Effectiveness of Peripheral-row vs. All-row Sprays against Plum Curculio

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Studies by Chouinard et al. (1992) and Vincent et al. (1997) suggest that spraying only peripheral rows of trees as opposed to all rows of trees can be an effective approach to plum curculio (PC) control in many Quebec apple orchards. This approach is rooted in the presumption that most PCs overwinter in woods or hedgerows outside of orchards and when entering orchards in spring do not move beyond peripheral rows of apple trees before settling down to feed and lay eggs. The proportion of overwintering PCs that satisfies this presumption under New England conditions is uncertain. Such uncertainty invites evaluation of peripheral-row vs. all-row sprays against PC in New England orchards.

Here, in 2003 in one orchard in Vermont and two orchards in New Hampshire, we compared three different approaches to spraying PC that differed in location of trees (peripheral vs. interior rows) designated to receive sprays.

Materials & Methods

There were three experimental plots in each orchard. Each plot contained seven rows of apple trees. The perimeter row of each plot bordered woods. All rows within a plot were of the same length (80-120 yards). All plots in the same orchard received the same insecticide at each spray event against PC: Avaunt in orchard X and Guthion in orchards Y and Z (each at label-recommended rate).

Treatment protocols in each orchard were as follows:

Plot	Petal fall spray	1st & 2nd cover spray
A	All rows	All rows
B	All rows	Rows 1 and 2
C	Rows 1 and 2	Rows 1 and 2

The petal fall spray was applied within 5 days after 90% petal fall (June 1, June 4, and June 8, respectively, for orchards X, Y, and Z). The first cover spray was applied when fruit on odor-baited trap trees reached a pre-determined threshold of two fresh egglaying scars out of 100 fruit sampled beginning 7 days after the last insecticide spray. A trap tree baited with one dispenser of attractive pheromone (grandisoic acid) plus four dispensers of attractive fruit odor (benzaldehyde) was located at the center of the perimeter row of each plot. In all, 33 or 34 fruit were sampled twice per week on each trap tree, giving a total of 100 fruit per sampling date across all three trap trees in an orchard. In response to sampling information, the first cover spray was applied on June 15 in each orchard. Sampling fruit on trap trees indicated no need to apply a second cover spray in orchards X and Y, whereas orchard Z received a second cover spray on

Table 1. Effectiveness of different spray treatment protocols for controlling plum curculio (PC) in three commercial apple orchards.

	Fruit with PC injury (%)*		
Orchard	Plot A**	Plot B**	Plot C**
X	1.7	1.9	2.0
Y	0.9	0.3	1.1
Z	0.3	1.0	6.5
Average	1.0a	1.1a	3.2a

* Average values followed by the same letter are not significantly different at odds of 19:1.
** Plot A: all rows sprayed at petal fall and first and second cover. Plot B: all rows sprayed at petal fall; only rows 1 and 2 sprayed at first/second cover. Plot C: only rows 1 and 2 sprayed at petal fall and first and second cover.

June 23. For spray applications only to rows 1 and 2, the tractor was driven outside of row 1 and between rows 1 and 2.

On June 26, we sampled 100 fruit in each of the seven rows in each plot for signs of any PC injury.

Results

Data in Table 1 show that across all three orchards, plot-wide injury to fruit by PC averaged 1.0, 1.1, and 3.2% for plots A, B, and C, respectively. Although these values did not differ significantly from one another, injury trends were similar for each orchard, with plot C always showing the greatest injury.

Conclusions

Results from this experiment indicate that applying a petal fall spray against PC only to peripheral rows 1 and 2 (as in plot C) is unlikely to provide effective orchard-wide control. However, applying a petal fall spray to all rows followed by subsequent sprays only to rows 1 an 2 (as in plot B) appears to be just as effective as applying a petal fall spray and subsequent sprays to all rows (as in plot A).

Our data from 2003, therefore, suggest the PC behavior and ecology might be slightly different in New England compared with Quebec, possibly due to the colder climate of Quebec. It seems that either more PCs overwinter within orchards in New England than in Quebec or that, prior to petal fall, more PCs move deeper into orchards in New England than Quebec after emerging from overwintering sites in woods (see the next two articles in this issue of *Fruit Notes* for further information on these two questions). Whichever, based on results here, we tentatively recommend that growers apply insecticide against PC to the entire orchard at or shortly after petal fall and spray only peripheral rows 1 and 2 in subsequent treatments against PC.

We recognize that data from trials in only three orchards provide a somewhat thin foundation for the above recommendation. We therefore plan to repeat this experiment in these same orchards in 2004.

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References

Chouinard, G., S. B. Hill, C. Vincent and N. N. Bartakur. 1992. Border row sprays for control of plum curculio in apple orchards. *Journal of Economic Entomology* 85: 1307-1317.

Vincent, C., G. Chouinard, N. J. Bostanian and Y. Morin. 1997. Peripheral zone treatments for plum curculio management: validation in commercial apple orchards. *Entomologia Experimentalis Applicata* 84: 1-8.

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