UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION COUNTY OF LAKE

your Lake County HORTICULTURAL NOTES

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August 1988

WHICH PEARS SURVIVED THE 1988 FROST SEASON?

Depending on location and grower, orchards were frost protected up to 30 nights (more?) in 1988. Conceivably, one could have already protected 8 - 9 nights by full bloom (March 21). Later in the season it is easy - and preferable - to "forget" all those early nights of potential crop loss. The hailstorms and frosts of late April-early May resulted in significant yield and quality loss. However, in many cases much of the potential crop had already succumbed to early, pre-bloom frosts.

The unusually early, long frost season and corresponding earliest bloom in history prompted Broc Zoller to suggest we try to quantify which bloom stages were most vulnerable to frost damage, or conversely, which would make harvest.

PART I

On March 19th, Broc and I sampled 50 clusters from the upper and lower portions of five trees in a cold orchard near the Kelseyville key station at Stokes Ladder. We also collected a random 100 blossom sample of each flower stage to determine the percent damaged. Approximate bloom distribution was:

STAGE	% of TOTAL FLOWERS
pre-petal	30
unopen popcorn	30
partially open	10
partially dehisced*	10
fully dehisced	20

*anthers split and pollen released

In the lower portion of the tree, only the pre-petal blooms were as yet relatively undamaged. The other stages had suffered 75 - 95% damage (black pistil). Upper portion blooms were better off: pre-petal, unopen popcorn and partially open blooms were only slightly (1 - 10%) damaged. Partial dehisced and fully dehisced were 20 - 30% damaged. Thus, in the lower part of the trees, 65 - 70% of the crop had been lost by March 19. In the upper portion, more than 70% still remained. This data correlates with temperatures in early March known to kill pre-bloom stages:

TABLE I. CRITICAL TEMPERATURES FOR BLOSSOM BUDS

BUD DEVELOPMENT STAGE	CRITICAL TEMPERATURE (°F) 10% KILL	90% KILL
separated scales	15	0
blossom buds exposed	20	6
tight cluster	24	15
pre-petal	25	19
popcorn	26	22
partially open	27	23
full bloom	28	24
post bloom	28	24

TABLE 2. DAMAGING TEMPERATURES, SPRING 1988

DATE	KELSEYVILLE	SCOTTS VALLEY
3/09	23.5	24.0
3/10	24.0	26.0
3/11	25.0	26.0
3/12	25.0	25.0
3/13	27.0	27.0
3/14	27.0	27.0
3/15	26.5	27.5
3/23	27.5	(29.0)
3/26	27.0	(31.5)
3/27	26.0	28.0
4/07	27.0	27.5
4/30	27.5	(29.0)

PART 2

In the upper and lower part of each tree, two terminal and two spur clusters were selected. Various colors of thread, one for each bloom stage, were tied around corresponding flowers in the clusters. On July 7th, we returned to count the surviving pears.

In the lower clusters, mainly the unopen popcorn and partially open stages (as of March 19) had survived the subsequent nights of frost to make pears. BUT - the survival rate was only 15 - 23%. Very few later stage or pre-petal blooms (0 - 6%) became fruit. In the case of pre-petal, the reason could either be a vulnerable stage at some critical later time or more likely, they were too far behind to become crop.

In the upper part of the trees, unopen popcorn and partially dehisced (but undamaged as of March 19), blooms survived the best (about 60%). However, we only tagged upper clusters in one out of the five trees so the sample size was too small to draw definite conclusions. The trend is similar to the lower portion situation.

So, what can we say about bloom stage vis-a-vis frost? We can only conclude that as of March 19 in one very cold orchard:

1) most of the remaining blooms were in pre-petal through partially open stage;
2) the lower portion of trees had already suffered major frost damage; the upper portions were relatively intact.

As of July 7:

3) the earliest blooms were least likely to make pears; unopen to partially open blooms were most likely to survive;
4) pre-petal blooms were apparently too late to set fruit;
5) less than 50% of even the least vulnerable stages survived subsequent frosts.

Since we only checked blooms/fruit on the two dates, exactly on which nights each flower was damaged is unknown. Also, if the bloom had been "tighter", i.e. a narrow distribution among stages, the results would have differed for better (more at an earlier stage) or worse (more at a later stage). We cannot account for why a certain stage was damaged or not, e.g. exposed pistil, etc.

This study was preliminary at best. Only several years of data under similar conditions will confirm the results. Hopefully, years of prolonged frost and early bloom will be few and far between. ALSO - yield variation due to microclimate, frost protection practices, original crop load, and luck is great this year. We chose a "worst case" orchard to get the most clear cut data possible.

FROST PROTECTION SEMINAR

Contact me for more information on this seminar:

COOPERATIVE EXTENSION
University of California
Riverside, CA 92521

U. S. DEPARTMENT OF COMMERCE
National Oceanic and
Atmospheric Administration
National Weather Service

Cooperating

WHAT: Frost protection seminar/workshop for the purpose of improving growers use of frost protection methods, especially using irrigation, helicopters, chemical sprays, and fruit frost forecasts. Latest research and operational ideas will be discussed. This workshop should also be very informative to farm advisors who must answer grower questions about frost protection.

WHEN: Wednesday, October 19, 1988 (12:30 p.m. to 5:30 p.m.)
Thursday, October 20, 1988 (8:00 a.m. to 4:30 p.m.)

WHERE: University of California, Riverside, California, University Club

COST: $25 (includes lunch on Thursday)

PARTICIPANTS: LIMITED TO NO MORE THAN 100

REGISTRATION:

Advance registration is required including registration fees. Checks or money orders payable to the **Regents of the University of California.**

Mail to:
Attn: Gwyn Dixon
Soils Extension
University of California
Riverside, CA 92521

The last day for registration will be Friday, September 16, 1988.

Maps, parking information, and the final agenda will be sent to you upon receipt of your registration and fee.

For further information or questions, contact Ron Hamilton or Nancy Dean at 714/787-3644 or 714/351-6750; or Gwyn Dixon at 714/787-5522.

FROST PROTECTION WORKSHOP--October 19 & 20, 1988
Please Enclose Check

Name_____

Organization_____

Address_____City_____

Telephone_____

THE 1988 PEAR HARVEST

It's been a long, challenging season. As a new advisor, it's been a rapid education on what it takes to pack a box of quality Lake County pears. I wish you all the best this harvest and look forward to going into 1989 with research ideas for a profitable future.

Sincerely,

Rachel

Rachel Elkins
Farm Advisor