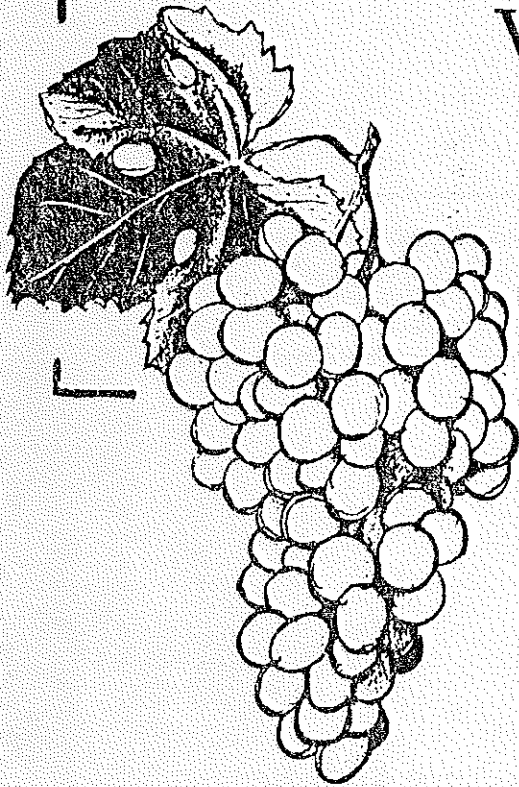


UNIVERSITY OF CALIFORNIA
COOPERATIVE EXTENSION



VITICULTURE

RESEARCH REPORT

1989

SAN JOAQUIN COUNTY

Funded through contributions made by the
members of the Lodi District Growers Association
to the Lodi Grape Growers Research Fund

This progress report is for your information.
It is not a recommendation and is not for publication.
A final report will be submitted upon completion
of each project for general distribution .

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Special Thanks to:

The Lodi District Grape Growers Association and
the many cooperators.

**Viticulture Research Report
1989
San Joaquin County - Lodi District**

The first year of research sponsored by the Lodi District Grape Growers Association (LDGGA) has been a big step forward for both local industry and the University research program at the county level. The voluntary support for this first year of funding has been encouraging and strong, with respect to individual cooperators and the LDGGA as a whole.

Research at the local level will become increasingly important as producing areas continue to specialize in varieties, wine types and production goals, while maintaining economical production. Even with this specialization, each area's needs should and can benefit from a connection to statewide research. A funding program as provided by the LDGGA helps in both local projects of interest and by encouraging more statewide projects locally, in cooperation with the faculty of U.C. Davis. The hope is that support for a district funding program will not only continue, but increase when expansion is needed into any aspect of viticulture/enology.

Many of the projects just initiated will have minimal data for the current report, but will be presented as information is developed. Currently there are 12 funded projects. I look forward to continuing this report on an annual basis until projects are completed and as the funding program continues for the Lodi District and San Joaquin County.

Paul S. Verdegaal
Viticulture Advisor, San Joaquin County

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Project: 89-01 Chardonnay Conal Evaluation Trial

Objective: To evaluate the growth, yield and quality difference, if any, of some of the available Chardonnay clones from the Foundation Plant Materials Service (FPMS), U.C. Davis selection. Chardonnay will continue to become an increasingly important white wine variety for the Lodi area. Any differences currently known about the clones are site specific and based on anecdotal experience. Local growers will need to know which clone, if any, will suit their vineyard and marketing needs.

Cooperator: Vino Farms, J. Ledbetter

Methods: Seven clonal selections of Chardonnay will be included in this trial. The FPMS selections to be evaluated are from different sources and have varying times of heat treatment. The clones are numbered: 4, 5, 6, 13, 14, 15, and 16. The trial will have 5 replications with 8 vines per plot, for a total of 40 vines per treatment (clone). This will total 280 vines for the trial. Clones 4 through 14 are from selections made by Harold Olmo, Professor Emeritus, U.C. Davis.

The vineyard is spaced 6 x 10' and trained to a bilateral cordon on a vertical trellis with 24" cross-arms. The vineyard is on Freedom rootstock and is drip irrigated. Last fall the vineyard was budded to Chardonnay clone number 3. Although this clone will not be directly included in the replicated portion of the trial, it will be evaluated on an observational basis for comparison.

