildew pressure was somewhat different from site to site but, in general, increased in magnitude from west to east (a correction from our November 1996 report) and from south to north. All vineyards in the system experienced a week of sustained high mildew pressure the last week of May and the last week of June when moderate temperatures prevailed over the entire region. Most severe pressure was at vineyard three with five weeks of sustained high pressure from early May through early June and again in late June. Vineyard 2 showed sustained high pressure the last three weeks of May and the last week of June. Vineyards one and five each experienced a total of three weeks of sustained high pressure in May and June while vineyard four showed the least pressure by far with just two weeks of moderately high pressure during the last weeks of May and June. With the advent of sustained high, mid-summer daytime temperatures, the pressure declined steadily to minimum levels after mid-July when increasing berry sugar levels also minimized mildew susceptibility.

Growers saved sprays (Vineyard 3) or increased mildew control efficacy (Vineyard 1). The model did not differ from the standard program at vineyard 4 and actually increased the number of sprays over the standard program at vineyard 2. Here the program was conducted in Merlot which is known to be relatively resistant to mildew. The Gubler-Thomas model does

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not include a varietal bias which might allow for an increase in spray intervals in resistant varieties. Although vineyard 5 did not provide for comparison plots, the model suggested significantly fewer sprays than the growers standard program, a result similar to vineyard 3, owned by the same grower.

In some cases, growers did not adhere strictly to the model spray schedule (deviations in timing) due to other cultural considerations or, especially early in the season, due to the learning process in understanding model recommendations and the need to react promptly to spray alarms when informed of their activation.

Detailed information for each of the vineyards is presented as Appendix A. This is equivalent to Appendix A as submitted with the Interim Progress Report, however the format has been expanded and more detailed economic information has been provided in order to illustrate more clearly potential savings attributable to the program, where applicable.

#### **IV. Progress in Group Formation/Community Involvement**

Prior to the initiation of Project Sporecast, the Temecula Winegrape Growers Association (TWGA) was an informally organized, loosely knit group created primarily as a forum for communication on an "as-needed" basis. Accordingly, it was necessary for the better organized and more powerful Vintners Association to submit the initial Project Sporecast application on behalf of the growers. With implementation of Project Sporecast, TWGA was prompted to apply for incorporation as a 501-c-(3) non-profit organization. Incorporation was completed in December and the group's application for exempt status is pending approval.

Encouraged by the Project Sporecast grant award in April, 1996, the group established a regular, monthly meeting schedule primarily to provide a forum for continuing grower education regarding IPM practices, planning for local research and coordinating sales and marketing activities.

In January 1997, the group conducted an extremely ambitious and successful growers technical conference and trade show attended by 90 members, guests and speakers from throughout the state (see conference agenda, Appendix C).

The decision by growers to formalize their organization has increased their collective visibility while encouraging a sense of renewed activism. The group is now represented on the American Vineyard Foundation (AVF) as well as the California Association of Winegrape Growers (CAWG). AVF representation has helped to assure that member funds generated in the Valley are returned to support much needed local research such as the managed deficit irrigation trial initiated this season with AVF funds to be conducted at Vigne Hills Vineyard (Callaway) by Dr. Larry Williams.

In addition, TWGA was represented in 1996/1997 at the Winetech/Grapetech Conference; CAWG Annual Meeting; the Unified Wine and Grape Symposium (ASEV & CAWG), the ASEV Annual Meeting and the Annual Wine Industry Meeting. In 1997, TWGA will participate in Temecula's Annual Wine and Balloon Festival (April); the Annual Taste of Temecula Exposition (Fall) and as an exhibitor at the ASEV Annual Meeting June 30 in San Diego.

V. Project Status: Future Potential

When DPR's Pest Management Advisory Committee (PMAC) declined to approve second-year funding for Project Sporecast's proposed three-year program, the Temecula Winegrape Growers Association was forced to seek alternative means to secure its already considerable investment and that of member growers in the Project. It is beyond the means of the small Association to complete the buyout of project equipment without government assistance or private refinancing. The acquisition of project equipment and software completed during year one either privately or with grant funds will be rendered useless unless the critical base station components can somehow also be acquired. At present, TWGA is considering several alternatives, including:

- 1). Incorporation of Project Sporecast into California PestCast, the statewide IPM Project's weather station network. Under this option, growers would be required to complete the work of model local validation at their own expense. It is also unclear what arrangements, if any, can be made for the ongoing maintenance and repair of the system as well as periodic equipment and software upgrades;
- 2) Long-term refinancing of project assets either through Adcon telemetry (the present owner and a project partner) or a local financial institution. This arrangement would require that TWGA contract annually with Adcon, or their agent, for maintenance, upgrades and applicable training;
- 3). Acquisition of the entire Sporecast system by Western Farm Services with subsequent service under an annual fee structure for TWGA with a separate fee structure for vineyard owners who have privately acquired associated telemetry equipment or software.

At present, Adcon Telemetry has agreed to keep the system in place through the current growing season or until the situation can be resolved. The growers present inclination is to seek a privately funded solution given the inherently tenuous nature of government programs.

Currently, the project continues to function as if funding had not been withdrawn. The frost forecasting, damage suppression component will continue through April, while the responsibility for mildew scouting and data collection for validation purposes has been assumed by personnel of the SJBRCD, the former project management agency.

With the likely prospect of increased TWGA financial responsibility for the acquisition of project equipment, the most likely casualty of project termination will be continuing grower education regarding IPM practices, an unfortunate and ironic result in light of the originally stated objectives for DPR's Pest Management Grants program. It is hoped this setback will prove to be temporary.

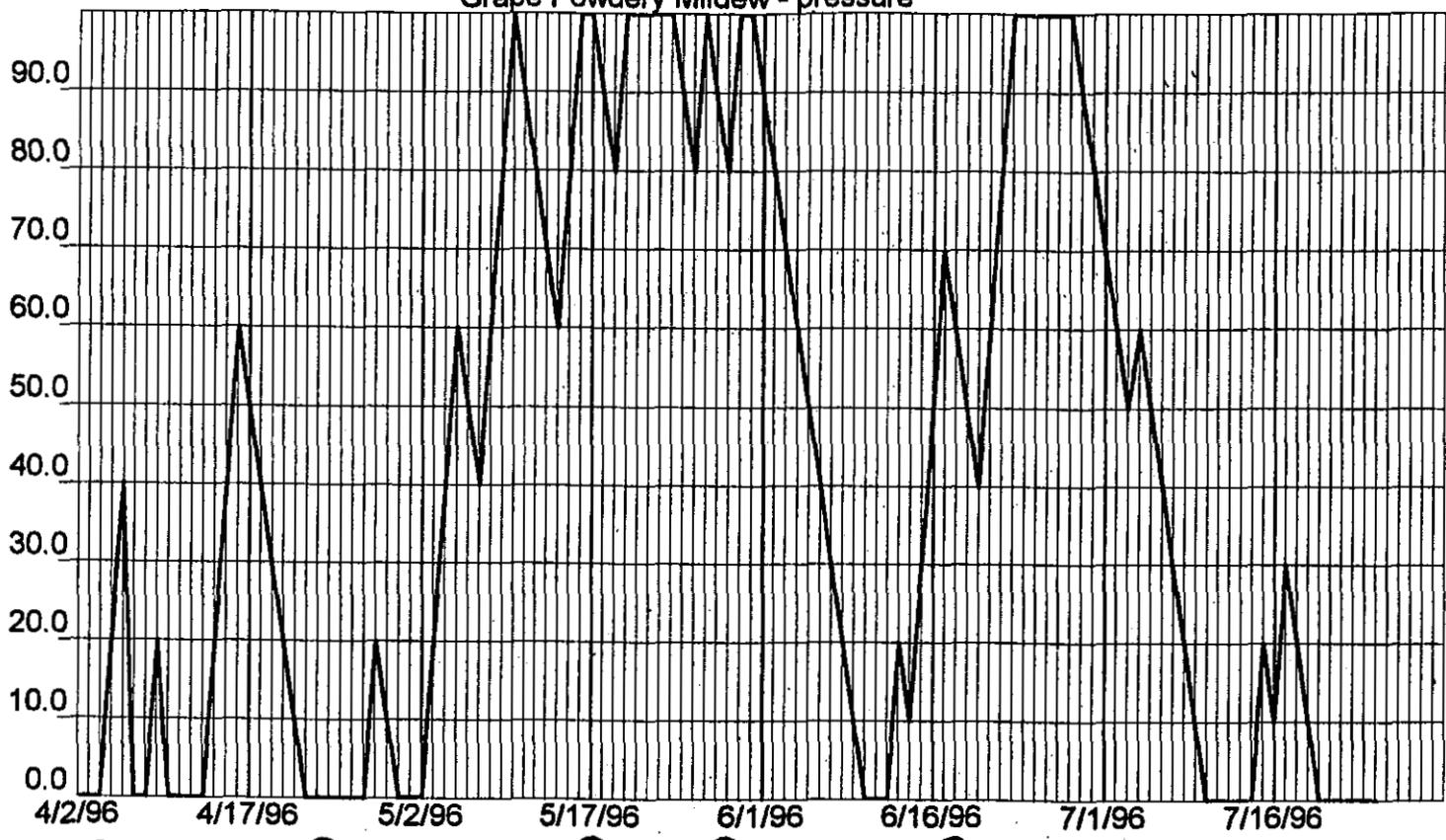
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PROJECT SPORECAST  
Final Progress Report  
April, 1997

APPENDICES

- APPENDIX A : Vineyard Summaries
- APPENDIX B-1: Sample Frost Forecast/Weather Report
- APPENDIX B-2: Frost Suppression Measures Effectiveness Graph
- APPENDIX B-3: Frost Forecasting Program; March Statistical Summary
- APPENDIX C : Agenda: Grape Day 1997
- APPENDIX D : Cover Crop Selection Questionnaire
- APPENDIX E : The Vine -- Volume I; No. 1
- APPENDIX F : News Story: Natural Born Killers

Grape Powdery Mildew - pressure



Spray Dates: Model

Spray Dates: Standard

Model Program: 7 applications (Chardonnay)

| SPRAY DATES | PRODUCT/RATE | \$/A  | TREAT \$/A | TOTAL \$/A | STUDY AREA | STUDY AREA \$ | PROJECTED/92A |
|-------------|--------------|-------|------------|------------|------------|---------------|---------------|
| 3/19        | Thiolux-6#/A | 3.72  | 5.00       | 8.72       | 1.5A       | 13.08         | \$802.24      |
| 4/4         | Thiolux-6#/A | 3.72  | 5.00       | 8.72       | 1.5A       | 13.08         | \$802.24      |
| 4/24        | Thiolux-6#/A | 3.72  | 5.00       | 8.72       | 1.5A       | 13.08         | \$802.24      |
| 5/17        | Thiolux-6#/A | 3.72  | 5.00       | 8.72       | 1.5A       | 13.08         | \$802.24      |
| 5/29        | Rub.- 3 oz/A | 7.59  | 5.00       | 12.59      | 1.5A       | 18.89         | \$1158.28     |
| 6/18        | Rub.- 4 oz/A | 10.12 | 5.00       | 15.12      | 1.5A       | 22.68         | \$1391.04     |
| 7/4         | Rub.- 4 oz/A | 10.12 | 5.00       | 15.12      | 1.5A       | 22.68         | \$1391.04     |
| TOTALS      |              |       |            |            |            | \$116.57      | \$7149.32     |

Projected Cost/A/Season: \$77.71  
 Mean Cost/A/Spray: \$11.10  
 Mean Vineyard Cost/Spray: \$1021.33

Mildew Incidence: 0%  
 Mildew Severity: 0%

Standard Program: 6 applications (Chardonnay)

