COOPERATIVE EXTENSION UNIVERSITY OF CALIFORNIA

your Lake County HORTICULTURAL NOTES

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JUNE 1988

UC TEST PLOT FIELD DAY

Chet Hemstreet "founded" our 2-acre test plot to see if treated effluent water would be suitable for irrigation. We no longer irrigate with effluent but the plot has remained as a species and variety testing ground for Lake County conditions. Eight years of data have been collected on wine and table grapes, fruit and nut trees, turf and even corn.

This summer, we would like to "show off" the plot to the people who own it -- you. Jim Benson, our Agricultural Technician, has put many hours of work into pruning, insect and disease control, weed control, thinning, taking data and harvesting. We hope you will join us.

DATE: Thursday, June 16, 1988
TIME: 9:30 A. M. - 12:00 P. M.
PLACE: Meet at Ag Center, carpool to test plot
883 Lakeport Blvd., Lakeport
(leave from Ag Center at 9:45 A. M.)

HOSTS: Jim Benson, Lake County Cooperative Extension
Agricultural Technician
Jim Beutel, UC Cooperative Extension
Pomology Specialist
Rachel Elkins, UC Cooperative Extension
Farm Advisor

For those of you who cannot make the morning session, a homeowner "tour" will be held in the afternoon. Meet at 1:30 P. M. in our parking lot.

THE BIG FREEZE -- WHAT HAPPENED?

(co-authored by Art Horton, National Weather Service Ag Meteorologist)

For many grape, kiwifruit and walnut growers, the night of April 30 - May 1 was the ultimate test of their sprinkler system (if one was in place) and for some, the system failed. Inadequate pump capacity (not enough gallons per minute), poor water distribution, lack of back-up systems for power outage or breakage, lack of diesel to run pumps -- the list goes on. I heard it all and I think everyone, including myself, learned valuable lessons the hard way. The bottom line is -- in a high elevation, northern growing area like Lake County plan for the worst.

If your system pumped adequate water (at least 55 gpm) and damage still occurred, what happened? Weather-wise, there are three factors and perhaps a fourth: (all times are Pacific Standard Time - PST)

1) Dry-bulb temperature (air temperature)

Temperatures dropped rapidly between midnight and 2:00 A. M. For example, at Art Horton's Upper Lake key station, the temperature at midnight was 37 F, 36 at 12:30 and 32 at 1:30 A. M. It remained at 32 or below for 4 hours (2:00 - 6:00 A. M.).

2) Dew-point (calculated from dry-bulb and relative humidity)

Most growers rely on Art's forecasted dew-point, in this case 28 F, to decide when to turn sprinklers on. Art only collects relative humidity data at his Ag Center (Lakeport) station, so other areas could have had a higher or lower dew-point (this was likely). At the Ag Center, relative humidity dropped rapidly between 7:00 and 9:00 P. M.

3) Wet-bulb temperature (critical temperature)

WET-BULB IS THE WHOLE BALLGAME

At our elevation, Art uses the following:

	critical temp (air)	"safe" turn-on (wet-bulb)
grapes -	31 F	33 F
pears -	29	31
walnuts -	31	33

Wet-bulb is the temperature due to evaporation. If the wet-bulb temperature is at or below the critical temperature for the crop, the air temperature will drop to or below the critical temperature even when protection is applied.

The following table, thanks to Art, shows dry-bulb (TEMP), relative humidity (RH), dew-point (DP), wet-bulb (WB), and wind speed (mph) at the Ag Center and dry-bulb temperatures for various key stations.

