

PEACH AND NECTARINE CORKING

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Summary

The effect of crop load, tree nitrogen status, and summer pruning were investigated as to their effect on corking in Summer Fire nectarines. Trees summer pruned 60 days before harvest had significantly less corking than trees receiving no summer pruning. High vigor trees, and lightly cropped trees also had more corking, but the effects were not as evident. Corking incidence did not increase in storage.

Introduction

Fruit corking has been a troublesome malady affecting peaches and nectarines for more than a decade. When corking occurs, it can cause tremendous fruit loss – often 30 to 50% or more. It is made worse by its seeming “progression” in storage after harvest.

Our prior CTFA funded research in 2003 established that corking is worst in seasons with cool, wet springs; under high vigor situations, and on trees that are lightly cropped. In that study we collected leaf samples from orchards displaying various degrees of corking and found that there was no consistent relationship between orchard nutrient status and expression of corking; however, corked fruit had a higher concentration of total nitrogen (1.15-1.42%) than did fruit displaying no corking (0.88-0.91% total N).

Because corking is associated with cold post-bloom temperatures, the 2006 growing season provided an opportunity to better examine the issue. Developmental temperatures in March were the coldest they have been in the past 25 years, (figure 1). To that end, we designed an experiment to investigate the role of crop load, tree vigor, summer pruning, and their interactions on corking incidence.

Methods

The trial was performed in a mature block of Summer Fire nectarine trees growing at the Kearney Ag Center. Our objectives were to determine the effect of the following, and their interactions, on corking severity: 1) tree nitrogen status, 2) crop load, and 3) summer pruning. Four single tree replicates were used. Trees were stripped of fruit on August 1 – about mid-way between the 2nd and 3rd harvests. Fruits were initially evaluated for external corking occurrence and then placed into cold storage at 34 F. Final fruit evaluation was performed on August 18. Leaf and fruit samples were collected from each tree for nutritional analysis.

Treatment Summary and Explanation

- Summer Pruning – Selected trees were heavily summer pruned on June 1 by removing most of the new extension growth using thinning cuts – no heading cuts that could stimulate new growth were used. The hypothesis here was that by reducing vigor, corking incidence would be suppressed.
- Nitrogen Fertilization – Since vigorously growing trees are reported to have more corking, 300 pounds nitrogen per acre was applied to selected trees in mid-April to try to induce corking.
- Crop Load – Large fruit size and light crops are associated with corking incidence, to duplicate this, selected trees were thinned to normal crop loads and light crop loads. Note that 2006 was a light setting year so in most instances the “normal” crop received little, if any, thinning; while the “light” crop trees were thinned additionally.

Fruit Evaluation

Fruit were scanned visually and rated on a 0-5 scale for corking severity, with each category representing approximately 20% occurrence intervals. For example, a fruit with a rating of ‘0’ had no corking, while a fruit with a ‘3’ had about 60% of its surface or flesh affected. The initial evaluation only rated external symptoms. During the second evaluation, all fruits were rated for external symptoms and then were peeled so that initial symptoms could be observed and rated.

Results

A summary of the treatment results are presented in table 1. We performed 12 total tests, and for external expression of corking only summer pruning (2 instances of reduction of corking) and nitrogen fertilization (4 instances of increasing corking) had a statistically significant effect. For internal incidence, summer pruning reduced corking in 11 out of 12 tests. Corking incidence did not increase in storage – data not shown.

External corking incidence is shown in tables 2 and 3. Summer pruning significantly reduced corking. Only 12% of the fruit from summer pruned trees showed any sign of corking, while 26% of fruit from non-summer pruned trees showed some degree of corking, (table 2). Five percent of the fruit from trees receiving high rates on nitrogen were severely corked, while only 1% of the fruit from low nitrogen trees fell into the same grouping, (table 3).

Internal corking incidence is shown in table 4. Summer pruning significantly reduced corking – approximately 80% of the fruit from summer pruned trees fell into categories considered easily marketable (categories 0 and 1), while only 50% of the fruit from non-summer pruned trees fell into the same grouping. Severe corking affected only 2% of the fruit on summer pruned trees, and 11% of the fruit on non-summer pruned trees.

Discussion

Of the options that are commonly available to growers, summer pruning offers the greatest possibility of reducing corking expression in orchards. In this trial, heavy summer pruning approximately 60 days before harvest significantly reduced both external and internal corking. (Note that this is drastically earlier than the timing of summer pruning commonly practiced in this area and that even earlier summer pruning might have been more beneficial.) Presumably, summer pruning reduces the competition between growing shoots and developing fruits, allowing some as yet unknown resource(s) to be diverted to fruit. Both supplemental nitrogen and crop load had some, but slighter effects, on corking incidence.

As such, on those varieties and blocks known to have problems with corking, growers should avoid stimulating excessive vigor. Most importantly, in seasons in which March and April temperatures are significantly cooler than normal, trees should probably be summer pruned sometime in May.

Table 1. Summary of the effectiveness of treatments on the expression of corking severity in Summer Fire nectarine. Where n = incidence of significant difference by categorical test, 12 tests total. Totals do not equal 12 due to interaction.

Treatment	External Symptoms	Internal Symptoms
No effect	6	1
Summer Pruning	2	11
Nitrogen Fertilization	4	0
Crop Load	0	2

Table 2. Categorical incidence of external corking in Summer Fire nectarine. Differences are significant at the 5% level.

Treatment	No Corking (category 0)	Corking Incidence
Summer Pruning	88%	12%
No Summer Pruning	74%	26%

Table 3. Categorical incidence of external corking in Summer Fire nectarine. Differences are significant at the 5% level.

Treatment	Severe Corking (category 3-5)
Low Nitrogen	1%
High Nitrogen	5%

Table 4. Categorical incidence of internal corking in Summer Fire nectarine. Differences are significant at the 5% level.

Treatment	None to Slight Corking (category 0-1)	Severe Corking (category 3-5)
Summer Pruning	79%	2%
No Summer Pruning	50%	11%

Figure 1. Annual growing degree-day temperatures in March using 45 F as cutoff. Horizontal line is the average, 357 DD.