The trial is still in the process of establishment and it will be another two years before pruning and harvest data are available. In the interim, observations will be made on vine growth, etc.

Chardonnay	4	Olmo selection 66 with heat treatment
	5	Olmo selection 69 also with heat treatment
	6	Olmo selection 68 with the greatest single heat treatment
	13	Olmo selection 68 with 2 heat treatments
	14	Olmo selection 65 with heat treatment
	15	From Washington state collection without heat treatment
	16	From Australian collection with minimal heat treatment
	3	Believed from the Livermore Valley

The various Chardonnay clones have shown some difference under field conditions, but have not been compared directly, at least in Lodi.

During the course of their growth and development, these clones will be evaluated for any differences in phenology, vigor, yield and juice composition. Data to be evaluated would include pruning weight, budbreak, bloom date, veraison, yield, cluster number, cluster weight and berry weight. At harvest, juice analysis would include: brix, total acids (T.A.), pH and possibly malic acid and potassium levels. Future goals also include wine lots run either at U.C. Davis or done locally.

Project: 89-02 Zinfandel Clonal Evaluation Trial

Objective To evaluate the growth, yield and quality difference, if any, of the available Zinfandel clones from the FPMS selection. Zinfandel has been and will continue to be an important red wine variety for the Lodi area. It will be important to have available the information on the best selections for quality and economic production.

Cooperator: L. Thompson and C. Thompson

Methods: Five clonal selections of Zinfandel and one of Primitivo (believed to be a possible Zinfandel source) are included in this trial. The trial has 6 replications with 7 vines per plot, for a total of 421 vine per treatment (clone). This will total 252 vines for the trial.

The vineyard is spaced 7 x 11' and trained to a bilateral cordon on a vertical trellis with cross-arms. The soil is a sandy loam and is drip irrigated.

Last fall the field was budded to a field selection from the Costamagna vineyard. This selection, although not a true clone, is included in the treatments along with FPMS clones 1A, 2, 3, 6, and Primitivo clone number 3. Clones numbers 1A, 2, and 6 are originally from Lodi vineyard selections, and number 3 from the Livermore Valley. These selections were made in the late 1950's by University staff. The Primitivo clone is from FPMS and is an imported selection. It is believed to be related to the Zinfandel clones that arrived in California just after the gold rush and may be a direct ancestor. The field selection of the Costamagna vineyard has been used by several growers in the area as a preferred budwood source and will be compared to the available clones. These treatments were budded this Spring. All clones are grafted on the field rootstock, Freedom.

Data to be evaluated will include pruning weight, budbreak, bloom date, veraison, yield, cluster number, cluster weight and berry weight. At harvest, juice analysis would include: brix, total acidity, pH, and possibly malic acid and potassium levels. Wine lots would be run either at U.C. Davis or done locally.

Zinfandel clones to be evaluated:

1A	Lodi	No heat treatment
2	Lodi	No heat treatment
3	Livermore	No heat treatment
6	Lodi	With heat treatment
Primitivo 3	Italy	With heat treatment

Project: 89-03 Cabernet Sauvignon Clonal Evaluation

Objective Evaluate and determine any differences in yield, quality, and growth among several commercially available clones.

Method: This trial was established by A.N. Kasimatis and Jim Kissler in 1985, with the cooperation of S. Lange and the Robert Mondavi Winery Lodi-Woodbridge. The seven clones are: FPMS numbers 2, 4, 5, 6, 8, 10, and 21. Each clone is replicated three times with 10-11 vines in each plot. This makes a total of 231 vines in the trial.

The vineyard is spaced 7 x 11' trained to a bilateral cordon with a two wire vertical trellis. The soil is sandy loam and relatively deep.

The trial has yielded two harvests to date, and data is being collected on pruning weight and growth habits.