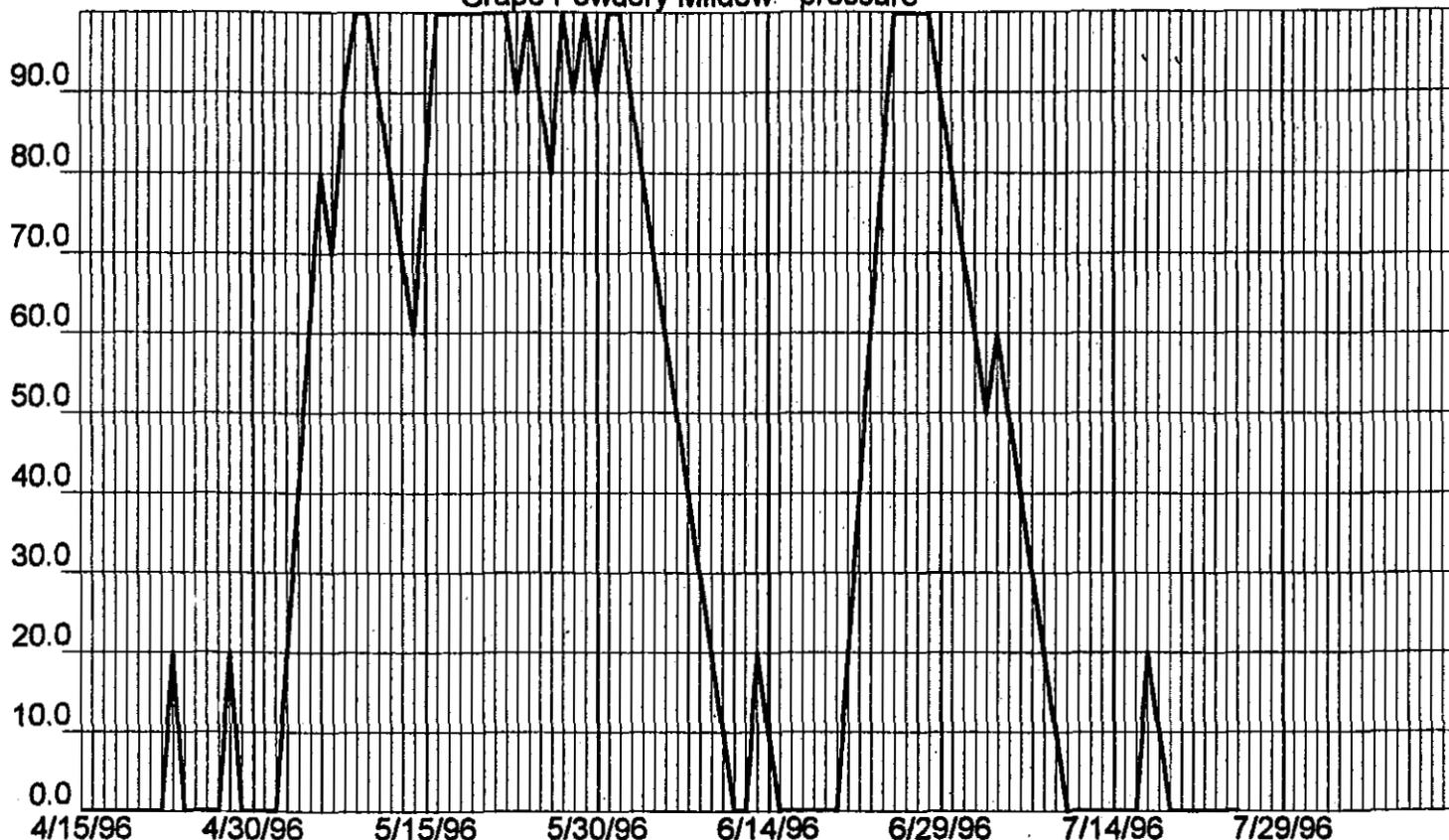
| SPRAY DATES | PRODUCT/RATE | \$/A  | TREAT \$/A | TOTAL \$/A | STUDY AREA | STUDY AREA \$ | PROJECTED/92A |
|-------------|--------------|-------|------------|------------|------------|---------------|---------------|
| 3/19        | Thiolux-6#/A | 3.72  | 5.00       | 8.72       | 1.5A       | 13.08         | \$802.24      |
| 4/4         | Thiolux-6#/A | 3.72  | 5.00       | 8.72       | 1.5A       | 13.08         | \$802.24      |
| 4/19        | Thiolux-6#/A | 3.72  | 5.00       | 8.72       | 1.5A       | 13.08         | \$802.24      |
| 5/7         | Thiolux-6#/A | 3.72  | 5.00       | 8.72       | 1.5A       | 13.08         | \$802.24      |
| 5/22        | Rub.- 3 oz/A | 7.59  | 5.00       | 12.59      | 1.5A       | 18.89         | \$1158.28     |
| 6/3         | Rub.- 4 oz/A | 10.12 | 5.00       | 15.12      | 1.5A       | 22.68         | \$1391.04     |
| TOTALS      |              |       |            |            |            | \$93.89       | \$5758.28     |

Projected Cost/A/Season: \$62.59  
 Mean Cost/A/Spray: \$10.43  
 Mean Vineyard Cost/Spray: \$959.71

Mildew Incidence: 14%  
 Mildew Severity: 0.1%  
 Date Observed: July 8

COMMENTS: Model plot received one more application than the standard program plot, but two applications after treatments in the standard area had ceased. Mildew was detected in the standard plot on July 8. Since no mildew appeared in the model plot, both the timing of treatments as well as the additional treatment appear to have been effective and appropriate.

Grape Powdery Mildew - pressure



Spray Dates: Model  
 Spray Dates: Standard

Model Program: 5 applications (Merlot)

| SPRAY DATES | PRODUCT/RATE | \$/A | TREAT \$/A | TOTAL \$/A | STUDY AREA | STUDY AREA \$ | PROJECTED/35A |
|-------------|--------------|------|------------|------------|------------|---------------|---------------|
| 4/19        | Thiolux-8#/A | 4.96 | 6.43       | 11.39      | 2.65A      | 30.18         | \$398.65      |
| 5/9         | Dust. S-6#/A | 0.96 | 6.43       | 7.39       | 2.65A      | 19.58         | \$258.65      |
| 5/17        | Dust. S-6#/A | 0.96 | 6.43       | 7.39       | 2.65A      | 19.58         | \$258.65      |
| 5/25        | Dust. S-6#/A | 0.96 | 6.43       | 7.39       | 2.65A      | 19.58         | \$258.65      |
| 6/27        | Dust. S-6#/A | 0.96 | 6.43       | 7.39       | 2.65A      | 19.58         | \$258.65      |
| TOTALS      |              |      |            |            |            | \$108.50      | \$1437.25     |

Projected Cost/A/Season: \$41.06  
 Mean Cost/A/Spray: \$8.21  
 Mean Vineyard Cost/Spray: \$287.45  
 Mildew Incidence: 0%  
 Mildew Severity: 0%  
 Date Observed: n/a

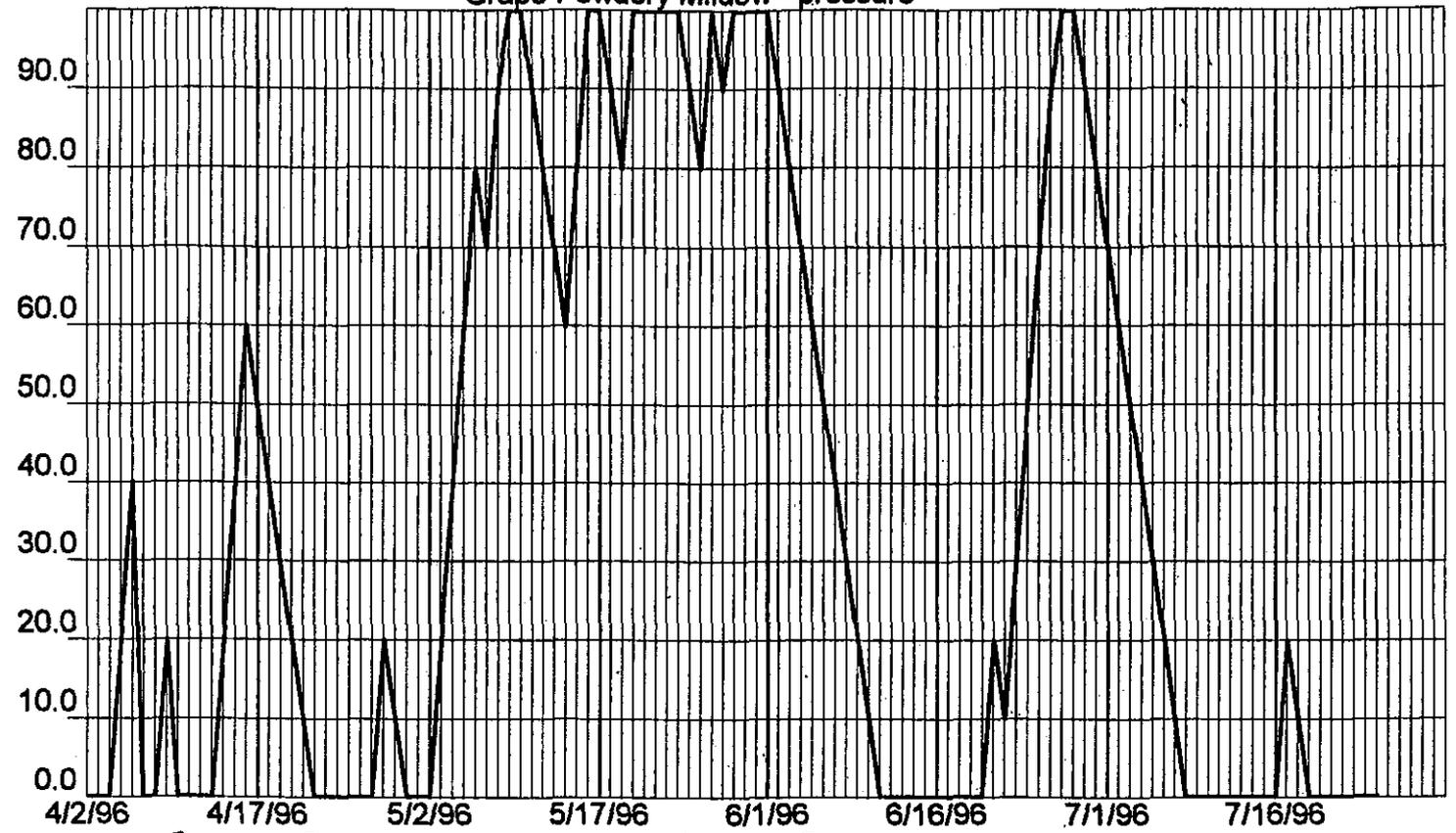
Standard Program: 3 applications (Merlot)

| SPRAY DATES | PRODUCT/RATE | \$/A | TREAT \$/A | TOTAL \$/A | STUDY AREA | STUDY AREA \$ | PROJECTED/35A |
|-------------|--------------|------|------------|------------|------------|---------------|---------------|
| 5/3         | Dust. S-6#/A | 0.96 | 6.43       | 7.39       | 2.65A      | 19.58         | \$258.65      |
| 5/16        | Dust. S-6#/A | 0.96 | 6.43       | 7.39       | 2.65A      | 19.58         | \$258.65      |
| 6/27        | Dust. S-6#/A | 0.96 | 6.43       | 7.39       | 2.65A      | 19.58         | \$258.65      |
| TOTALS      |              |      |            |            |            | \$58.74       | \$775.95      |

Projected Cost/A/Season: \$22.17  
 Mean Cost/A/Spray: \$7.39  
 Mean Vineyard Cost/Spray: \$258.65  
 Mildew Incidence: 0%  
 Mildew Severity: 0%  
 Date Observed: n/a

COMMENTS: Model plot received three more applications than the standard program plot, although mildew was not detected at any time during the season in either area. Merlot is less susceptible to mildew than chardonnay, thus it would have been possible to stretch the spray intervals more than that estimated by the model or recommended by the product manufacturer. The model does not now provide for a varietal bias.

