UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION COUNTY OF LAKE

your Lake County HORTICULTURAL NOTES

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AUGUST 1990

STRESS - BY MANY OTHER NAMES

1990 has been a strange year. Grapevines that were supposedly fine last year failed to come out, or emerged from dormancy only to weaken, or even collapse soon after. Many vineyards exhibit foliar symptoms that only vaguely resemble known nutritional deficiencies and are thus attributed to "spring fever" (even in July!). In pears, calcium-induced iron chlorosis is the most pronounced I have seen since arriving in Lake County. Peculiar "zinc-like" symptoms in Red Sensation Bartlett, though noted in previous years, was also severe this spring, even in Upper Lake, normally relatively unplagued by obvious nutrition-related maladies.

Besides nutrition-related and "mystery" symptoms, there has been a spate of oak root fungus (ORF) reportings in both pears and grapes and deep bark canker is "running" in affected Hartley walnuts.

What do all these seemingly unrelated problems have in common? Upon reflection, after having observed many orchards and vineyards over the past three years, I feel they are all, either directly or indirectly, related to accumulated STRESS. Nutritional symptoms often signal roots' inability to adequately take up water and dissolved ions. Collapse seldom occurs all of a sudden, but is often the final stage of a decline process that began sometime in the past and involves one or more predisposing and compounding factors. In the case of diseases, many virus symptoms are more pronounced under stressful conditions. Deep bark canker in Hartley walnuts, a bacterial disease, has long been associated with water stress, though, as is the case with other stress-related phenomena, this has never been proven. Also, walnuts which have suffered "winter injury" during dry years are susceptible to sunburn and subsequent branch wilt fungus attack.

Two examples illustrate what I feel are "chain reaction" cases of stress-aggravated debilitation and ultimate plant death.

In case #1, vines failed to emerge in a timely manner in 1990. When they did, most of the main spurs were dead and new growth was out of dormant buds in the cordon and at the base of the vines ("suckers"). In 1989, peculiar foliar symptoms resem-

bling potassium deficiency were attributed to the stress of a somewhat above-average crop, possible below-normal soil moisture and possible winter injury in 1988. There was also scattered spur death and a few completely dead vines. The vineyard was pruned in mid-December 1989 during fairly warm weather and a sudden cold spell followed the pruning. The pieces of the puzzle? Successive dry years, dry soil, warm fall, early pruning followed by cold and a large 1989 crop all worked together, stressing the vines until many were too weak to emerge at all in 1990. The foliar symptoms in 1989 were thus an indication of the weakening process.

In case #2, a widening circle of dying Bartlett pears on Winter Nelis rootstock was diagnosed with oak root fungus (ORF). Trees had previously been replanted, signifying a historical ORF "hot spot". Though limbs and young trees had died in recent years, the circle widened in 1990 and several larger trees collapsed. In this case, the combination of successive dry years - again, the "stress factor" - and late spring rains may have aggravated the ORF. Why?

The March 1989 and April-May 1990 rains prevented, or at least delayed, absolute disaster in many walnut orchards, and who knows how severe the iron chlorosis would be if not for those rains? Needed as they were, the rains may have promoted ORF by saturating the soil at an inappropriate time of year when trees were starting to actively transpire. Oaks tolerate the presence of ORF very well as long as winters are wet and summers are dry; irrigation during the active growing season ultimately weakens and kills them.

Pears, though extremely resistant to ORF, are not immune. Winter Nelis is considered "moderately resistant" in the presence of ORF under reasonable soil moisture conditions. The pathogen plus saturated soil in late spring plus active spring growth plus possible stress due to successive dry years set the stage for more apparent symptoms and collapse in 1990.

August is an excellent month to observe stress-related symptoms and to try and discern the underlying causes. Pears are harvested, relieving trees of their water and energy requiring "burden". However, for grapes, veraison signals the period of maximum sugar accumulation and minimum supplemental irrigation. Walnuts are heavily-cropped this year and effects of stress will be apparent this month as nut dry weight accumulates.

When making observations, note especially the SOIL PHYSICAL ENVIRONMENT. Stress is defined (in physics) as "an applied force or system of forces that tends to strain or deform a body". In the case of perennial plants, the "body" is the water/nutrient pathway, which begins at the roots. "A system of forces" is any external impediment to adequate uptake and flow of water and dissolved nutrients. Water quantity and distribution pattern -

either natural or man-provided - can either enhance or impede the process and alleviate or aggravate stress. Many "prime" soils in Lake County are less than ideal for root growth and function and there is less capacity to "buffer" roots from the effects of too much or too little water. Year-to-year stress is thus magnified and the longer these stressful conditions continue, the more problems will likely be encountered.