TABLE 1

FREEZE INFORMATION

April 30 - May 1, 1988

	LAKE COUNTY AGRICULTURAL CENTER					KEY STATION TEMPERATURES					
TIME (PST)	TEMP	RH	DP	WB	AVG WIND	UPPER LAKE	HLND SPGS	SCOTTS VALLEY	KELSEY VILLE	MIDDLE TOWN	COYOTE VALLEY
4 PM	51	50	33	43	18	51.0	52.0	49.0	50.0	51.0	58.0
5 PM	49	57	34	42	19	49.0	51.0	48.0	48.5	50.0	56.0
6 PM	48	61	35	42	13	47.5	49.5	45.0	44.0	47.0	52.0
7 PM	45	68	35	40	10	45.5	47.0	43.5	42.5	45.0	49.0
8 PM	43	59	30	37	12	43.5	44.0	42.5	39.0	44.0	47.5
9 PM	42	60	29	37	11	41.0	43.0	41.0	41.0	43.0	45.5
10 PM	41	63	29	36	9	39.5	40.0	39.0	39.0	42.5	45.0
11 PM	40	67	30	36	9	39.0	38.5	38.0	34.0	42.0	43.5
12 MD	39	70	30	35	8	37.5	39.0	38.0	37.0	40.0	43.5
1 AM	38	73	30	35	1	33.0	35.0	36.0	31.5	32.5	37.5
2 AM	35	84	31	33	2	32.0	30.5	31.0	30.0	31.0	34.0
3 AM	33	90	30	32	1	30.5	30.2	30.0	29.5	29.5	32.5
4 AM	31	91	29	30	1	29.5	28.5	29.0	28.0	28.5	31.0
5 AM	30	93	28	29	1	30.0	29.0	29.0	27.5	27.8	30.0
5:30 AM	31	87	28	30	0	31.0	28.0	34.0	34.0	27.0	38.0
6 AM	36	85	32	34	0	32.5	28.0	37.0	40.0	31.5	46.0

Sunset on April 30 7:03 PM PST
Sunrise on May 1 5:14 AM PST

Using the forecasted dew-point of 28, maintaining WB of 31 necessitated turn on at 33 dry-bulb. Turn-on for the "safe" WB of 33 required turn on at 36 dry-bulb. From Table 1, at the Ag Center 31 WB occurred shortly after 3:00 A. M. (PST), at 33 dry-bulb. 33 WB occurred at 2:00 A. M. (35 dry-bulb). For Kelseyville-area vineyards, 33 dry-bulb occurred shortly before 1:00 A. M. Art's thermograph shows 36 occured by 10:30 P. M. If you turned on at 11:00 P. M., at 34, you missed the "safe" window. Turn-on any later than midnight probably missed the 31 WB threshold. IF DEW-POINT DROPPED BELOW 28, EVEN 36 TURN-ON TEMPERATURE WAS TOO LATE. Table 2 shows:

TABLE 2

TURN ON/TURN OFF AIR TEMPERATURES (°F)

DEW-POINT (°F)	WET-BULB (°F)		
	28	31	33
32			34
31		31	34
30		32	35
29		33	35
28	28	33	36
27	29	34	37
26	30	34	37
25	30	35	38
24	31	35	38
23	31	36	39

This year brought home the importance of knowing the wet-bulb temperature in the vineyard or orchard rather than relying on dry-bulb and assuming an arbitrary dew-point. Measuring wet-bulb directly makes it simple to confidently decide turn-on time. Next year, Art and I will demonstrate making and using wet-bulb thermometers. Also, a county-wide climatic station system, currently in the planning stages, will hopefully be in place. This will provide continuous data so that forecasts can be updated in response to rapidly changing meteorological conditions as occurred on April 30 - May 1.

I mentioned a fourth possible factor -- wind. The freeze was both advective (incoming cold air mass) and radiative (cold, calm, clear conditions). Heavy damage occurred after midnight when winds died down to an average of 1 - 2 mph (see Table 1). In fact, slight winds caused a temporary temperature increase at midnight. "Coffee shop" talk implicates wind in some areas. This may be the case but we feel frost damage occurred due to the rapid temperature and dewpoint plunges that either rendered protection systems inadequate or lead to misjudgement of turn-on time and temperature.

FROST: ADVICE FROM A FELLOW ADVISOR

Regardless of why vineyards got damaged, growers had to face "the morning after". Mendocino County Farm Advisor Bruce Bearden lived through the hard frosts of the early 1970's. He offered these sage words for a greenhorn advisor like myself:

- Frost protection, despite years of research, is still an art. Most growers will always be enrolled in the School of Hard Knocks as long as they farm in frost prone areas.