Currently in San Joaquin County and statewide, there is a great deal of interest in Cabernet Sauvignon. Of the available clones, often numbers 7 and 8 are selected from limited information and a lot of intuition. In this trial the clone sources are:

	<u>Source</u>
FPMS 2	Oakville
4	Argentina
5	Argentina
6	Jackson, CA
8	Livermore
10	Germany
21	Chile

1987

Clone	Yield Vine/lbs	Cluster/ Vine	Cluster Wt/lbs	Brix	pH	%TA	Berry Wt/g	Pruning Wt/lbs
10	15.0 a	75 a	0.20 a	21.1 a	3.43 a	0.83 a	0.94 a	5.0 a
8	13.1 ab	63 ab	0.22 a	22.2 a	3.48 a	0.76 a	1.00 a	4.5 a
21	12.2 ab	64 ab	0.19 a	22.0 a	3.49 a	0.79 a	0.95 a	5.3 a
2	9.7 abc	62 ab	0.16 a	22.8 a	3.55 a	0.74 a	0.95 a	6.1 a
4	9.3 abc	53 b	0.17 a	22.8 a	3.58 a	0.77 a	0.94 a	4.5 a
5	8.4 bc	51 b	0.16 a	23.6 a	3.60 a	0.78 a	0.82 a	5.2 a
6	7.5 c	58 b	0.13 a	22.7 a	3.57 a	0.73 a	0.92 a	5.9 a

1988

Clone	Yield Vine/lbs	Cluster/ Vine	Cluster Wt/lbs	Brix	pH	%TA	Berry Wt/g	Pruning Wt/lbs
10	19.4 a	101 a	0.19 a	24.6 a	4.44 c	0.92 a	0.84 a	6.19 c
8	18.6 ab	92 ab	0.20 a	24.5 a	3.47 c	0.87 a	0.89 a	5.92 c
21	18.1 ab	92 ab	0.20 a	24.0 a	3.49 abc	0.93 a	0.87 a	7.04 bc
4	15.8 bc	77 c	0.20 a	24.7 a	3.50 abc	0.94 a	0.87 a	6.55 bc
2	15.0 c	94 ab	0.16 b	25.0 a	3.48 bc	0.90 a	0.85 a	7.68 ab
5	14.1 c	90 abc	0.16 b	25.4 a	3.57 a	0.91 a	0.77 a	7.21 abc
6	10.2 d	86 bc	0.12 c	25.3 a	3.56 ab	0.90 a	0.77 a	8.45 a

Project: 89-04 VR-Hybrid Rootstock Trials

Objective: Determine the effect of various rootstocks on yield, quality and growth characteristics of Zinfandel. Also, it will be important to learn about their relative effectiveness on soil pests for this area.

Cooperator: M. Shimosaki, Stanton Lange

Methods: Zinfandel Trial

A trial consisting of four rootstocks, including two standard stocks and two vinifera x rotundifolia (VR) hybrids: Freedom, Harmony, 039-16 and 043-43. The scion cultivar is FPMS clone number 6 of Zinfandel.

The trial has five replications for each treatment. Each replication has 6 vines, for a total of 30 vines per treatment (rootstock). This makes a total of 150 vines. The vineyard is spaced 8 x 10' and will be head trained.

This is a previous vineyard site with both dagger nematode (X.Index) and phylloxera present.

Last year the VR hybrids were planted as benchgrafts (100% take), while the other two stocks were planted as rootings. This spring the Freedom and Harmony rootings were chip-budded. Missing vines will be replaced with dormant benchgrafts.

As growth continues, the vines will be monitored for characteristics such as budbreak, pruning weight, bloom date, veraison, yield, cluster weight, cluster number, berry weight, and juice composition (Brix, total acidity, pH, if possible, malic acid and potassium will be measured). Currently there is no plan to make wine samples, but this would be desirable, future funding permitting.

The project length will be for a minimum of five to seven years 1988-93 (or longer).

The VR hybrid rootstock vines have grown very strong. The Harmony rootstock itself began growth 7-10 days earlier than the Freedom, before they were topped to encourage scion bud growth. Over the season, both seemed to grow equally by observation.

Comparison of the rootstock will help provide data for rootstock selections in the future. Currently from the experiment station trials at Parlier by Mike McKenry, there are indications that Freedom has resistance to dagger nematode equal to the new VR hybrid, but long term field resistance to fanleaf virus (spread by the dagger nematode) is still unique to the VR hybrid.

Cabernet Sauvignon Trial

In addition to the VR rootstock trial, there is an ongoing rootstock trial with eight rootstocks on Cabernet Sauvignon. This trial is to determine the performance of several rootstocks, including the VR hybrids with respect to fanleaf virus and its vector the dagger nematode (X. index).