Grape Powdery Mildew - pressure



Spray Dates: Model

Spray Dates: Standard

Model Program: 6 applications (White Riesling)

| SPRAY DATES   | PRODUCT/RATE  | \$/A  | TREAT \$/A | TOTAL \$/A | STUDY AREA | STUDY AREA \$   | PROJECTED/380A    |
|---------------|---------------|-------|------------|------------|------------|-----------------|-------------------|
| 4/10          | Thio+SA-6#/A* | 4.72  | 7.86       | 12.58      | 1.34A      | 16.86           | \$6038.40         |
| 4/22          | Thio+SA-6#/A  | 4.72  | 7.86       | 12.58      | 1.34A      | 16.86           | \$6038.40         |
| 5/25          | Thio+SA-6#/A  | 4.72  | 7.86       | 12.58      | 1.34A      | 16.86           | \$6038.40         |
| 6/5           | Thio+SA-6#/A  | 4.72  | 7.86       | 12.58      | 1.34A      | 16.86           | \$6038.40         |
| 6/24          | Thio+SA-6#/A  | 4.72  | 7.86       | 12.58      | 1.34A      | 16.86           | \$6038.40         |
| 7/4           | Rub+SA-6 oz/A | 15.26 | 7.86       | 23.12      | 1.34A      | 30.98           | \$11097.60        |
| <b>TOTALS</b> |               |       |            |            |            | <b>\$115.28</b> | <b>\$41289.60</b> |

\*SA = surfactant  
 Projected Cost/A/Season: \$86.02  
 Mean Cost/A/Spray: \$14.33  
 Mean Vineyard Cost/Spray: \$6881.60

Mildew Incidence: 0%  
 Mildew Severity: 0%  
 Date Observed: n/a

Standard Program: 11 applications (White Riesling)

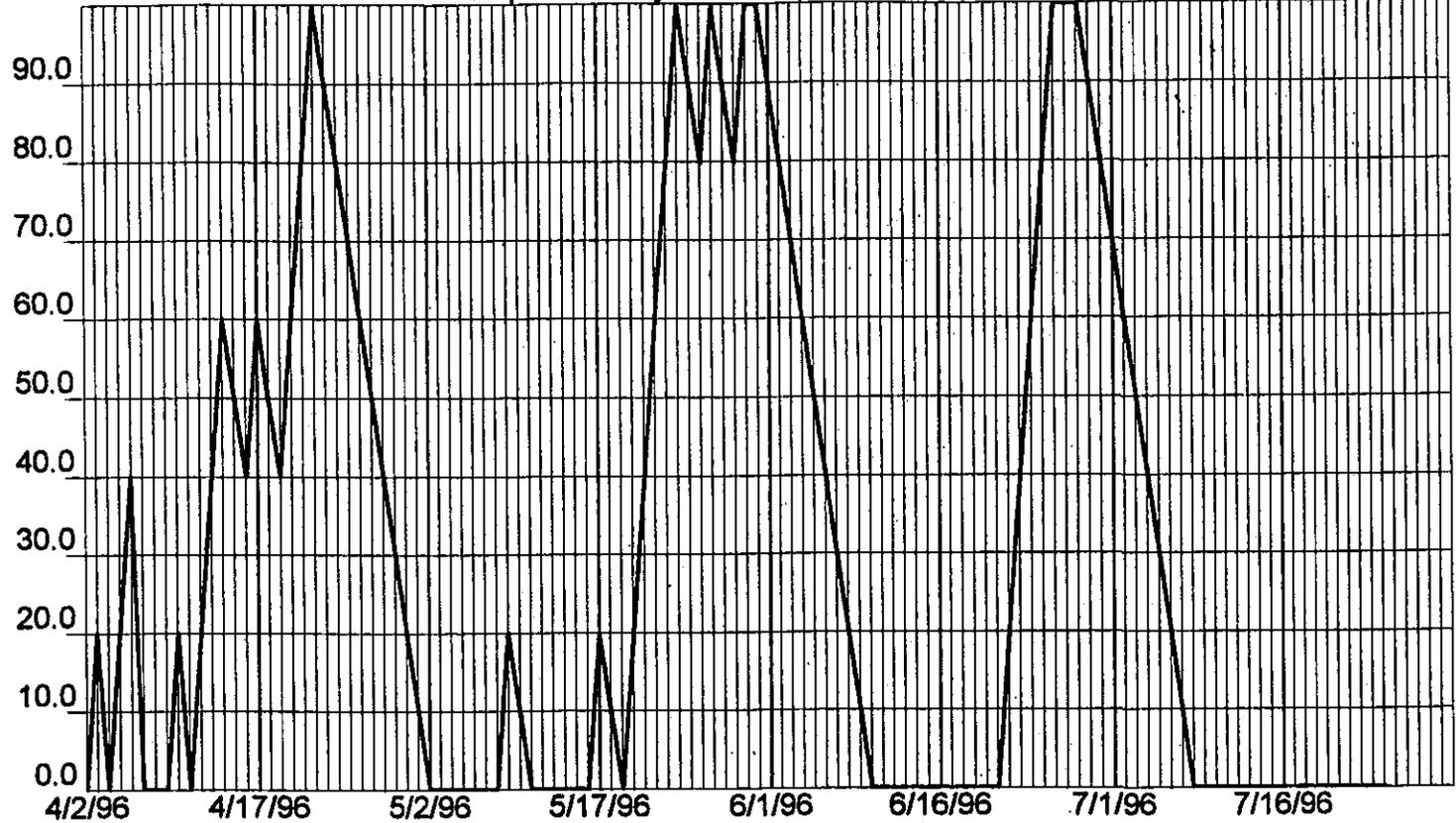
| SPRAY DATES   | PRODUCT/RATE  | \$/A  | TREAT \$/A | TOTAL \$/A | STUDY AREA | STUDY AREA \$   | PROJECTED/480A    |
|---------------|---------------|-------|------------|------------|------------|-----------------|-------------------|
| 3/28          | Thio+SA-6#/A  | 4.72  | 7.86       | 12.58      | 1.34A      | 16.86           | \$6038.40         |
| 4/10          | Thio+SA-6#/A  | 4.72  | 7.86       | 12.58      | 1.34A      | 16.86           | \$6038.40         |
| 4/22          | Thio+SA-6#/A  | 4.72  | 7.86       | 12.58      | 1.34A      | 16.86           | \$6038.40         |
| 5/10          | Thio+SA-6#/A  | 4.72  | 7.86       | 12.58      | 1.34A      | 16.86           | \$6038.40         |
| 5/22          | Thio+SA-6#/A  | 4.72  | 7.86       | 12.58      | 1.34A      | 16.86           | \$6038.40         |
| 5/29          | Thio+SA-6#/A  | 4.72  | 7.86       | 12.58      | 1.34A      | 16.86           | \$6038.40         |
| 6/07          | Thio+SA-6#/A  | 4.72  | 7.86       | 12.58      | 1.34A      | 16.86           | \$6038.40         |
| 6/15          | Thio+SA-6#/A  | 4.72  | 7.86       | 12.58      | 1.34A      | 16.86           | \$6038.40         |
| 6/22          | Thio+SA-6#/A  | 4.72  | 7.86       | 12.58      | 1.34A      | 16.86           | \$6038.40         |
| 6/29          | Rub+SA-6 oz/A | 15.26 | 7.86       | 23.12      | 1.34A      | 30.98           | \$11097.60        |
| 7/05          | Rub+SA-6 oz/A | 15.26 | 7.86       | 23.12      | 1.34A      | 30.98           | \$11097.60        |
| <b>TOTALS</b> |               |       |            |            |            | <b>\$245.53</b> | <b>\$76540.80</b> |

Projected Cost/A/Season: \$159.46  
 Mean Cost/A/Spray: \$14.50  
 Mean Vineyard Cost/Spray: \$6858.24

Mildew Incidence: 0%  
 Mildew Severity: 0%  
 Date Observed: n/a

COMMENTS: In a vineyard with a history of high mildew incidence, the model plot received 45% fewer sprays than the standard program plot. Since mildew did not appear at any time during the season in either plot, the reduction in sprays was accomplished without sacrificing mildew control.

Grape Powdery Mildew - pressure



Spray Dates: Model

Spray Dates: Standard

Model Program: 8 applications (Chardonnay)

| SPRAY DATES   | PRODUCT/RATE | \$/A  | TREAT \$/A | TOTAL \$/A | STUDY AREA | STUDY AREA \$   | PROJECTED/7A    |
|---------------|--------------|-------|------------|------------|------------|-----------------|-----------------|
| 3/16          | Thiolux-5#/A | 3.10  | 6.43       | 9.53       | 1.3A       | 12.39           | \$66.71         |
| 3/31          | Thiolux-5#/A | 3.10  | 6.43       | 9.53       | 1.3A       | 12.39           | \$66.71         |
| 4/12          | Thiolux-5#/A | 3.10  | 6.43       | 9.53       | 1.3A       | 12.39           | \$66.71         |
| 4/24          | Thiolux-5#/A | 3.10  | 6.43       | 9.53       | 1.3A       | 12.39           | \$66.71         |
| 5/08          | Thiolux-5#/A | 3.10  | 6.43       | 9.53       | 1.3A       | 12.39           | \$66.71         |
| 5/28          | Thiolux-5#/A | 3.10  | 6.43       | 9.53       | 1.3A       | 12.39           | \$66.71         |
| 6/12          | Rub.- 6 oz/A | 14.46 | 6.43       | 20.89      | 1.3A       | 27.16           | \$146.23        |
| 6/29          | Rub.- 6 oz/A | 14.46 | 6.43       | 20.89      | 1.3A       | 27.16           | \$146.23        |
| <b>TOTALS</b> |              |       |            |            |            | <b>\$128.66</b> | <b>\$692.72</b> |

Projected Cost/A/Season: \$98.96  
 Mean Cost/A/Spray: \$12.37  
 Mean Vineyard Cost/Spray: \$86.59

Mildew Incidence: 0%  
 Mildew Severity: 0%  
 Date Observed: n/a

Standard Program: 8 applications (Chardonnay)

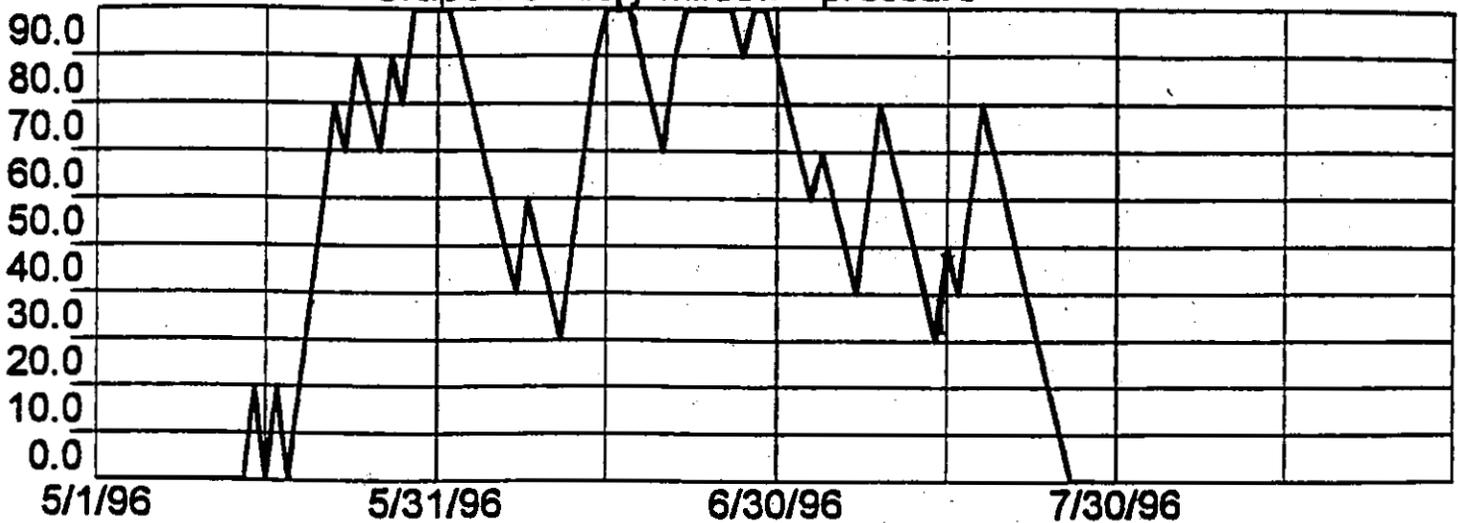
| SPRAY DATES   | PRODUCT/RATE | \$/A  | TREAT \$/A | TOTAL \$/A | STUDY AREA | STUDY AREA \$   | PROJECTED/7A    |
|---------------|--------------|-------|------------|------------|------------|-----------------|-----------------|
| 3/16          | Thiolux-5#/A | 3.10  | 6.43       | 9.53       | 1.3A       | 12.39           | \$66.71         |
| 3/31          | Thiolux-5#/A | 3.10  | 6.43       | 9.53       | 1.3A       | 12.39           | \$66.71         |
| 4/12          | Thiolux-5#/A | 3.10  | 6.43       | 9.53       | 1.3A       | 12.39           | \$66.71         |
| 4/24          | Thiolux-5#/A | 3.10  | 6.43       | 9.53       | 1.3A       | 12.39           | \$66.71         |
| 5/04          | Thiolux-5#/A | 3.10  | 6.43       | 9.53       | 1.3A       | 12.39           | \$66.71         |
| 5/28          | Thiolux-5#/A | 3.10  | 6.43       | 9.53       | 1.3A       | 12.39           | \$66.71         |
| 6/07          | Rub.- 6 oz/A | 14.46 | 6.43       | 20.89      | 1.3A       | 27.16           | \$146.23        |
| 6/23          | Rub.- 6 oz/A | 14.46 | 6.43       | 20.89      | 1.3A       | 27.16           | \$146.23        |
| <b>TOTALS</b> |              |       |            |            |            | <b>\$128.66</b> | <b>\$692.72</b> |

Projected Cost/A/Season: \$98.96  
 Mean Cost/A/Spray: \$12.37  
 Mean Vineyard Cost/Spray: \$86.59

Mildew Incidence: 0%  
 Mildew Severity: 0%  
 Date Observed: n/a

COMMENTS: Having purchased his own Advantage software, this grower was the only one to access the base station directly rather than relying on faxed alert advisories from the base station administrator. There was little difference in timing and no difference in the number of applications between this grower's model program plot and standard program plot. Although no mildew was observed in either scouted plot, the grower did report some mildew in a few border vines which received poor spray coverage due to obstacles near the applicable row.

