# A Preliminary Study of IPM Options for Peaches: Brown Rot

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Peaches have gained more attention from Massachusetts tree-fruit growers, who in recent years have been looking for crop options in addition to apples. Peaches can produce highly saleable fruit earlier in the season, and usually command a good price, particularly for direct market sales. High quality peaches which have been allowed to ripen on the tree longer than peaches shipped from California, New Jersey, or the South can get a premium price. However, the riper a peach is, the higher the chances are that it will develop brown rot or other postharvest decays. This may happen on the tree, or worse yet, on the customer's shelf. While other rots can be a problem, peach brown rot, caused by the fungus *Monilinia fructicola,* is the most serious fungal disease problem for Massachusetts growers, and fungicides used on peaches primarily are aimed at managing this disease. The timing of these fungicide applications is based largely on tree development, but it is not clear what timing scheme is most effective and efficient.

The biology of the fungus suggests that there are two critical times when peaches should be protected: bloom and fruit ripening. Brown rot infections on peach develop during these two phenological stages. Blossom blight may cause flowers to wither, turn brown, and die, and later produce spores which later infect fruit. These blossom infections may also move into twigs and cause significant damage when conditions for disease development are highly favorable. Normally blossom infections remain quiescent, or latent, until fruit starts to ripen. Then, the infections will start to grow, produce spores, and spread to other ripe fruit. Between bloom and harvest, fruit susceptibility to brown rot remains quite low from pit hardening to 2 weeks before full ripeness (Biggs and Northover, 1988). By monitoring pit hardening and ground color, growers might eliminate fungicide sprays during this period, and get better brown rot control.

## *Materials & Methods*

To examine the effect of reducing fungicide use for managing brown rot during pit hardening, an experiment was conducted at the University of Massachusetts Horticultural Research Center during the 1996 growing season. The experiment was conducted in two blocks of peaches, one Redhaven and the other Glohaven. Each treatment plot consisted of three trees. There were three replications of the experiment in the Redhaven block and four in the Glohaven block.

Sampling for pit hardening was done in mid- through late June. Until pit hardening in early June, all treatment plots received standard calendar-based fungicide applications every 7 to 10 days, starting at early bloom. These consisted Captan 80WP at 1 lb/100 gal. After that time, fungicides were applied according to four treatment patterns. In one treatment, the calendar applications were continued at 7 to 14 day intervals, using Captan (80W, 1 lb./100 gal.) on the early spray dates or the same rate of Captan plus Benlate

Table 1. Fungicide treatments in Redhaven and Glohaven peaches at the University of Massachusetts Horticultural Research Center, Belchertown, MA, 1996.

| Pesticide (rate/100 gal.) | Dates | Fungicide applications after pit hardening (no. after 10 July) |
|---|---|---|
| *Full spray* | | |
| Captan 80WP (1 lb.) | 17 June, 2 July, 14 July | 3 |
| Captan 80WP + Benlate 50DF (6 fl oz.) | 25 July, 2 Aug. | 2 |
| *Reduced spray* | | |
| Captan 80WP (1 lb.) | 2 July, 14 July | 2 |
| Captan 80WP + Benlate 50DF (6 fl oz.) | 2 Aug. | 1 |
| *Low spray* | | |
| Captan 80WP (1 lb.) | 2 July | 1 |
| Captan 80WP + Benlate 50DF (6 fl oz.) | 2 Aug. | 1 |
| *No spray* | | |
| None | none | 0 |

(50DF 6 fl oz./100 gal.) on later dates. In a second treatment, one fungicide application was made between pit hardening and fruit ripening, with one additional fungicide application during fruit ripening using the same fungicides and rates. In the third treatment, no fungicide applications were made following pit hardening and one fungicide application was made during fruit ripening using the same fungicides and rates. A fourth treatment was not sprayed at all. These treatments with the numbers and dates of applications are detailed in Table 1.

Redhaven fruit were harvested on 15 and 21 Aug.; Glohaven fruit were harvested on 3 Sept. Therefore, the last fungicide applications were made from 2 to 4 weeks before harvest, depending on the cultivar, and 2 to 4 weeks after pit hardening. Therefore the experiment evaluated the effect of different numbers of fungicide sprays applied during pit hardening, from no sprays to five sprays.