The project was established in 1985 by Goheen, Lider, and Jim Kissler. Jim Wolpert is continuing the research with the cooperation of Stanton Lange.

Vines are spaced 7 x 11' on a two wire vertical trellis and drip irrigated. The results for the first and second harvest are: See attached chart.

S04 and St. George dropped off in production ranking, while Salt Creek ranked higher than the year before in comparison to the other stocks. The VR hybrids increased in their ranking, but are behind in vine size and age.

These are initial results. Progress of the fanleaf virus and its effects on yield quality, etc. need to be monitored several more years.

VR ROOTSTOCK TRIAL: CABERNET SAUVIGNON

1988

<u>Rootstock</u>	<u>Yield/ vine/lbs</u>	<u>Cluster/ Vine</u>	<u>Cluster Weight/lbs</u>	<u>Brix</u>	<u>pH</u>	<u>%TA</u>	<u>Berry Wt/g</u>	<u>Pruning Wt/lbs</u>
SO4	12.7 a	67 a	0.18 a	22.9 a	3.61 b	0.83 a	1.02 a	2.4 b
St. George	13.2 a	72 a	0.18 a	23.2 a	3.62 b	0.80 a	1.03 a	4.1 bc
Harmony	14.2 a	67 a	0.21 a	22.9 a	3.61 b	0.88 a	1.04 a	5.3 b
Salt Creek	14.3 a	67 a	0.21 a	22.5 a	3.56 b	0.86 a	1.04 a	4.6 b
043-43	14.3 a	71 a	0.20 a	22.4 a	3.60 b	0.82 a	.99 a	3.1 cd
171-6	8.3 b	52 b	0.16 b	23.3 a	3.68 a	0.80 a	.99 a	7.1 a
039-16	--	--	--	--	--	--	--	2.8

1989

<u>Rootstock</u>	<u>Yield/ vine/lbs</u>	<u>Cluster/ Vine</u>	<u>Cluster Weight/lbs</u>	<u>Brix</u>	<u>pH</u>	<u>%TA</u>	<u>Berry Wt/g</u>
Salt Creek	34.5 ab	144 a	0.24 ab	22.4 ab	3.73 bc	0.60 ab	1.04 a
043-43	32.4 bc	139 a	0.23 b	21.9 b	3.76 bc	0.67 a	0.99 a
Harmony	35.8 a	138 a	0.26 a	23.2 a	3.86 a	0.67 a	1.03 a
039-16*	28.8 c	135 ab	0.21 b	21.1 c	3.68 c	0.66 a	0.44 a
171-6	27.2 c	127 ab	0.21 b	23.6 a	3.93 a	0.68 ab	1.04 a
SO4	28.9 bc	122 b	0.24 ab	23.1 a	3.78 abc	0.63 ab	0.98 a
St. George	27.7 c	122 b	0.23 b	23.3 a	3.81 ab	0.55 b	0.96 a

*first crop year

Project: 89-05 Pruning Levels and Leaf Removal Effects on Cabernet Sauvignon

Objective: To determine the effects of leaf removal and pruning level in order to obtain quality fruit at an acceptable yield in the Lodi area

Cooperator: R. Lange and B. Lange, Lange Twins Vineyard Management Company

Methods: This trial was established in 1988 to compare standard two-bud spur pruning versus three-bud spur pruning, both with and without leaf removal, and also to compare these to simulated machine hedging (in place of hand pruning). The five treatments are replicated five times with six vines per treatment. This totals 30 vines per treatment; 150 vines for the complete trial.

The vineyard is Cabernet Sauvignon on Freedom rootstock. The vines are spaced 7 x 10' and trained on a vertical trellis, furrow irrigation is used and the vines are of moderate vigor.

Leaf removal has been shown to have beneficial effects for vigorous Sauvignon blanc and for Chardonnay to reduce disease (bunch rot), while improving quality. Initial data on this trial shows some differences from wine lots that have been evaluated by an informal tasting panel.

Managing crop load and using canopy management on the "new" varieties for the Lodi area is of concern to both growers and wineries. There were differences in some cases, but most were not statistically significant

Increasing bud numbers did increase yields, but only slightly. Machine hedged vines yielded much more in the first year and this showed in the reduced sugar levels. Wine lots made from this trial were different in the informal taste tests. Leaf removal wines did taste different and better. Machine hedged vines tasted very different.