### Grape Powdery Mildew - pressure



Spray Dates: Model

Spray Dates: Standard

Model Program: 5 applications (Chardonnay)\*\*  
 \*\* Theoretical only: see comments below for explanation

| SPRAY DATES   | PRODUCT/RATE  | \$/A  | TREAT \$/A | TOTAL \$/A | STUDY AREA | STUDY AREA \$  | PROJECTED/355A    |
|---------------|---------------|-------|------------|------------|------------|----------------|-------------------|
| 5/07          | Thio+SA-6#/A* | 4.72  | 7.86       | 12.58      | 1.10A      | 13.84          | \$4465.90         |
| 5/22          | Thio+SA-6#/A* | 4.72  | 7.86       | 12.58      | 1.10A      | 13.84          | \$4465.90         |
| 6/02          | Thio+SA-6#/A* | 4.72  | 7.86       | 12.58      | 1.10A      | 13.84          | \$4465.90         |
| 6/21          | Thio+SA-6#/A* | 4.72  | 7.86       | 12.58      | 1.10A      | 13.84          | \$4465.90         |
| 7/01          | Rub+SA-6 oz/A | 15.26 | 7.86       | 23.12      | 1.10A      | 25.43          | \$8207.60         |
| <b>TOTALS</b> |               |       |            |            |            | <b>\$80.79</b> | <b>\$26071.20</b> |

\*SA = surfactant  
 Projected Cost/A/Season: \$73.44  
 Mean Cost/A/Spray: \$14.69  
 Mean Vineyard Cost/Spray: \$5214.24

Mildew Incidence: not scouted  
 Mildew Severity: not scouted  
 Date Observed: n/a

Standard Program: 9 applications (Chardonnay)

| SPRAY DATES   | PRODUCT/RATE   | \$/A  | TREAT \$/A | TOTAL \$/A | STUDY AREA | STUDY AREA \$   | PROJECTED/355A    |
|---------------|----------------|-------|------------|------------|------------|-----------------|-------------------|
| 5/07          | Thio+SA-6#/A*  | 4.72  | 7.86       | 12.58      | 1.10A      | 13.84           | \$4465.90         |
| 5/14          | Thio+SA-6#/A   | 4.72  | 7.86       | 12.58      | 1.10A      | 13.84           | \$4465.90         |
| 5/21          | Thio+SA-6#/A   | 4.72  | 7.86       | 12.58      | 1.10A      | 13.84           | \$4465.90         |
| 5/29          | Thio+SA-4.3#/A | 3.67  | 7.86       | 11.53      | 1.10A      | 12.68           | \$4093.15         |
| 6/07          | Thio+SA-5.2#/A | 4.22  | 7.86       | 12.08      | 1.10       | 13.29           | \$4288.40         |
| 6/13          | Thio+SA-5.7#/A | 4.53  | 7.86       | 12.39      | 1.10       | 13.63           | \$4398.45         |
| 6/20          | Thio+SA-5.5#/A | 4.41  | 7.86       | 12.27      | 1.10       | 13.50           | \$4355.85         |
| 6/27          | Thio+SA-5.2#/A | 4.22  | 7.86       | 12.08      | 1.10       | 13.29           | \$4288.40         |
| 7/04          | Rub+SA-6 oz/A  | 15.26 | 7.86       | 23.12      | 1.10A      | 25.43           | \$8207.60         |
| <b>TOTALS</b> |                |       |            |            |            | <b>\$133.34</b> | <b>\$43029.55</b> |

Projected Cost/A/Season: \$121.21  
 Mean Cost/A/Spray: \$11.02  
 Mean Vineyard Cost/Spray: \$4781.06

Mildew Incidence: not scouted  
 Mildew Severity: not scouted  
 Date Observed: n/a

COMMENTS: This block was not scouted for mildew because it was not included in the initial experimental design for comparison trials. After initiation of the trial, a weather station and monitoring software were purchased privately for this vineyard on May 9. The model program data shown above show what spray dates would have been from that date had sprays been scheduled using the model. This grower used a seven-day spray schedule and no mildew was observed. It should be noted that this grower did participate in the trial with another vineyard, but preferred to await compilation of the season's data before implementing model-based scheduling on this vineyard.



Global Weather Connection  
 38591 Haywood Lane  
 Squaw Valley, CA 93675  
 Phone: (209) 338\*2782  
 Mobil: (209) 287\*8089  
 Pager: (209) 979\*4173  
 Fax: (209) 338\*2861  
 e-mail: wweather@ix.netcom.com

**Temperature Forecast for night of: 97/04/3 - 4**
**WBF - NF**

| Site           | Low this morning<br>(°F) | Forecast Minimum<br>Temperature (°F) for tonight | Forecast Minimum<br>Temperature (°F) for<br>tomorrow night |
|----------------|--------------------------|--------------------------------------------------|------------------------------------------------------------|
| 1. Callaway    | 25                       | WBF - 27                                         | BF - 31                                                    |
| 2. Mt. Palomar | 30                       | BF - 31                                          | AF - 35                                                    |
| 3. Los Nogales | 29                       | BF - 29                                          | NF - 32                                                    |
| 4. Bell        | 31                       | BF - 31                                          | NF - 34                                                    |
| 5. Kollbri     | 33                       | NF - 33                                          | AF - 36                                                    |

**SYNOPSIS:** Yesterday's thunderstorms covered the streets of San Diego with hail and a tornado was reported in Murrieta. The wrap around clouds just skimmed the Area, and the clear skies allowed temperatures to go DOWN. Callaway reached 32° at 1 AM and remained below freezing until 6:15 AM. The temperature there was below 27° from 2:45 AM until 5 AM, bottoming out at 24.5°. Los Nogales and Mt. Palomar also reported minimums below 30°, 29.9° and 28.5° respectively, while Kollbri was the only probe to remain above freezing. The low there was 32.7°. While the air over the Area will begin to moderate at a fairly rapid rate, the Area is in for another cold night tonight and frost will remain a possibility through Saturday morning. Warmer and dry weather is expected for the weekend with temperatures returning to more normal values.

**FORECAST:**

**Today:** Skies will remain partly to variably cloudy into the evening and there will again be a few showers and thunderstorms around. These will be most numerous and strongest south and east of the Area, but gusty winds, small hail, and brief, but locally heavy showers can be expected in conjunction with the thunderstorms. Highs today will be in the middle 60's again and relative humidity will decrease to minimum values between 20% and 30%. Winds will be variable at 10 to 15 MPH with occasional gusts to 20 MPH.

**Tonight:** Skies will become partly cloudy after sunset, clearing through the night. Temperatures will again fall into the danger zone with lows expected to range from the upper 20's in the colder locations to the lower 30's in the warmer ones. Relative humidity will recover to 75% to 80%. This indicates that spray and misting prevention measures will be effective early in the event, but of limited usefulness during the coldest hours at the colder locations. It will be necessary to initiate these procedures as soon as the Start criteria are met. Light and variable winds and a sharp radiational inversion will make wind machines effective as well.

**Tomorrow:** Skies will be mostly sunny and temperatures will begin to recover to more normal values. Highs will be in the upper 60's to near 70°. Winds will be much less of a problem.

**Tomorrow Night:** Clear skies will bring another cold night, but the rapid moderation of the airmass over the Area means they can be expected to be 3 to 5 degrees warmer. Freezing conditions should occur at only the coldest locations, but all areas will remain cold enough for at least some frost on exposed surfaces. Lows are expected to range from 31° to 38°.

**FURTHER OUTLOOK:** Saturday through Monday, April 5-7, 1997. Conditions will make a fairly rapid recovery to more normal weather. There will be increasing marine influences over the weekend which

B-1



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 Fax: (209) 338\*2861  
 e-mail: weaman@ix.netcom.com

**Final Temperature Forecast for night of: 97/04/02 - 03**

**WBF - NF**

| Site           | Forecast Minimum Temperature (°F) for tonight | Forecast Minimum Temperature (°F) for tomorrow night |
|----------------|-----------------------------------------------|------------------------------------------------------|
| 1. Callaway    | WBF - 28                                      | NF - 30                                              |
| 2. Mt. Palomar | NF - 32                                       | NF - 34                                              |
| 3. Los Nogales | BF - 29                                       | NF - 31                                              |
| 4. Bell        | BF - 31                                       | NF - 33                                              |
| 5. Kollibri    | NF - 33                                       | SAF - 35                                             |

**SYNOPSIS:** There are no significant changes to the forecast. There may, however, be a saving feature to the weather over the Area. Satellite photographs indicate considerably more cloudiness associated with both the thunderstorm activity and the upper low itself. Some of these clouds are wrapping around the upper circulation and are now as far west and south as the Tehachapi and San Gabriel Mountains. If these clouds can hold together and move over the Temecula Area, temperatures will not be as cold as indicated above. That does not appear to be the most likely development, and hence there has been no change to the minimum temperatures forecast for tonight. Storms will be less numerous, but tomorrow will repeat today in many ways, with showers and thunderstorms over the Inland Empire and another cold night appears to be in store.

**FORECAST:**

**Tonight:** Assuming things behave themselves, a rare thing when dealing with a cut off low, skies will again begin to clear around midnight and the winds will diminish. This will produce another cold night with temperatures falling to Below to Well Below Freezing in most locations. Temperatures near freezing can be expected throughout the Area. Relative humidity will recover to 80% to 95% overnight. With temperatures expected near to below freezing, it will be necessary to begin spray and misting prevention procedures as soon as the Start criteria are met as they will be of limited effectiveness during the coldest hours. Temperatures will fall into the operational window by 1 or 2 AM. Temperatures will remain near to below freezing until an hour after sunrise. With strong radiational cooling, wind machines will be reasonably effective at locations where the natural flow drops off.

**Tomorrow:** Not a lot of change is expected, although the storms will be a little less numerous and the winds will not be quite as strong. As the upper level low shifts off to the east, the air over the Area will begin to moderate, allowing a gradual warming trend to begin. Skies will remain variably cloudy and temperatures will warm into the middle 60's.

**Tomorrow Night:** While not expected to be as severe as this morning and tomorrow, Friday morning will remain cold with a continuing frost/freeze threat. Skies will begin to clear and winds will relax considerably, setting things up for another night of strong radiational cooling. Overnight lows are expected to fall to near freezing at most locations, with lows ranging from 31° to 36°.

The weekend will bring a return of more typical SoCal weather!