- Let the plant tell you if, when and to what extent it will recover. You cannot see in the plant and internal damage to the conducting tissue may only become apparent later in the season. In the next month or so look for poor vigor, abnormal growth habit and delayed growth. Pay special attention to young vines coming up the stake and 1 - 2 year old wood on older vines.

- BE PATIENT. Don't be in a hurry to manipulate vines. Already, "fried" shoots are drying up and falling off. New shoots, whether fruitful or not, will soon cover up the damage.

FROST DAMAGED GRAPES-DOES SHOOT BREAK-OUT PAY?

A common question to me has been "should I break out the frozen shoots to stimulate crop from secondary growing points?" My answer has been, "don't bother to waste good money after bad." The above comments by Bruce and experimental data to date backs this opinion.

Some UC frost protection publications recommend shoot break-out 1) on varieties with a history of fruitful secondary/tertiary buds, 2) if the basal portion of the shoot below the clusters was undamaged, and 3) within three days of the frost while growth was still succulent. These recommendations are based on 1933 experimental data of Dr. Henry Winkler. He reported 50 - 70% yield increases in Tokay (San Joaquin County) from 2 growing points and fruitful laterals.

To date, researchers (including Dr. Winkler) have been unable to duplicate these results. In 1964, Dr. Lloyd Lider a) broke out injured shoots (12 - 18" long) and b) did nothing to frosted Cabernet sauvignon and White Riesling (Oakville, CA). There were no significant yield differences between treatments.

A large experiment by Extension Specialist Amand Kasimatis and San Joaquin County Farm Advisor Jim Kissler also came up empty handed. They worked with two varieties of interest to Lake County, Zinfandel (40 - 50% damage to 2 - 5" shoots) and Chenin blanc (99% damage to 1 - 6" shoots). Three days after the last frost (April 1), they a) broke out all shoots, b) broke out only frost damaged shoots, and c) did nothing. At harvest, crop was separated by growing point - primary/secondary buds or basal/latent/laterals (second crop). Again, there were no significant differences among treatments. Most important: fruit production from secondary growing points was not stimulated, even in Zinfandel, supposedly among the most fruitful in this aspect. Also, severely damaged shoots responded the same as less severely damaged.

These results do not rule out the possible crop recovery following shoot break out. Further experimentation and time will tell. For reference, here is how varieties we grow line up as to fruitfulness of secondary growing points. IN NO CASE SHOULD MORE THAN 50% RECOVERY BE EXPECTED. Many variables, such as vine vigor, come into play. The vines will tell you the final story on their own sweet time. Also, remember, "second crop" harvest will be delayed and lower in sugar.

VARIETY	FRUITFULLNESS OF 2 GROWING POINT*
WHITES	
Chardonnay	low
Chenin blanc	good
Gerwurtztraminer	low
Muscat Canelli	fairly good
Sauvignon blanc	very low
Semillon	low
White Riesling	very low
REDS	
Cabernet sauvignon	good
Merlot	good
Petit Sirah	fairly good
Pinot noir	low
Zinfandel	good

*from Wine Grape Varieties in the North Coast Counties of California, UC publication #4069, by A. N. Kasimatis, Bruce Bearden and Keith Bowers.

INTERPRETING BLOOMTIME GRAPE PETIOLE ANALYSES

By now, bloomtime petiole samples will (probably) have been taken by those who planned to do so. The purpose is to assess nutritional levels to decide on an appropriate fertility program. Plant tissue analysis is preferred over soil samples for most elements. Soil analysis is useful for assessing ph, salinity and certain toxicities (ex. boron and sodium), but not to measure the nutritional status of the vines.

For grapes, the main yield-related elements are nitrogen (N), phosphorous (P), potassium (K) and zinc (Zn). Depending on your site, boron (B), iron (Fe), and magnesium (Mg) may come into play. Like other North Coast counties, Lake County has many interesting and unusual soil types, so we can expect anything!

One concern is K:Mg ratio. Although not known why, when one is high the other tends to be low. Critical ratios are not experimentally known but labs which regularly analyze North Coast samples may have a handle on which ratios are likely to cause problems. In our serpentine soils, high Mg:K is the most likely. Fortunately, grapes are highly adaptable and thrive where other crops barely survive (e.g. on poor walnut ground).