The trial will continue to evaluate any significant and consistent differences in vigor, yield, fruit quality, and resulting wines.

This trial is being evaluated with the cooperation of Robert Mondavi Winery in Woodbridge.

See attached chart for initial results for 1988 and 1989.

1988

Treatment	Yield lbs/vine	Clusters	Cluster wt	Berry wt	Brix	pH	% TA	Malate ppm
2 bud	23.13	b 109	c 0.21	a 0.87	a 22.0	b 3.39	a 0.88	a 1762
2 bud leaf removal	23.23	b 110	c 0.21	a 0.86	a 22.2	ab 3.42	a 0.93	a 1564
3 bud	25.54	ab 141	b 0.18	b 0.85	a 22.0	b 3.41	a 0.87	a 1552
3 bud leaf removal	22.80	b 138	b 0.17	b 0.83	a 22.6	a 3.37	a 0.87	a 1082
Machine Hedge	28.56	a 230	a 0.12	c 0.63	b 21.4	c 3.24	b 0.63	b 1052

1989

2 bud	25.29	b 102	b 0.24	a	21.5	a 3.52	a 0.52	b --
2 bud leaf removal	26.12	b 107	b 0.24	a	21.1	a 3.40	b 0.54	ab --
3 bud	26.45	b 119	b 0.22	a	21.1	a 3.47	ab 0.55	ab --
3 bud leaf removal	22.91	b 111	b 0.21	a	21.4	a 3.40	b 0.57	a --
Machine hedge*	35.63	a 233	a 0.15	b	19.4	b 3.41	b 0.57	a --

* Harvested after rains

Project: 89-06 Leaf Removal vs Shoot Thinning for Quality and Disease Control

Objective: To determine benefits of shoot thinning as an alternative to leaf removal for improved fruit quality and/or disease control.

Cooperator: J. Cotta, Las Vinas Winery; R. Lange and B. Lange, Lange Twins Vineyards; Lodi Farming; and M.A.C. Vineyard

Methods: Two trials were established in Zinfandel, and an additional trial with Cabernet Sauvignon. Immediately adjacent to the Lodi district a fourth trial was also in progress on Chenin blanc.

Both Zinfandel and the Chenin blanc trials consisted of three treatments: Leaf Removal, Shoot Thinning, and a Control Check. Each was replicated 6 times with 8 vines per plot, for a total of 144 vines in each trial. The Cabernet Sauvignon trial consists of four treatments, but won't consider bunch rot. In this case, the quality and yield effects only will be evaluated.

There is no question as to the disease benefits of leaf removal, but this is more expensive than shoot thinning. The Zinfandel and Chenin blanc trials demonstrated the effectiveness of leaf removal over shoot thinning, although shoot thinning did reduce rot problems compared to the control.

The 1989 harvest was the first year for the Cabernet Sauvignon trial to determine the effects of leaf removal, shoot thinning, and a combination of both with respect to fruit and wine quality.

CABERNET SAUVIGNON
Short Thinning vs Leaf Removal 1989

<u>Treatment</u>	<u>Yield</u> <u>vine/lbs</u>	<u>Cluster</u> <u>per vine</u>	<u>Cluster</u> <u>weight/lbs</u>	<u>Berry</u> <u>Wt/g</u>	<u>Brix</u>	<u>pH</u>	<u>%TA</u>
Shoot Thin	19.8 a	68 a	0.29 a	1.17 a	22.1 a	3.67 a	0.52 b
Leaf Removal	19.6 a	79 a	0.25 a	1.10 a	22.0 ab	3.44 b	0.59 a
Shoot Thin & Leaf Removal	20.8 a	74 a	0.29 a	1.10 a	22.1 a	3.53 ab	0.54 b
Control	21.6 a	95 a	0.25 a	1.10 a	21.4 b	3.52 ab	0.53 b

ZINFANDEL
Short Thinning vs Leaf Removal 1989*

<u>Treatment</u>	<u>Yield</u> <u>vine/lbs</u>	<u>Clusters</u>	<u>Rot Yield</u> <u>vine/lbs</u>
Shoot Thin	18.9 a	30 a	7.5 a
Leaf Removal	23.1 a	36 a	4.2 b
Control	19.5 a	32 a	9.5 a

*No differences in 1988 for all data. No differences in 1989 for Brix, T.A., pH, or berry weight.