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B-1



Global Weather Connection  
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 Fax: (209) 338\*2861  
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Temperature Forecast for night of: 97/04/3 - 4

WBF- NF

| Site           | Low this morning (°F) | Forecast Minimum Temperature (°F) for tonight | Forecast Minimum Temperature (°F) for tomorrow night |
|----------------|-----------------------|-----------------------------------------------|------------------------------------------------------|
| 1. Callaway    | 25                    | WBF - 27                                      | BF - 31                                              |
| 2. Mt. Palomar | 30                    | BF - 31                                       | AF - 35                                              |
| 3. Los Nogales | 29                    | BF - 29                                       | NF - 32                                              |
| 4. Bell        | 31                    | BF - 31                                       | NF - 34                                              |
| 5. Kolibri     | 33                    | NF - 33                                       | AF - 36                                              |

**SYNOPSIS:** Yesterday's thunderstorms covered the streets of San Diego with hail and a tornado was reported in Murrieta. The wrap around clouds just skimmed the Area, and the clear skies allowed temperatures to go DOWN. Callaway reached 32° at 1 AM and remained below freezing until 6:15 AM. The temperature there was below 27° from 2:45 AM until 5 AM, bottoming out at 24.5°. Los Nogales and Mt. Palomar also reported minimums below 30°, 29.9° and 28.5° respectively, while Kolibri was the only probe to remain above freezing. The low there was 32.7°. While the air over the Area will begin to moderate at a fairly rapid rate, the Area is in for another cold night tonight and frost will remain a possibility through Saturday morning. Warmer and dry weather is expected for the weekend with temperatures returning to more normal values.

**FORECAST:**

**Today:** Skies will remain partly to variably cloudy into the evening and there will again be a few showers and thunderstorms around. These will be most numerous and strongest south and east of the Area, but gusty winds, small hail, and brief, but locally heavy showers can be expected in conjunction with the thunderstorms. Highs today will be in the middle 60's again and relative humidity will decrease to minimum values between 20% and 30%. Winds will be variable at 10 to 15 MPH with occasional gusts to 20 MPH.

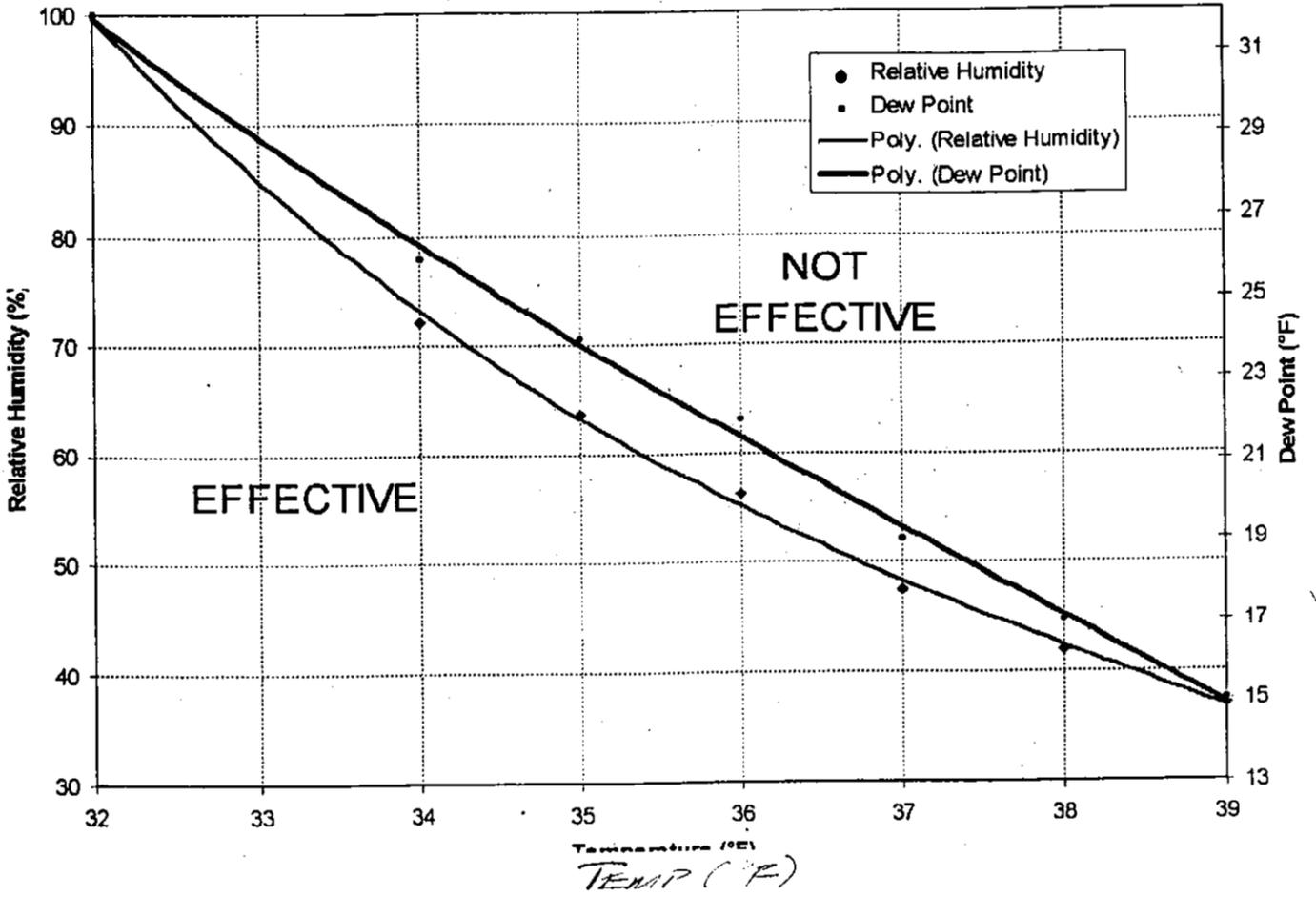
**Tonight:** Skies will become partly cloudy after sunset, clearing through the night. Temperatures will again fall into the danger zone with lows expected to range from the upper 20's in the colder locations to the lower 30's in the warmer ones. Relative humidity will recover to 75% to 90%. This indicates that spray and misting prevention measures will be effective early in the event, but of limited usefulness during the coldest hours at the colder locations. It will be necessary to initiate these procedures as soon as the Start criteria are met. Light and variable winds and a sharp radiational inversion will make wind machines effective as well.

**Tomorrow:** Skies will be mostly sunny and temperatures will begin to recover to more normal values. Highs will be in the upper 60's to near 70°. Winds will be much less of a problem.

**Tomorrow Night:** Clear skies will bring another cold night, but the rapid moderation of the airmass over the Area means they can be expected to be 3 to 5 degrees warmer. Freezing conditions should occur at only the coldest locations, but all areas will remain cold enough for at least some frost on exposed surfaces. Lows are expected to range from 31° to 36°.

**FURTHER OUTLOOK:** Saturday through Monday, April 5-7, 1997. Conditions will make a fairly rapid recovery to more normal weather. There will be increasing marine influences over the weekend which

### Evaporative Frost Suppression



TEMECULA WINEGRAPE GROWERS ASSOCIATION  
 FROST FORECASTING PROGRAM  
 MARCH EVALUATION SHEET

B-3

|                                            | CALLAWAY              | MT. PALOMAR            | LOS NOGALES            | BELL                   | KOLIBRI                | TOTALS                 |
|--------------------------------------------|-----------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
| N (DATA POINTS)                            | 16                    | 30                     | 30                     | 28                     | 31                     | 135                    |
| FROST EVENTS                               | 3                     | 5                      | 8                      | 5                      | 0                      | 21                     |
| FORECAST                                   | 2                     | 2                      | 3                      | 1                      | 0                      | 8                      |
| MISSED (MN <sup>o</sup> )                  | 1 (5.0 <sup>o</sup> ) | 3 (3.0 <sup>o</sup> )  | 5 (2.6 <sup>o</sup> )  | 4 (3.3 <sup>o</sup> )  | 0                      | 13 (3.1 <sup>o</sup> ) |
| AFTER BB                                   | 1                     | 0                      | 1                      | 1                      | 0                      | 3                      |
| NO SHOWS                                   | 0                     | 1                      | 3                      | 1                      | 0                      | 5                      |
| MN. FORECAST DEV.<br>(ALL DAYS)            | 5.4 <sup>o</sup>      | 3.1 <sup>o</sup>       | 3.6 <sup>o</sup>       | 3.6 <sup>o</sup>       | 2.5 <sup>o</sup>       | 3.4 <sup>o</sup>       |
| HIGH FORECASTS<br>(MN DEV - <sup>o</sup> ) | 7 (8.4 <sup>o</sup> ) | 13 (5.2 <sup>o</sup> ) | 14 (5.9 <sup>o</sup> ) | 15 (5.1 <sup>o</sup> ) | 16 (3.8 <sup>o</sup> ) | 65 (5.3 <sup>o</sup> ) |
| LOW FORECASTS<br>(MN DEV - <sup>o</sup> )  | 7 (4.0 <sup>o</sup> ) | 12 (2.0 <sup>o</sup> ) | 10 (2.3 <sup>o</sup> ) | 11 (2.2 <sup>o</sup> ) | 10 (1.8 <sup>o</sup> ) | 50 (2.3 <sup>o</sup> ) |
| RIGHT ON                                   | 2                     | 5                      | 6                      | 2                      | 5                      | 20                     |

B-3



**TEMECULA  
WINEGRAPE  
GROWERS  
ASSOCIATION**

**SOUTH COAST WINE GRAPE DAY**

*JANUARY 10, 1997 7:30 a.m. to 5:00 p.m.*

*Callaway Vineyards and Winery Meeting Room*

*32720 Rancho California Rd., Temecula, CA 92589*

---

**SPONSORED BY**

University of California Cooperative Extension Riverside County and Temecula Winegrape Growers Association

**HOSTED BY**

Callaway Vineyards & Winery and Temecula Winegrape Growers Association.

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**7:30 REGISTRATION\***

First Session Moderator: Ben Drake, President, Temecula Winegrowers Association.

**8:00 ECOLOGICAL SOIL, WATER & VINE CANOPY MANAGEMENT.** Dr. Bob Bugg, Sustainable Agriculture Unit, University of California, Davis.

**CIMIS BASICS AND IRRIGATION SCHEDULING.** Jim Gilmore, IPM Project & Mobil Irrigation Lab Leader, San Jacinto Basin Resource Conservation District, Hemet, California.

**HOW TO INSTRUMENT AND MONITOR YOUR SOILS TO ENHANCE RETURNS ON YOUR IRRIGATION DOLLARS.** Dr. Jewell Meyer, Coop. Extension Irrigation Specialist, emeritus; UC Riverside.

**GRAPE GROWER ORGANIZATION GOALS & OBJECTIVES:**

American Vineyard Foundation: Patrick Gleason, President.

California Association of Grape Growers: Karen Ross, President.

**10:00 BREAK AND FARM TRADE SHOW.** Product Exhibits and Information During the Break.

Second Session Moderator: Rudy Neja, Farm Advisor, Grapes; Univ. of Calif. Cooperative Extension, Riverside County.

**11:00 SOME IRRIGATION SCHEDULING CONSIDERATIONS TO OPTIMIZE RETURNS AS WELL AS CONTROL SALINITY.** Rudy Neja, Farm Advisor; University of California Cooperative Extension, Riverside County, Indio, Calif.

**GRAPEVINE NUTRIENT ASSESSMENT AND MANAGEMENT.** Dr. Mike Kilby, Cooperative Extension Tree & Vine Specialist, University of Arizona, Tucson.

**COVERCROP MANAGEMENT TECHNIQUES FOR ENHANCING NATURAL PREDATOR CONTROL OF VINEYARD PESTS; A PROGRESS REPORT.** Dr. Michael Costello, Farm Advisor, University of California Cooperative Extension, Fresno County.

Continued, next page



**CERUS**  
CONSULTING

## Temecula Cover Crop Mixes

### On Flats

|                     |                |                      |
|---------------------|----------------|----------------------|
| <u>Soil Builder</u> | Planting Rate: | 100 lb/planted acre. |
| Barley/Oats         | 40%            |                      |
| Bell Beans          | 20             |                      |
| Peas                | 20             |                      |
| Common Vetch        | 20             |                      |

|                     |                |                      |
|---------------------|----------------|----------------------|
| <u>Green Manure</u> | Planting Rate: | 100 lb/planted acre. |
| Bell Beans          | 40             |                      |
| Peas                | 40             |                      |
| Common Vetch        | 20             |                      |

### On Hills

|                        |                |                     |
|------------------------|----------------|---------------------|
| <u>No Till Clovers</u> | Planting Rate: | 25 lb/planted acre. |
| Crimson Clover         | 20             |                     |
| Hykon Rose Clover      | 30             |                     |
| Burr Medic             | 10             |                     |
| Dalkeith Subclover     | 20             |                     |
| Trikkala Subclover     | 20             |                     |

### Around Borders

Flowers, Beneficial Mixtures, or No Till Clovers.