"Critical levels," above or below which toxicity/deficiency occurs, have been established experimentally for some nutrients. Most work has been done in the San Joaquin Valley on Thompson Seedless grapes. Some zinc, boron and phosphorous deficiency research has been done in the coastal ranges. Critical levels have not been established for all varieties, especially wine varieties. Each grower must learn over time what is adequate based on vine growth (vigor), crop load and crop quality. We suggest tissue analysis be done for several years to establish baseline values for "good" and "poor" areas and for each variety.

Here are UC critical values for grapes*.

ELEMENT	LEVEL	ADEQUACY
Nitrate-nitrogen	less than 350 ppm	Deficient
	350 - 500	Questionnable
	**500 - 1,200	Adequate
	over 1,200	More than necessary
	over 2,000	Excessive
	over 3,000	Possibly toxic
Phosphorous	less than 0.10%	Possibly deficient
	0.10 - 0.15	Questionnable
	over 0.15	Adequate
Potassium	less than 1.0%	Deficient
	1.0 - 1.5	Questionnable
	over 1.5	Adequate
Zinc	less than 15 ppm	Deficient
	15 - 26	Questionnable
	over 26	Adequate
Boron	less than 25 ppm	Deficient
	26 - 30	Questionnable
	over 30	Adequate
	100 - 150 and above	Possibly toxic
	over 300 in blades	Toxic
Iron	none established	N/A
Magnesium	less than 0.2%	Probably deficient
	0.2 - 0.3	Questionnnable
	over 0.3	Adequate

Manganese	less than 20 ppm	Deficient
	20 - 25	Questionnable
	over 25	Adequate

*From Grapevine Nutrition and Fertilization in the San Joaquin Valley - UC publication #4087 ($5.00) by Pete Christensen, A. N. Kasimatis and Fred Jensen.

**Nitrate values vary greatly among wine varieties.

ANY NEW NEWSLETTER SUBSCRIBERS OUT THERE?

Thanks to all who have sent in their subscription forms - KEEP THEM COMING! The ethnic/sex data for clientele demographics is very helpful.

I would like all Lake County agricultural personnel who can make use of newsletter information to be a subscriber. This includes ranch owners and employees who make production decisions. If you have permanent employees in responsible positions, such as crew supervisors, pesticide applicators, or others who do not currently receive their own newsletter, please give me their names and mailing addresses or get them in touch with me. If enough Spanish-speaking persons are added, I will look into starting a Spanish-language version of the newsletter, perhaps on a bimonthly basis.

I believe that employees should be just as informed as their employers. With the tightening labor situation, a well-informed and trained labor force is a valuable asset to Lake County agriculture. Another point -- many of these people pay taxes and should receive the benefits their revenue dollars provide.

Pear Cost Study

Greg Vogel, Sacramento County Farm Advisor, has completed the "1987 Pear Orchard-Sample Production Costs" for Sacramento County. The study uses a hypothetical 100 acre orchard and contains six tables:

- General assumptions (land/tree value, labor rates, equipment costs and taxes)
- Cost of production worksheet (including a blank column to compare your actual costs)
- Monthly summary of sample costs
- Equipment list
- Materials list (insect and disease sprays)
- Harvest cost summary

The last cost study for Lake County, that I can find, was done in 1978. Bruce Bearden prepared one for Mendocino in 1982. We sorely need one and it is high on my priority list for the "off season". Greg's provides a good model and adjustments can be made for our conditions.

Karen Klonsky, UCCE Farm Management Specialist and Jim DuBruille, Staff Research Associate with Karen, also aided Greg in preparing the study. Contact me for a copy.

NEW PUBLICATIONS - order from our office

Beekeeping in California - Publ. #2422 - $3.50
Describes fundamentals of keeping bees in California and discusses the differences between commercial and non-commercial approaches.

Small-Scale Cold Rooms for Perishable Commodities - Publ. #21449 - $1.00
Includes location in relation to fields and retail outlets, optimum size as a function of produce volume, adapting used railcars, highway vans and marine containers and construction basics, including a sample plan for a self-constructed cold room.

Sincerely,

Rachel

Rachel Elkins
Farm Advisor

RE:jv