Project: 89-07 Minimal Pruning Cordon Training

Objective: To determine the effects of a minimal pruning system that would reduce time and labor inputs to vine management and still produce quality fruit.

Cooperator: Mohr-Fry Ranches

Methods: A trial was established in 1988 to compare minimal pruning versus a standard level of pruning. Minimal pruning consists of training vines to a bilateral cordon, then allowing the vines to grow in their natural habit of many small shoots and many small clusters. This results in some shading out and "self-pruning". The large number of buds promotes many small berried clusters located on the outer part of the canopy. Minimal cane trimming is done to maintain shoots off of the ground and allow machine harvesting, which is a requirement.

This system and similar ones have been adopted in areas of Australia due to the scarcity of available labor. The purpose of this trial is to evaluate how to manage this type system and what effects there will be on vine growth, crop quality, yield, and pest problems.

There are 7 replications of 10 vines each, for a total of 140 vines in the trial. The vineyard is Cabernet Sauvignon on Freedom rootstock. Vines are spaced 7 x 11' on a vertical trellis and furrow irrigated.

The MPCT vines did overcrop the first year of conversion (1988). Clusters and berries were smaller, and there were considerably more than standard (20-22 spurs) pruning. In the second year (1989) MPCT vines again had very small berries and lower sugar. Cluster numbers were higher than standard, but yield was comparable to standard!

This trial will continue in order to determine if there are enough benefits to out weigh the potential problems.

Advantages: Less labor is needed
Vigorous growth can be reduced
Smaller berries are produced (higher skin to volume ratio for color)

Disadvantages: Shading of buds
Exposed clusters sunburned
Pivotal striker harvesting head needed

The vines were harvested with an FMC shaker head. A reasonably good job was done to what had been expected. However, the small berries were easily blown out by the leaf sorter. This may necessitate hand sorting or the recommended pivotal striker head.

See attached chart for 1988 and 1989 results.

MPCT TRIAL
CABERNET SAUVIGNON

1988

<u>Treatment</u>	<u>Yield</u> <u>vine/lbs</u>	<u>Clusters</u>	<u>Cluster</u> <u>Weight/lbs</u>	<u>Berry Wt/g</u>	<u>Brix</u>	<u>pH</u>	<u>%TA</u>
MPCT	45.38	a 563 a	0.08 b	0.70 b	20.4 a	3.17 b	0.67 b
Standard	14.58	b 93 b	0.16 a	1.17 a	21.4 a	3.23 a	0.78 b

1989

<u>Treatment</u>	<u>Yield</u> <u>vine/lbs</u>	<u>Clusters</u>	<u>Cluster</u> <u>Weight/lbs</u>	<u>Berry Wt/g</u>	<u>Brix</u>	<u>pH</u>	<u>%TA</u>
MPCT	27.13	b 416 a	0.07 b	0.57 b	18.2 b	3.40 b	0.62 a
Standard	29.87	a 139 b	0.21 a	1.12 a	20.8 a	3.52 a	0.50 b

Project: 89-08 Table Grape Observation Trial

Objective: To evaluate two new varieties and six numbered selections of seedless table grapes developed by Dr. David Ramming, U.S.D.A. Although table grape production continues to decline as a whole for the Lodi area, there is a potential for more production in a seedless variety suited to this area, both for shipping and direct marketing. The climate of the area provides the rare opportunity to produce quality wine grapes, and to also grow table grapes as an alternate choice for local growers.

Cooperator: Phillips Farm, M. Phillips

Methods: Six numbered selections of seedless table grapes and two newly released varieties (Crimson seedless and Fiesta) from the U.S.D.A. breeding program were budded on to Freedom rootstock in 1989. These seedless grapes initially will become pruned and appear not to require gibberellic acid for sizing. These will be observed to determine their performance under the growing conditions of the Lodi area.

In conjunction with Dr. Ramming, the varieties will be evaluated over the next several years. Data to be evaluated will include pruning weight, budbreak, bloom date, veraison, yield, cluster number, cluster weight and berry weight, berry color, and flavor.