With irrigation include: Alyssum, Poppy, Coriander, Bishop's Flower, Fennel, Yarrow, Tidy Tips, Crimson Clover, and Lupines.

P.O. BOX 479  
RICHVALE, CA 95974  
(916) 882-4292 OFFICE

# Cover Crop Selection Questionnaire

**Crop:**

Cultivar:

Rootstock:

Tillage or No-Till:

Average Precipitation:

Soil Type:

Depth:

pH:

Topography, Hilly or Flat:

Type of Irrigation:

Potential to Irrigate:

Age of Perennial Crop:

Cropping Rotation:

History of Disease:

Rodents:

Nematodes:

Winter Weeds:

Summer Weeds:

Previous Cover Crops:

Reasons for Planting a Cover Crop:

D

### Cost of Seed and Seed Mixes

| Items                                                     | lb/acre | \$/acre | Stand Life | Units Nitrogen | Soil Improvement |
|-----------------------------------------------------------|---------|---------|------------|----------------|------------------|
| Barley                                                    | 120     | 22.80   | 1 year     | 0              | ++++             |
| Oats                                                      | 100     | 18.00   | 1          | 0              | ++++             |
| Triticale                                                 | 100     | 18.00   | 1          | 0              | ++++             |
| Bell Beans                                                | 140     | 36.40   | 1          | 130            | +++              |
| Magnus Peas                                               | 60      | 27.00   | 1          | 130            | ++               |
| Common Vetch                                              | 50      | 22.50   | 1          | 130            | ++               |
| Lana Vetch                                                | 50      | 42.50   | 2-3        | 180            | ++               |
| Purple Vetch                                              | 50      | 32.50   | 2          | 180            | ++               |
| Berseem Clover                                            | 25      | 37.50   | 1          | 180            | ++               |
| Crimson Clover                                            | 25      | 43.75   | 1-2        | 120            | ++               |
| Burr Clover                                               | 20      | 40.00   | 5-10       | 80             | ++               |
| Strawberry Clover                                         | 12      | 41.28   | 15 +       | 80             | ++++             |
| N.Z. White Clover                                         | 12      | 31.56   | 15 +       | 80             | +++              |
| Broadleaf Trefoil                                         | 12      | 43.56   | 15 +       | 80             | ++++             |
| Bermudagrass                                              | 10      | 25.00   | 25 +       | - 30           | 0                |
| Creeping Red Fescue                                       | 25      | 28.25   | 10         | - 30           | +++              |
| Dwarf Ryegrass                                            | 35      | 41.65   | 10         | - 30           | +++              |
| Sheeps Fescue                                             | 20      | 81.20   | 10         | - 15           | ++               |
| Hard Fescue                                               | 20      | 67.60   | 10         | - 15           | ++               |
| <b>Mixtures</b>                                           |         |         |            |                |                  |
| <u>Organic Builder</u><br>Oats, Bell Beans, Peas<br>Vetch | 100     | 39.00   | 1          | 50             | +++++            |
| <u>All Legumé Mix</u><br>Bell Beans, Peas, Vetch          | 100     | 51.00   | 1          | 150            | +++              |
| <u>All Grass Sod</u><br>60/20/20                          | 35      | 50.75   | 10 +       | - 30           | ++++             |
| <u>Grass/Clover Sod</u><br>85/15                          | 35      | 61.25   | 10 +       | 0              | ++++             |
| <u>Non Till Clover</u><br>Crimson, Sub, Rose, Burr        | 25      | 62.50   | 5          | 50             | +++              |

D

# Grape Cover Cropping

## Current Usage

Cover Crop plantings are extensive in the wine grape regions and moderate for table grapes and raisins. The acreage of grapes under cover crops, probably 100,000 or more acres, represents the usage of all other crops combined.

Because of climates, soils, culture, and grape cultivars there are many different types of cover crops and systems. Even in the area of summer cover crops, there were several thousand acres planted last year mainly for habitat.

Clearly wine grapes represent the leading edge of cover crop research and innovations.

## Potential Usage

Despite the existing usage, vineyardists represent a continuing large market. Cover crops is considered an accepted practice and the vineyard soils frequently need improvement.

## Difficulties and Challenges

The innovations of vineyard managers have overcome most challenges. For every vineyard there is some type of cover crop that can be planted to benefit the vines and crop.

## Common Situations For Cover Cropping

- Soil Improvement
- Nitrogen Fixation
- Water Infiltration
- Beneficial Habitat
- Weed Suppression
- Erosion Control
- Winter Operations
- Dust Reduction

# Master Cover Crops List

## Grasses

|                       |                                 |
|-----------------------|---------------------------------|
| Annual Fescue         | <i>Vulpia myuros</i> L.         |
| Annual Ryegrass       | <i>Lolium multiflorum</i>       |
| Barley                | <i>Hordeum vulgare</i>          |
| Blue Wildrye          | <i>Elymus glaucus</i>           |
| California Bromegrass | <i>Bromus californicus</i>      |
| Cereal Rye            | <i>Secale cereale</i>           |
| Chewings Fescue       | <i>Festuca rubra commutata</i>  |
| Creeping Red Fescue   | <i>Festuca rubra</i>            |
| Hard Fescue           | <i>Festuca ovina duriuscula</i> |
| Idaho Fescue          | <i>Festuca idahoensis</i>       |
| Meadow Barley         | <i>Hordeum brachyanthreum</i>   |
| Oats                  | <i>Avena sativa</i>             |
| Orchardgrass          | <i>Dactylis glomerata</i>       |
| Perennial Ryegrass    | <i>Lolium perenne</i> L.        |
| Pine Bluegrass        | <i>Poa scabrella</i>            |
| Purple Needlegrass    | <i>Stipa pulchra</i>            |
| Sheep Fescue          | <i>Festuca ovina</i>            |
| Soft Chess            | <i>Bromus mollis</i>            |
| Sorghum & Sudangrass  | <i>Sorghum bicolor</i> L.       |
| Tall Fescue           | <i>Festuca arundinacea</i>      |
| Wheat                 | <i>Triticum vulgare</i>         |

## Forbs

|                |                               |
|----------------|-------------------------------|
| Buckwheat      | <i>Fagopyrum esculentum</i>   |
| Mustard/Radish | <i>Brassica</i> sp.           |
| Phacelia       | <i>Phacelia tanacetifolia</i> |
| Wildflowers    |                               |

# Slide Headings for 40 Cover Crops

## 1. Cover Crop Planning

## 2. 40 Cover Crops

## 3. The Annual Grasses

Annual Ryegrass  
Blando Bromegrass  
Zorro Fescue

Barley  
Oats  
Ryegrain, Merced  
Triticale  
Wheat

## 4. The Perennial Grasses

Bermudagrass  
Chewings Fescue  
Creeping Red Fescue  
Covar Sheep Fescue  
Native Grasses (many types)  
Turf Type Ryegrass  
Turf Type Tall Fescue

## 5. Big Seeded Legumes

Bell Beans  
Peas  
Vetch

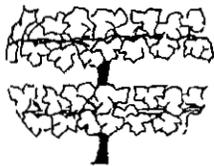
## 6. Small Seeded Legumes

Annuals

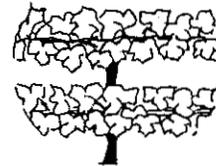
Berseem Clover  
Crimson Clover  
Medics  
Rose Clover  
Subterranean Clover  
Sweet Clover

# Slide Headings for Cover Cropping Systems

1. Cover Cropping Systems
2.                   4  
Systems Management
3. The Four Basic Systems  
Organic Matter Builder  
Nitrogen Producer  
Perennial Sod  
Reseeding Annuals
4. Organic Matter Builders
5. Nitrogen Producers
6. Perennial Sods
7. Reseeding Annuals
8. Organic Matter Builders  
Grains, Cellulose, Big Legumes  
Usually disced  
Grow during off crop season
9. Nitrogen Producers  
Big Legumes and Clovers  
Grow during off crop season  
100 to 200 units of Nitrogen
10. Perennial Sods  
Mowed in Trees and Vines  
Long lived  
Excellent for Winter traffic
11. Reseeding Annuals  
Clovers, Grasses. or Forbs  
Mowed in Trees and Vines  
Extra Management



# the vine



Volume 1, Issue 1, 2nd Quarter 1997

Temecula Winegrape Growers Association

## Pierce's Disease

by Sandy Purcell

Pierce's Disease (PD), is a lethal disease of the grapevine spread by certain types of leafhoppers known as sharpshooters. PD is restricted to the north American grape growing regions with mild or warm climates. (San Diego county had about 5000 acres planted in grapes which were almost completely lost in the 1930's, mostly to PD), First symptoms of PD are the "

(Continued on page 2)

## Grape Day '97

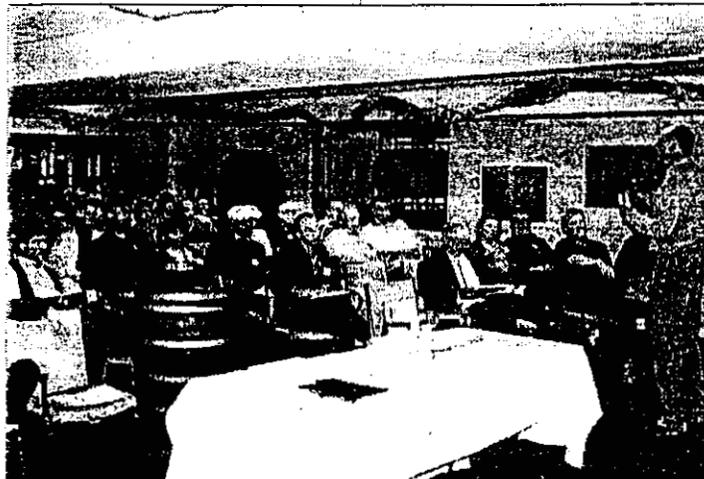
The 1997 South Coast Wine Grape Day, was held on Friday, January 10, 1997 at Callaway Vineyards and Winery on Rancho California Road in Temecula. It was organized by the Temecula Winegrape Growers Association in cooperation with the University of California Cooperative Extension. This one-day event was an educational forum, featuring in-depth seminars on the latest advances and developments in viticulture and vineyard management, as well as a trade show, featuring exhibits of new equipment and other products available to winegrape growers.

The day-long program, which was open to the public, started at 7:30 a.m. with the registration of the participants. Seminars on vineyard ecology, irrigation and soil composition for enhancement of crop yields followed. The first

session also included seminars on the control of saline irrigation residues in the

concluded at 5:00 p.m.

Approximately 85 persons, including growers, exhibitors and speakers, attended the meeting. Our feature article in this issue is an essay by Mike Costello,



Dr. Purcell from U.C. Berkeley talks about Pierce's Disease

soil, grapevine nutrients and natural vineyard pests management. The afternoon session was convened after lunch with five more seminars on vineyard management ranging from spacing and trellising, to rootstock selection, to soil pest and disease detection and control, to weed control methods. The day's program was

Fresno County farm advisor, on the influence of cover crops on leafhoppers and spiders, taken from his presentation on Grape Day 97. Synopses of some of the noteworthy presentations made at the meeting are given inside. Others will be included in future copies of The Vine.

Temecula Winegrape Growers Association  
P.O. Box 891032  
Temecula, CA 92589

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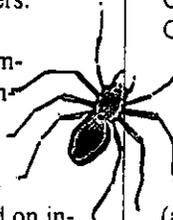
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## *Influence of Cover Crop on Leafhoppers and Spiders*

by Michael J. Costello

The management of vineyard floor vegetation, either in the form of planted cover crops or resident (weedy) vegetation, has become a popular component of integrated pest management. Some cover crops provide habitat and food resources for natural enemies. Hence, cover cropping is looked upon as a method of enhancing vineyard natural enemies and, consequently, decreasing pest populations. It has been thought for some years now that cover cropping can enhance numbers of beneficial spiders and lower the density of certain vineyard pests such as leafhoppers.

Spiders are a major component of the natural enemy complex in California vineyards, and are the dominant group of predators which feed on insects. They exist as a multi-species community, and there are usually 3 or 4 species which comprise a majority of the spiders in a given vineyard. A free publication entitled "



Spiders in the San Joaquin Valley Grape Vineyards" is available by request from your farm advisor.