If anyone would like to discuss suspected "stress-related" problems, as well as possible solutions, please contact me. And, let's hope it rains alot during winter 1990-91!

THE BEAUTY OF THE BACKHOE

The absolute best way to observe the soil/root profile is with a backhoe. Unlike shovel or auger holes, backhoe trenches reveal a "panoramic" view from the surface down through the root zone. When called out to diagnose dying trees and vines, I often request a backhoe pit be dug. Riverside County Farm Advisor Rudy Neja wrote the following article in 1971 when he was a farm advisor in Santa Clara County. Although the article refers to vineyars, it is relevent to orchards as well.

> "Many growers are evaluating land with a backhoe -- for soils diagnosis you have to get up awfully early in the morning to beat the backhoe!
>
> Before planting or replanting a vineyard, a number of well placed backhoe slots will tell you a lot more in half a day than you could discover with a soil auger or shovel in weeks. Soil texture, consistancy, uniformity -- interface conditions, plowpans, claypans, hardpans -- drainage, perched water tables -- and other soil depth limitations can be looked at and evaluated. Judgements on whether to chisel, disk plow, deep rip or slip plow can be weighed.
>
> In existing vineyards, a backhoe slot will not only uncover soils and water penetration facts but also expose vine roots. Root distribution and depth can tell you a lot about how the vine feels about the existing situation.
>
> Have the backhoe operator dig the slot with a gradual incline on one end so you can walk down into the slot. About 8 feet is usually deep enough. Use good judgement though -- some slots are not safe to walk down into.
>
> Try to schedule "backhoe analysis" soon after the slots are dug and before the side walls dry out. Moist to wet soil conditions are much easier to evaluate and give better information than dry soil conditions.

ASH WHITEFLY UPDATE

As of July, ash whitefly had been detected in 17 California counties, including Sacramento, San Mateo, Santa Clara and Yolo. Since chemical eradication has been deemed impractical due to its life history and reproductive abilities, biological control will be the primary control weapon.

In fall 1989, a tiny (1 mm) parasitic (to whitefly) wasp, Encarsia sp. was released in field trials at U.C. Riverside. It overwintered successfully and widespread releases began in early July in 6 southern California counties and will continue through the summer. Releases are being made by U.C. entomologists, CDFA and local agricultural commissioners. According to a recent article in the Sacramento Bee, the wasps are being confronted by hordes of Argentine ants protecting the whiteflies because of their copious honeydew. However, U.C. Entomologist Tom Bellows expects that as wasp numbers increase, they will overcome this impediment. Other bio-control agents, including a predaceous lady beetle, are being researched and it is expected a "team" of several agents will ultimately bring the whitefly under steady control.

A descriptive pamphlet, Ash Whitefly - What, How, Why, What You Can Do, is available from our or the Ag Commissioner's office.

FARM ENERGY LOAN PROGRAM

The California Energy Commission is now accepting applications for loans made available under the Commission's Farm Energy Assistance Program. This program, established with passage of SB 1145 (Chapter 1341, Statutes of 1986), provides financial and technical assistance to California farmers, with funds allocated from the Petroleum Violation Escrow Account. This is the second round of solicitation of the Farm Energy Loan Program. A total of $2 million is available for the purchase of equipment and services to improve farm energy use. Loan applications will be accepted on a first-come, first-serve basis beginning July 1990. Applications must be postmarked by December 31, 1990.

The minimum funding amount that can be requested for any given project is $2,000 and the maximum amount is $200,000. The simple annual interest rate for the loan proceeds is fixed at 6.5 percent and loan repayments shall not exceed seven years. The objective of this loan program is to provide financial assistance to California farmers and agricultural-related industries to implement farming practices that have significant direct and indirect energy conservation potential, including energy demand reduction or demand shifting. Direct energy use refers to fuels and electricity which are purchased and used directly, to power machinery, lights and pumps. Indirect energy

use refers to the use of fossil fuels as feedstocks and as energy sources used in the production of agricultural chemicals such as fertilizers, pesticides and herbicides.

Funding is only available for projects that can: 1) demonstrate clear and quantifiable energy savings, 2) have a potential payback of seven years or less and 3) implement commercially available technologies.

SB 1145 directs the Energy Commission to make assistance available to the farm sector. Any California farmer or group involved in agriculture who is interested in undertaking activities to demonstrate energy conservation farming practices, techniques or technologies, is eligible for this program and is encouraged to apply.

Loan funds can be used to purchase energy efficient farm equipment and to pay for services (installation, consulting, etc.). Funding is available for a wide variety of projects which result in direct and/or indirect energy savings. Suggested project areas include, but are not limited to, the following: 1) irrigation and pumping equipment, 2) water delivery system equipment, 3) tillage equipment, 4) computerized farming equipment, 5) pest management equipment, 6) greenhouse equipment, 7) dairy equipment, 8) post-harvest equipment and 9) other energy efficient farm equipment.