No harvest data will be available for two to three years, but observations will be made on budding out, growth, disease or insect problems, etc. Although the trial is not scientifically replicated, it was observed that two of the numbered varieties were very difficult to bud compared to the others.

Project: 89-09 Carbohydrate Partitioning under effects of Water Stress

Objective: To determine the vine response to long term water stress with respect to the accumulation of carbohydrates (storage reserves in roots and woody parts), and how this accumulation might affect graft success.

Cooperator: R. & N. Ripken

Methods: With the termination of the five year water stress trial on Chenin blanc, these vines were grafted to Cabernet Sauvignon. to determine what effect five years of various irrigation regimes have had on these vine's ability to produce and store carbohydrates, one vine from each full water treatment and one vine from each 50% water treatment were removed. The trunk, cordons, and all roots, were analyzed for carbohydrate and nutrient composition.

This should help demonstrate how a vine manages water stress and can continue to produce a crop. In addition, as the remaining vines were grafted, the percentage take and subsequent growth was recorded to correlate any detrimental effects of five years water stress on grafting.

The Cabernet Sauvignon will be grafted onto Chenin blanc on Dogridge rootstock. The vines are spaced 7 1/2 x 11 on vertical trellis.

Results: It appears that overall reduction in the permanent structures dry weight between the 100% and 50% irrigation was about 25%. Carbohydrates were reduced by 32%, stored nitrogen was reduced 19%, and potassium was reduced 34%. Therefore, growth and nutrient storage were significantly reduced by cutting water use by 50% with carbohydrates and potassium more severely affected than nitrogen.

Generally vines stressed very hard for water show less growth and less nutrient use. At approximately 70% ET (Evapo-Transpiration) demand a vine will compensate somewhat and no difference would be seen in yield. However, at 50% ET severe effects on growth, yield, and nutrient demand would change fertilization needs and strategies.

Grafting response was very favorable. There were very few misses (less than 5%) and most, if not all, second tries were successful. The subsequent growth was strong and uniform. There was not any significant difference in the growth of the Cabernet Sauvignon scions that now are in place.

See attached chart.

Total Avg Weight of Vine Sampled (lbs)

Irrigation Treatment	Cordon	Trunk	Roots	Total
100%	8.08	5.25	7.45	20.78
50%	5.98	4.37	5.15	15.50
% reduction	26	17	31	25

% Nitrogen of Dry Weight

100%	0.34	0.42	12.3
50%	0.36	0.39	13.1

% Potassium of Dry Weight

100%	0.47	0.46	.53
50%	0.44	0.40	.44

% Carbohydrates of Dry Weight

100%	17.1	19.0	26.4
50%	15.5	15.8	25.5

Project: 89-10 Evaluation of Merlot Clones and Effect of Different Rootstocks on Production and Quality

Objective: To evaluate in one project trial the differences, if any, on the yield and quality of fruit for the available Merlot clones under Lodi soil and climate conditions. A second trial would determine any effects various rootstocks might have on either quality or yield of Merlot.

Cooperators: Rodney Schatz

Methods: Currently there are only four clones of Merlot available commercially. The variety can be erratic in bearing and is sensitive to nitrogen, but little is known about how much of a difference there is among these clones. Also, Merlot is considered a cool climate grape. A trial to determine production characteristics, quality of fruit and how to manage them in the Lodi area would benefit growers as they try to meet winery demands and diversify to different varieties.

The four clones are numbers 1, 3, 6, and 8. These are replicated four times, with five vines in each plot. They will be evaluated for yield, fruit quality, vigor, and other growth characteristics. Recently there has been big interest in clones 3 and 6, but this has been based on "coffee shop talk" with limited local experience.

A second proposed trial would look at how potential rootstocks for the area such as S04, 110R, Mgt 101-14, Ruggeri 140, 420A, 1103 Paulsen, 039-16, and 043-43 would compare to Freedom and Harmony. The need to have various rootstocks and to know their capabilities or limitations will increase as soil pests continue to spread, and chemical controls become more restricted. What effects these rootstocks have on varieties and how to manage them in the Lodi area will be important to produce the yields and quality necessary with a "new" variety such as Merlot.