Along with my colleague Dr. Kent Daane of UC Berkeley, I recently completed several years of study on the effects of vineyard floor vegetation on spiders and leafhoppers. The cover crop we used was a mixture of purple vetch and common barley, which was allowed to go to seed in early summer and was replaced by a complex of weedy grasses. These were mowed until mid-summer and compared to a clean cultivated treatment.

Our main findings were 1) Cover cropping did not increase the total number of spiders on grapevines. However, in one vineyard, the antmimic *Trachelas pacificus*, was more abundant (about seven more spiders per vine) in the months of August and September where ground cover was present; 2) The spider species complex found in the cover crop is very different from that of the

grapevines. Grapevine spiders were mainly sac spiders, antmimic spiders, cobweb weavers, jumping spiders and funnel weavers, whereas cover crop spiders were mainly wolf spiders and dwarf weavers. This means that there is probably very little movement of spiders between the cover crop and the vines. However, it is possible that mobile prey such as flies, move from cover crop to the vines and enhance the canopy spiders' diet; 3) Late season (third generation) leafhopper nymphal counts were considerably lower with cover cropping, but the effects of clovers on leafhopper parasitism was variable.

Our studies confirm the observations that maintaining a vineyard floor cover can lower leafhopper numbers. However, this does not necessarily result in a practical benefit

*(Continued on page 3)*

***"Cover cropping did not increase the numbers of spiders on grapevines...but maintaining a cover crop can lower leafhopper numbers"***

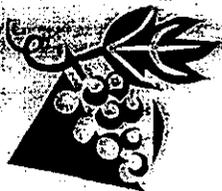
## *Pierce's Disease*

*(Continued from page 1)*

scorching" of leaves, followed by progressive drying, in days or weeks, to consume the entire vine. Grapes most sensitive to PD include Sauvignon Blanc and Chardonnay. Least sensitive are Merlot, Cabernet Sauvignon and

Sylvaner. Some control of PD is attained through insecticidal control of sharpshooters in late winter or early spring. Applications of dimethoate have been used, with some success, onto a band of vegetation approximately fifty to a

hundred feet wide along the vineyard perimeter. The presentation also included a description of the seasonal development of the Grapeleaf Skeletonizer and detailed some management guidelines for combating this dreadful pest.



# 1997 CALENDAR

| January                                                                                                                                      | February                                                                                                     | March                                                                                                                                                                                                                                                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>10. South Coast Grape Day</p> <p>27-29. Varietal Winegrape Production Course at UC Davis</p> <p>28-30. Winetech-Grapetech, Sacramento</p> | <p>18. GAWG Annual Meeting Sacramento</p> <p>19-20. Unified Wine &amp; Grape Symposium (ASEV &amp; CAWG)</p> | <p>3. Grape &amp; Fruit Tree League Annual Meeting Newport Beach</p> <p>11. TWGA, 4:00 @ Callaway</p> <p>17. Clonal Aspects of Winegrowing, UC Davis</p> <p>27. Recent Advances in Viticulture and Enology, UC Davis</p> <p>26. Central Coast Wine Industry Symposium</p> |
| April                                                                                                                                        | May                                                                                                          | June                                                                                                                                                                                                                                                                      |
| <p>8. TWGA, 4:00 @ Callaway</p> <p>12. FFA Field Day Vine Judging Contest, CSUFresno 209-278-2011</p>                                        | <p>13. TWGA, 4:00 @ Callaway</p> <p>28. Grape Insect Monitoring, UC Davis</p>                                | <p>10. TWGA, 4:00 @ Callaway</p> <p>30. ASEV Annual Meeting, San Diego, 916-753-3142</p>                                                                                                                                                                                  |
| July                                                                                                                                         | August                                                                                                       | September                                                                                                                                                                                                                                                                 |
| <p>1-2. ASEV Annual Meeting continues, San Diego, 916-753-3142</p> <p>8. TWGA, 4:00 @ Callaway</p>                                           | <p>TWGA, No Meeting This Month</p>                                                                           | <p>TWGA, No Meeting This Month</p>                                                                                                                                                                                                                                        |
| October                                                                                                                                      | November                                                                                                     | December                                                                                                                                                                                                                                                                  |
| <p>14. TWGA, 4:00 @ Callaway</p> <p>21. Annual Wine Industry Meeting, Napa 800-927-6272</p>                                                  | <p>11. TWGA, 4:00 @ Callaway</p>                                                                             | <p>9. TWGA, 4:00 @ Callaway</p> <p>(Note: Grapeday '98 is on March 13, 1998)</p>                                                                                                                                                                                          |

## Cover Crops

(Continued from page 2)

from covers. In only one of the three years in this study did the presence of cover lower leafhopper numbers below what could be considered a tolerance level (less than 15 nymphs per leaf) compared to no cover. In addition, there was some evidence in our studies that com-

petition from the cover crop decreased vine vigor, which may have made these vines less suitable hosts for leafhoppers and increased their mortality. Spiders are an important part of the vineyard ecosystem, but cover crops are not a requisite for a healthy vineyard population; cutting back on the use of

broad spectrum insecticides probably does a lot more to conserve their numbers. And while occasionally we find a spider species, such as *Trachelas*, which appears to be encouraged by the presence of covers, we do not know the full impact of such spiders on leafhoppers or any other pest.

## Latinos and Wine

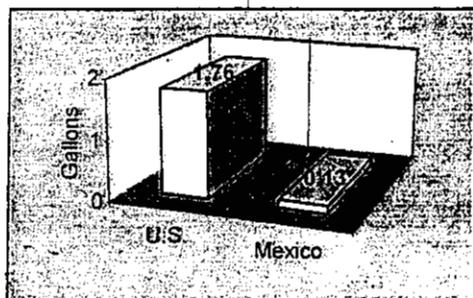
From *Wine Business Monthly*

Latinos comprise the fastest-growing segment of the American consumer market; however, this community, according to *Wine Business Monthly*, drinks little wine and is largely absent from wine

industry calculations. Leaving Latinos to the beer, spirits and soda makers means consigning wine to an even narrower niche of the beverage industry. Latinos in the U.S. are said to retain wine drinking habits born in their native countries. Data put wine consumption in Mexico at 0.13 gallon per capita, compared with about two gallons for Americans. Also, fewer than 11% of Latinos in the U.S. have drunk wine in the past 30 days, compared to 24% of the

total population.. Experts differ on the best method to reach the Latino community. John Gillespie, director of the Wine Market Council, said his time is better spent focusing on the 37 million middle class Americans who drink some wine and might be persuaded to drink more. But according to David Hayes-Bautista, a UCLA marketing researcher,

wineries should work harder to single out Latinos for a specific marketing appeal. "Clearly, that's where the sweet spot for California industry lies, whether you make wine, tires or automobiles," he said. "If you sell BMWs in California you better well figure out how to reach Latinos. You just have to put away the blinders and stop thinking of Latinos as impoverished farm workers, or you're going to miss the market."



Annual Per Capita Wine Consumption in Two Nations



### U.C. Davis Offers a Course on Grape Insect Monitoring

A one-day course, intended for winegrape growers, is being offered by U.C. Davis on May 28, 1997. It will focus on monitoring and identifying leafhoppers, mites, and major beneficial insects generally found in California vineyards. The class combines lecture and slides with identification exercises using microscopes and hand-lenses. Instructors will include Mike Costello, a speaker at our Grape Day '97, and Donna Hirschfeld, also a speaker at a previous TWGA Grape Day. For additional information regarding this course call (800) 752-0881.

## Coastal California Appellation

Ben Drake reported in November on a meeting he had attended that month at Andy Beckstoffer's office in Napa concerning the proposed Coastal California Appellation. The idea, apparently advanced by Kendall-Jackson, is to combine the current four contiguous Coast appellations (North, Central, South, and Sonoma)

into a single appellation. It would comprise a strip along the California coast from



North to San Diego and include Temecula, but not Cucamonga Valley. It is expected that the proposal

would be submitted to BATF in 3 to 4 months. This would be followed by a comment period and a review by BATF staff. Final ruling is estimated to require about a year. The appellation, if approved, could prove very beneficial to TWGA members in marketing their grapes.

## Grape Day '97

### *Spacing/Trellising Trends and Rootstock Selection*

UC Davis professor Andy Walker gave a most informative talk on vineyard spacing and trellising for high productivity per acre coupled with high quality. The discussion included canopy management, soil types and factors involving vine vigor. Both low and high vigor sites were matched with appropriate trellis types. The presentation also included rootstock selection to match the stock vigor to the site, trellis and fruit ex-

pectations, as well as a review of rootstock breeding at UCD, new rootstocks, evaluation systems and pest resistance.



*A Full Day of Presentations*



*Grape Day Lunch at Callaway*

### *Vineyard Irrigation Scheduling*

*Jim Gilmore, our Sporecast Project manager and the Mobile Irrigation Lab manager at the San Jacinto Basin Resource Conservation District, gave a very useful presentation on vineyard irrigation scheduling utilizing the weather data supplied daily to farmers by the California Irrigation Management Information System (CIMIS) via computer or telephone.*

*Jim explained the usage of evapotranspiration and grape crop coefficients and presented a simplified method to compute irrigation schedules based on "bucket capacity" to improve distribution uniformity and irrigation efficiency.*

*For a copy of Jim's very useful presentation materials, and also to learn how to get CIMIS information daily, please contact him at (909) 654-7733, or drop a line to this newsletter.*

## *We are Now Incorporated*

Attorney Tom Huntington has informed us that the Temecula Winegrape Growers Association (TWGA) has officially been incorporated as a non-profit mutual fund corporation under the laws of the State of California, as of December 2,

1996.

The specific purpose for which this corporation is organized is to promote the growing of quality winegrapes in the Temecula Valley area of Riverside County, California, through education, forums, research, encourag-

ing technological advances, acting as clearinghouse with buyers of premium winegrapes, and enhancing the awareness and recognition of the Temecula Valley.



## From the Internet

**Vineyard:** Bardet Vineyards

**Location:**

Bordeaux, France

**Owner/Manager:**

Philippe Bardet

**Background:**

After graduating with a degree in viti-enology, Mr. Bardet began working on the family farm of approximately 100 acres, of which 19 acres were planted to vines. Bardet Vineyards now encompass about 230 acres, of which one half is

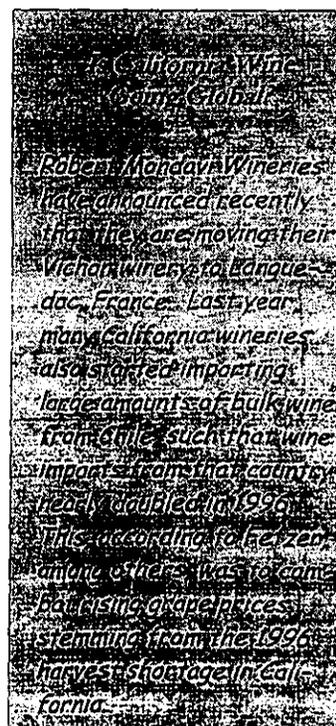
*"the farming methods are aimed primarily at improving the quality of the soil"*

family owned. The vineyards are divided in over 100 lots, varying in size from 0.5 to 90 acres.

**Farming Techniques:** The farming methods employed

by Bardet Vineyards are aimed primarily at improving the quality of the soil while at the same time being compatible with the environment. Complete soil analyses are made before each planting, with samples taken at different depths. This is repeated every five years. Petiole analyses are also conducted periodically. In addition, the set of tests include aerial and ground observations of each lot. Data obtained from the tests are then used to allocate the exact amounts of nitrogen, phosphorous, potassium and magnesium needed by the vines. Special attention is paid to avoid interactions between potassium and magnesium in the fertilizer. Organic materials are regularly added by the inclusion of the "marc" as a composting agent for clay-limestone type soils, whose pH is lowered by the acidity of such a compost. Composted

mushrooms are added to sandy or gravelly soils which are naturally more acid. This measured application of fertilizers helps maintain a healthy equilibrium in the soil and consequently in the vines.