Evaluation of fruit rot damage was done at harvest, and 5 to 7 days after harvest. Brown rot and other rots were distinguished on the basis of symptoms. Disease incidence is the number of fruit which show any disease. Disease severity estimates the extent of fruit rot using a 1 to 5 scale, with 1 the least severe and 5 the most severe.

## *Results & Discussion*

The number of fungicide applications after pit hardening but before ripening had an effect on brown rot and other rots, but it was not consistent. In Redhaven fruit at harvest, there was significantly less rot in the full spray and reduced spray treatments compared with the low spray treatment (Table 2). However, the no spray treatment also had significantly less brown rot at harvest compared with the low

Table 2. Disease evaluations on Redhaven peach fruit under different pesticide treatment schedules, University of Massachusetts Horticultural Research Center, 1996.*

| | At harvest | | | | Postharvest | |
|---|---|---|---|---|---|---|
| Treatment | Brown rot incidence (%) | Brown rot severity | Incidence of other rots (%) | Severity of other rots | Brown rot incidence (%) | Incidence of other rots (%) |
| Full spray | 2 b | 0.02 c | 0 b | 0.01 b | 24 b | 14 a |
| Reduced spray | 4 b | 0.11 b | 0 b | 0.00 b | 21 b | 21 a |
| Low spray | 8 a | 0.19 a | 2 a | 0.05 a | 31 b | 14 a |
| No spray | 4 b | 0.07 c | 0 b | 0.00 b | 49 a | 9 a |

* Severity: 1 = least severe, 5 = most severe. Means in each column followed by the same letter do not differ significantly from each other at odds of 19:1.

Table 3. Disease evaluations on Glohaven peach fruit under different pesticide treatment schedules, University of Massachusetts Horticultural Research Center, 1996.*

| | At harvest | | | | Postharvest | |
|---|---|---|---|---|---|---|
| Treatment | Brown rot incidence (%) | Brown rot severity | Incidence of other rots (%) | Severity of other rots | Brown rot incidence (%) | Incidence of other rots (%) |
| Full sprays | 7 c | 0.18 c | 1 a | 0.01 a | 37 a | 20 a |
| Reduced spray | 20 b | 0.52 b | 1 a | 0.01 a | 60 a | 28 a |
| Low spray | 10 c | 0.30 c | 2 a | 0.02 a | 32 a | 12 a |
| No spray | 48 a | 1.30 a | 1 a | 0.01 a | 58 a | 36 a |

* Severity: 1 = least severe, 5 = most severe. Means in each column followed by the same letter do not differ significantly from each other at odds of 19:1.

spray regime. Approximately one week after harvest, none of the sprayed treatments had significantly different brown rot incidences, and all were lower than the no spray treatment.

In Glohaven fruit, the pattern was closer to what one would expect (Table 3). At harvest, the no spray treatment had more brown rot and more severe brown rot than any of the spray treatments. Again, brown rot was lowest in the full spray trees. However, in this cultivar, brown rot was just as low in the low spray treatment, and significantly higher in the reduced spray treatment.

Unfortunately, this test did little to resolve the usefulness of fungicides during the period between pit hardening and harvest. None of the reduced-spray options consistently did as well as the five-spray program. It is difficult to explain the failure of two fungicide applications vs. no applications in Redhaven, and of three applications vs. two applications in Glohaven. It is possible that there was contamination caused by fungicide drift. Beyond that, there may have been differences in inoculum or other factors which were not adequately controlled.

This test did not conform to the recommendations made by Biggs and Northover. Rather than eliminating or reducing sprays after pit hardening, and then making one or two applications very near harvest as fruit ripened, this test looked at different numbers of fungicide applications made after pit hardening but stopping all fungicides at least two weeks before harvest. This may account for the results, as Captan and Benlate would not generally persist for more than a week against heavy brown rot pressure. Any small, random outbreak of brown rot would have been able to spread in all treatments during the 2 to 3 unprotected weeks before harvest. Only the heaviest fungicide treatment consistently reduced this problem.

A similar experiment, focusing on bloom and harvest fungicide applications, will need to be done to resolve these problems.

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