A trial with these various rootstocks will be planted in the Spring of 1990.

Project: 89-11 Early Season Control of Powdery Mildew

Objective: To evaluate early season control strategies with both chemicals and leaf removal for powdery mildew to help reduce late season incidence. Also determine any effects on insect pests and bunch rot.

Cooperator: P. Hale

Methods: Treatments included wettable sulfur, a synthetic compound, leaf removal, and combinations of these treatments. There is a continuing need to determine the effectiveness of these strategies to prevent late season problems of powdery mildew, and to slow or stop possible development of resistance with the use of mid-season treatments of sterol inhibitors such as Bayleton, Rally, Rubigan or others.

Also, these treatments to be looked at may provide alternatives to currently available materials, if need be.

The trial was established last year and had some good initial results in helping control the powdery mildew last year, but failed to show significant differences this year. Part of this was due possibly to higher disease pressure, but otherwise was not really explainable. There was an effect on leafhoppers and bunch rot, both reduced by leaf removal. Jim Stapleton, Area IPM Advisor was the principal investigator in this trial. Trials he conducted in Stanislaus and Madera showed similar results, but even more significantly. This may have been due to all other trials being on trellised vines, while the Lodi trial was with head trained vines. The Lodi area had more of a problem with Botrytis bunch rot compared to the other valley areas that have sour rot. This follows a pattern of cooler temperatures and more rain in Lodi.

The results do indicate leaf removal can make a difference on head trained vines, but that sunburn can also be a problem. Vines trained on trellis show significantly better results from leaf removal/canopy management. Better exposure, but less yields, result from a head trained vine. However, machine harvesting is ruled out.

The early season control of powdery mildew with wettable sulfur at 0-2" shoot length makes mid season and late season control easier, but does not eliminate their need. Leaf removal can reduce a powdery mildew problem along with bunch rot and leafhopper populations (also, possibly mites), but a chemical control program is still the most economically sound for powdery mildew.

Project: 89-12 Biological Control of Pacific Spider Mites by introduced Populations of Willamette Mites

Objective: An early season population of Willamette Mites has been seen in some initial trials to reduce the Pacific mite populations and damage later in the season. It might be possible to reduce, if not eliminate, late season mite flare ups and needed sprays. A field trial on head trained Zinfandel was established to confirm this and develop information for future control strategies.

Cooperator: Tony Racco

The following excerpts are from an article recently published and based in part from local work:

"Willamette mites and Pacific mites are often negatively associated on grape vines. In particular, vineyard with early season infestations of the less damaging Willamette mite rarely develop high populations of the economically important Pacific mite. We report that Willamette mites had a negative effect on Pacific mite populations in both the greenhouse and field. In some experiments, the negative effect was more pronounced when vines had been damaged by previous feeding of Willamette mites and in other experiments concurrent feeding by both mite species was necessary to demonstrate a negative effect. Therefore, we cannot conclude if the mechanism of the response involves induced resistance against Pacific mites, more conventional interspecific competition, or both. Since predators were uncommon in our experiments, predator build up on Willamette mites did not cause the low Pacific mite population that we observed, although this mechanism may be important in many vineyards. Further, larger scale experiments are necessary to determine if growers can introduce Willamette mites to help control Pacific mites.

It may be possible for growers to introduce Willamette mites to their vines in situations in which Pacific mites have become a chronic problem. However, we are still far from being able to make any specific recommendations. Understanding why the two species are often negatively associated will aid greatly in the intelligent development of such techniques. In the immediate future we plan large-scale introductions of Willamette mites to vineyards where Pacific mites have produce substantial decreases in yield to test the efficacy of using vaccinations to protect grape vines."

Reference: *Negative interactions between Willamette mites and Pacific mites: possible management strategies for grapes*

Gregory M. English-Loeb & Richard Karban
Department of Entomology, University of California, Davis, CA 95616 USA

Miscellaneous Trials:

Mothball Vineyard on French Colombard
M.A.C. Vineyard, Dale Carlson

Nutsebye Control in Grapes
Mohr-Fry Ranches, Sauvignon blanc
Azevedo Farms, John Azevedo Zinfandel

Pruning Training Trial - Long Term
Kautz Farms, Sauvignon blanc

Data on these trials are still being compiled and should be available during this year.

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