## San Diego Wineries in Search of Grape Growers

John Culbertson, president of the newly-formed San Diego Vintners Association, told the California, Arizona Press that San Diego County wineries need grapes that are grown there. Currently most of the 94 acres planted in grapes in that county are

used for landscaping around the wineries. The vintners also want the grapes so as to gain a county wine appellation. They want to provide a locally grown product and say so on the label to satisfy the large local wine drinking clientele. How-

ever, vintners cannot apply for an appellation unless 50 percent or more of the grapes used in a wine are from the area. This is an impossibility at the present time.

## From the Grape Grower's Kitchen

### Stuffed Grape Leaves

Collect 40 to 60 leaves, preferably in the spring when the leaves are nice and tender, or you may also use preserved grape leaves. The ingredients listed below are for a vegetarian recipe but you can add ground lamb if you prefer. You may also add pine nuts and raisins for additional flavor.

- 1 cup uncooked basmati brown or traditional white rice
- 2 large tomatoes, chopped
- 1 medium onion, chopped
- 1/4 cup chopped parsley
- 1 Tablespoon vegetable oil
- Juice of 1 lemon
- 1/2 teaspoon salt
- 1/4 teaspoon pepper
- 1/4 teaspoon allspice
- 1 cup tomato sauce
- 2 cups water
- Round sliced carrots, frozen or fresh (enough to cover the bottom of a 3 quart

pot, approximately 15-carrot slices, depending on their size)

ix all ingredients except grape leaves, tomato sauce, water, and carrots in a bowl. Place grape leaves with the rough side up, one at a time, on a large flat plate. Be sure that the pointy parts of the leaf are directed away from you and the flatter edges and stem are towards you. Place one teaspoon of the mixture on the bottom of the leaf, near the stem, and arrange it lengthwise using your fingers. First roll the flat edges near the stem upwards and tuck them slightly under the filling. Then applying pressure to keep the leaves rolled tightly, tuck one side at a time of the two parts of the leaf pointing outwards. Now, roll the rest of the way upwards, still applying pressure to keep the leaf tight.

Cook sliced carrots in water until tender. Cover the bottom layer of a large pot with these carrots. Begin layering the stuffed leaves above the carrots and be sure that they are packed tightly together; otherwise they may fall apart during cooking. Each layer of leaves should be in varying directions across the pot. Pour the tomato sauce and water over the leaves and bring the sauce to a boil. Reduce heat to medium, and place a flat plate (glass or stoneware) upside down over the top layer of leaves, and press down as hard as you can. Leave the plate in place during cooking. Cover the pot with its cover as well, and cook for 40-45 minutes. Check one leaf to see if rice has cooked fully. Serve warm.

Total Calories Per Stuffed Grape Leaf : 27  
Fat: 1 gram

### Classified Ads

The Vine offers classified ads as a service to its readers. Grapes, equipment, real estate, services and job positions will be included. Cost per ad on a single issue will be as follows:

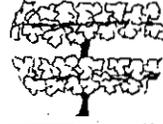
TWGA Members: 3 lines free, additional lines \$3 each.  
Other Readers: \$5 per line.

### Frost Project

Jim Gilmore has contracted with Global Weather Connection to provide weather forecasting and frost warnings to TWGA members by fax. Temperature data from the five Adcom stations in Temecula vineyards is being used for this project. Members who signed up are already receiving daily forecasts by fax. Codes can be sent to members' pagers alerting them to check their fax machines when an unscheduled forecast is sent. To sign up fax Jim Gilmore at 654-3157.



# the vine



Postage

Temecula Winegrape Growers Association  
P. O. Box 891032  
Temecula, CA 92589

(Address label)

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## from the vineyard

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This newsletter should be more than an entertaining read. It should serve as a forum for TWGA members to share their opinions and their concerns. It can also serve as a vehicle to advertise the availability of grapes, vineyards, equipment or other property for sale or wanted.

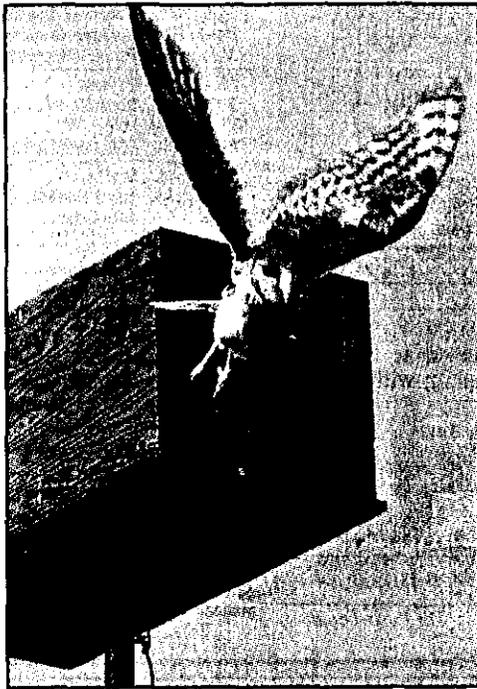
The first issue of the newsletter cannot meet these requirements as the members did not know of its existence. However, we were lucky to have all the good material that was presented on Grape Day '97 for use in this issue and we are thankful to the UC Extension professors and other experts who made presentations for the wealth of experience that they shared with us.

I would like to add a word about Grape Day. If we would like to be known for quality grapes, we should strive to have a good quality Grape Day.

We should plan in advance to get the best possible presentations, rather than the repeatedly warmed over material some presenters would like to get away with. We should have excellent exhibits and workshops for training with the latest equipment. And last, but not least, we need to be able to announce the event well in advance, so that the industry and other publications can include us in their calendars. Fortunately, Ben Drake has decided to form a TWGA committee to do just that.

It was gratifying to overhear a very well respected UC professor talk about another (large) wine producing region in California, saying that it produces good wine but nothing compared to Temecula fine wines. That remark made my day.

*Alex Yakut*



*Wineries in the Inland Empire are letting Mother Nature help them control nasty insects and rodents.*

# Natural-born killers

By Jeff Crider  
The Press-Enterprise

**A** few years ago, the rolling hills surrounding Callaway Vineyard & Winery in Temecula were haunted by a voracious insect with a frightening name: the grapeleaf skeletonizer.

The tiny black, yellow and purple-striped insect attacks plants in large numbers, like piranhas, chewing up all of the foliage, leaving behind only the skeleton of the plant.

And while they don't necessarily attack humans, their bodies are covered with tiny spines that sting like nettles if you happen to touch them.

But instead of bringing in truckloads of man-made pesticides, Callaway fought off

the skeletonizer with weapons from nature's arsenal, in this case, parasitic flies, provided courtesy of the University of California, Riverside.

Craig Weaver, Callaway's vineyard manager, said the flies were so effective against the skeletonizer that it hasn't been a serious threat to its vineyards since 1991.

Further north, in the Cucamonga Valley, Joseph Filippi Winery is controlling its leaf-eating grasshopper population with a naturally occurring disease called *Nosema locustae*, which it ordered out of a catalog.

Nick Karavidas, Filippi's winemaker, said the disease works like a charm, controlling not only the immediate generation of grasshoppers, but its offspring as well, leaving them too lethargic to do much damage to the vineyards.

Please see **CLOSER LOOK, E-3**



Thomas Kelsey / The Press-Enterprise

A roost high above the vines at Callaway Vineyard in Temecula is home to a red-tailed hawk by day and an owl by night (top photo) as part of the winery's predator control.

## notepad

### California crush down slightly

California's vintners crushed 2.17 million tons of wine grapes in 1996, or about 2 percent less than the 1995 tonnage, according to a preliminary grape crush report by the state Department of Food and Agriculture.

California's wine grape crush has averaged about 2.2 million tons annually for the past three years.

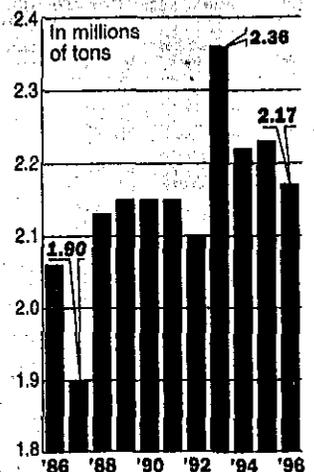
Despite the slightly lower crop yields, chardonnay and merlot posted significant gains in volume among the major grape varieties, according to the Wine Institute, a San Francisco-based industry association.

Chardonnay, the predominant grape variety in the Temecula Valley, totaled 309,457 tons in 1996, an 8 percent gain from a year earlier.

Merlot tonnage increased 41 percent to 103,899 tons, continuing a five-year growth pattern.

The varieties that experienced declines in 1996 included cabernet

### California wine grape crush



Source: State Dept. of Food and Agriculture

sauvignon, with tonnage falling 12 percent to 158,625 tons; French colombar, down 12 percent to 58,303 tons; and zinfandel, which fell 8 percent to 299,789 tons.

### Appellation application

The South Coast Varietal Alliance, a newly formed association consisting of three Temecula wineries — Hart Winery, Mount Palomar Winery and Thornton Winery —

Please see **NOTEPAD, E-3**

Continued from E-1

Across Riverside and San Bernardino counties, wine grape growers are increasingly moving away from pesticides and marshaling the forces of nature to do battle against a wide range of insects and rodents that devour everything from the roots of the vines to the sweet, succulent fruit that keeps area wineries in business.

"It's biological warfare," said Weaver of Callaway. "We're using what the good Lord gave us to fight off these things."

And nature's arsenal has a natural predator for just about everything.

Weaver recalls that in the old days, Callaway used to control gophers with traps and strychnine. But just keeping up with the traps each day can be pretty labor-intensive, he said. And what about mice, rats, squirrels and rabbits?

## notepad

Continued from E-1

plans to petition the federal Bureau of Alcohol, Tobacco and Firearms to broaden the South Coast appellation to include the Cucamonga Valley.

Appellations are geographic designations that appear on wine labels, indicating the origin of the grapes used in the wine.

Peter Poole, general manager of Mount Palomar Winery, said a broadening of the South Coast appellation is needed because grapes in the Cucamonga Valley area are often used in wines made by Temecula wineries, which themselves fall within the South Coast appellation. The Cucamonga Valley is also affected by coastal weather patterns.

Poole said broadening the South Coast appellation would do nothing to change existing Temecula, Cucamonga Valley or San Pasqual Valley appellations, but would help wine buyers outside the Southern California area have a better idea of where grapes used in South Coast wines are coming from.

Callaway found a natural way to control these rodents by luring owls and redtailed hawks to its vineyards with roosting boxes and perches. These accommodations not only give the birds a place to rest, but a terrific view of the vineyards and any rodents that happen to be in the area.

Filippi uses hawks and owls, too, though most of its birds roost in the eucalyptus trees that were planted in the area as windbreaks many years ago.

Wine grape growers and winery operators say their use of nature's weapons against crop-damaging insects and rodents will only increase as time goes on.

"I think that the nation, if not the world, is becoming more organically sensitive," said Mike Rennie, who oversees 300 acres of vineyards as owner and partner of Stage Ranch Farm Management in Temecula.

"Not only are the wineries asking for things that are pesticide-free," he said. "But as farmers, we're having to look for alternatives."

Rennie uses the herbicide Round Up to control grasses in his vineyards, but he limits his applications to 12 inches on either side of each grapevine. That way, he said, grasses can grow between the rows of grapevines, creating a habitat for beneficial insects.

Mount Palomar Winery in Temecula also recognizes the need to move away from pesticides whenever possible, said vineyard manager Vidal Perez.

This year, he said, the winery is experimenting with organic grapes on a seven-acre block. That means using dairy compost manure and green waste compost instead of chemical fertilizers and only using organically approved pesticides, such as sulphur, which is applied to control mildew on the

leaves.

"I think the consumer is concerned about pesticides in any food and there's an increasing demand for organically grown foods," Perez said. "We think there is a market out there" for organically grown wine grapes.

Growers say they like to avoid using pesticides whenever possible because pesticides kill beneficial insects as well as the ones they would like to keep. Still, using nature's weapons is not without its costs because there has to be a certain number of detrimental insects or rodents in a vineyard to keep the beneficial predators around.

"You have to be able to tolerate some damage," Weaver said.

A little noise, too.

In the summertime, when the grapes reach their full sweetness, sparrows, linnets and blackbirds like to cruise into Temecula's wine country to feast on the fruit. Weaver, however, will be waiting for them, armed with propane cannons that make intermittent blasting sounds that can make the area sound like a battleground between the Hatfields and the McCoys.

"It makes it appear to birds that someone is shooting at them," Weaver said. "But we're not."