Projects will be processed by California Energy Commission staff and recommendation for funding will be presented to the full Commission for approval. The Commission will establish a loan agreement with selected participants in which the participant must maintain an active relationship with Commission representatives, provide the Commission access to data collected and provide access to the site for data collection, project observation, etc.

Project applications may be obtained by writing or calling:

Farm Energy Assistance Program
California Energy Commission
Local Assistance Office, MS-26
1516 Ninth Street
Sacramento, CA 95814-5512
Telephone: 916) 324-3338
FAX Number: 916) 324-3029

WALNUT DEHYDRATOR TOUR

U. C. Ag Engineering Extension is offering a day-long Walnut Dehydrator Tour in the Sacramento Valley on August 14. Morning 'classroom' topics include history and principles of drying, practical application of principles (dryer selection, minimizing moisture variability and energy use reduction) and moisture measurement. An afternoon tour will include stationary bin, wagon-type and pothole dehydrators, in-bin moisture meters and equalization bins. The tour costs $25.00 including bus, lunch, refreshments and handouts. Registration deadline is August 7. Contact us if you would like a complete agenda and registration form (I am also sending copies to all Lake County dryer operators).

JUST PUBLISHED - PESTS OF THE GARDEN AND SMALL FARM

UC ANR Publication #3332 - 276 pages with color photos - $25.00

PESTS OF THE GARDEN AND SMALL FARM, written by UCIPM Specialist Dr. Mary Louise Flint, is a comprehensive and easy-to-use guide to insects, mites, plant diseases, nematodes and weeds that affect vegetables and fruit trees.

Featuring more than 250 color photographs of pests and more than 100 black and white drawings and photographs, this book enables you to identify pests quickly - and to prevent, correct, or live with mot common pest problems. Crop tables at the back describe major pests on 30 vegetable and fruit tree crops and refer you to specific pages for more detail.

The IPM approach minimizes the use of bread-spectrum pesticides, relying primarily on alternatives such as:

* biological control
* resistant varieties
* traps and barriers
* less toxic pesticides such as soaps, oils and microbials
* changing planting, irrigation or cultivating procedures; and
* other preventive measures

This book tells you how to tailor a pest management program to your needs, taking advantage of beneficial organisms and using organically acceptable methods whenever possible.

AUGUST CHECKLIST (contact me about any of these)

Weed Control - BEGIN PLANNING YOUR FALL PROGRAM!!! Pear growers should contact us for a copy of the excellent section on weed management in the May 1990 UC Pear IPM Guidelines (60 cents).

Declining/dead trees and vines - Remove as soon as possible to prepare the ground for replanting. If oak root fungus is the culprit, I recommend you consider fall pre-plant fumigation with methyl bromide.

1990 Pear Short Course - November 26-30; PLAN TO ATTEND! More info later.

Grape potassium deficiency sampling - If June bloom petiole levels were low or you are seeing suspicious symptoms, collect another sample this month so you can decide if a fall treatment is necessary.

K LEVELS

Level	Percent Bloom	Percent Mid-summer
Adequate	over 1.5	0.8
Questionable	1.0 - 1.5	0.5 - 0.8
Deficient	below 1.0	below 0.5

Late-season grape irrigation - Severely stressed vines due to phylloxera, poor soil conditions (gravel, hard pan, etc.) or some other reason should not be deprived of water simply to enhance "quality". A dead vine produces absolutely no quality.

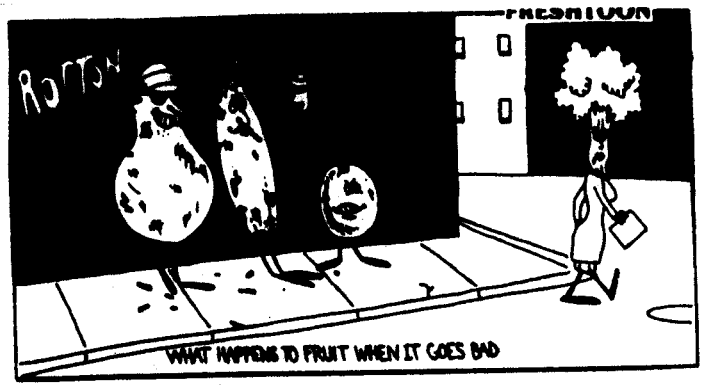
UC Grape Pest Management Guidelines - We have July 1990 updates for cutworm and omnivorous leafroller.

Walnut husk fly - Continue to monitor traps since adults can emerge through September (see July Hort Notes).

Sincerely,

Rachel

Rachel Elkins
Farm Advisor



HAVE A GREAT PEAR HARVEST!!