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Evaluating the Impact of Spray Volume and Pruning on Effectiveness of the Sooty Blotch/flyspeck Warning System

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Abstract
A sooty blotch flyspeck (SBFS) warning system, developed in North Carolina and modified in Kentucky, extends the period between first-cover and second-cover fungicide sprays until a total of 175 hours of wetness has been measured in the orchard canopy. After the second cover, sprays are made at 2-week intervals until harvest.

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Evaluating the Impact of Spray Volume and Pruning on Effectiveness of the Sooty Blotch/flyspeck Warning System

RFR-A9010

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Introduction

A sooty blotch flyspeck (SBFS) warning system, developed in North Carolina and modified in Kentucky, extends the period between first-cover and second-cover fungicide sprays until a total of 175 hours of wetness has been measured in the orchard canopy. After the second cover, sprays are made at 2-week intervals until harvest.

In our replicated field experiments at the ISU Horticulture Station in recent years, the warning system was consistently as effective as calendar-based spray timing in suppressing SBFS and other summer diseases (secondary scab and fruit rots). But in our demonstration trials in commercial orchards, the warning system resulted in commercially unacceptable levels of SBFS in 12 of 28 site-years during 2001–2003.

When analyzing the trials where SBFS control was unacceptable, we suspected that two factors—inadequate pruning and low-volume spraying—could be responsible. Inadequate pruning can reduce control of SBFS, scab, and other diseases, both by blocking spray penetration and slowing dry-off after rain or dew periods. Because of labor shortages, however, apple growers sometimes cannot prune all blocks annually, and SBFS damage is often greatest where pruning has fallen behind schedule.

The objective of this research was to determine whether pruning and/or fungicide-spray volume affect the success of a widely tested SBFS warning system.

Materials and Methods

Chieftain Apples (M7 rootstock; spacing 12 × 25 ft) planted at the ISU Horticulture Research Station in a randomized complete block (RCB) design (4 trees/replicate) with 8 treatments: a factorial combination of 2 pruning treatments × 4 fungicide-spray volume treatments. Trees were pruned during the winter. Fungicide treatments were applied with an airblast sprayer. In Iowa, the treatments applied to pruned and unpruned trees were:

- **200 gal/acre –** we are using the SBFS warning system to time the second cover spray
- **100 gal/acre –** we are using the SBFS warning system to time the second cover spray
- **48 gal/acre –** we are using the SBFS warning system to time the second cover spray
- **Unsprayed control** – no fungicide sprays after petal fall

Following the second cover fungicide spray, all treatments were sprayed with 48 gal/acre every 14 days until harvest, to emulate the lower range of spray volumes that apple growers are using in the Midwest. At harvest, 50 apples from each tree (25 from the upper half of the tree, 25 from the lower half) were evaluated for presence of codling moth, scab, bitter rot, and the severity of SBFS.

Results and Discussion

All fungicide spray treatments were effective in controlling SBFS (Table 1). Spray volume affected the incidence of apples with SBFS ($P < 0.0001$), and the 200 gal/acre treatment resulted in less than 2% of the apples

developing SBFS. SBFS severity was frequently less than 2%, however, so most of the apples were considered marketable, according to USDA standards, for all spray volume treatments. Pruning was found to have no influence on the effectiveness of the warning system ($P = 0.6637$). However, pruning without summer fungicide sprays resulted in less SBFS than no pruning without summer fungicide sprays. Incidence of codling moth was greater ($P < 0.0001$) in pruned than unpruned trees. No symptoms of bitter rot or scab were detected.

General Conclusions

Increasing the spray volume from 48 gal/acre to 200 gal/acre for the second cover spray (whose timing was determined by the SBFS warning system) reduced incidence of SBFS in harvested apples by about 6%. Therefore, increasing spray volume to 200 gal/acre for this spray can help to ensure effectiveness of the warning system in suppressing SBFS.

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Table 1. Average percent of apples with marketable quantities of SBFS (< 2% coverage), with any SBFS, and with codling moth damage.

Treatment	Treatment	Marketable apples (%)[a]	Apples with SBFS (%)[a]	Codling moth (%)[a]
1	Unpruned, 200gal/acre	100 a	1.62 a	16.7 a
2	Unpruned, 100gal/acre	100 a	3.80 ab	21.2 ab
3	Unpruned, 48gal/acre	99 a	9.27 c	22.9 ab
4	**Unpruned, Unsprayed**	**84 c**	**51.37 e**	**30.9 cd**
5	Pruned, 200gal/acre	100 a	0.73 a	21.2 ab
6	Pruned, 100gal/acre	99 a	3.13 ab	24.4 cd
7	Pruned, 48gal/acre	99 a	7.05 bc	24.7 bc
8	**Pruned, Unsprayed**	**92 b**	**44.20 d**	**34.0 d**

[a]Least square means followed by the same letter are not different within column according to Fisher's protected LSD at $P \leq 0.05$.