

# Comparison of Avaunt versus Guthion in Every-row versus Perimeter-row Sprays Against Key Apple Insect Pests: 2001 Results

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Organophosphate insecticides such as azinphosmethyl and phosmet have been the mainstay of grower control of plum curculios (PCs) and apple maggot flies (AMF) for more than three decades. Recent decisions by the EPA restrict use of these and other organophosphates on apple trees in ways that may cause growers to seek alternative approaches to controlling these key apple pests.

One possible alternative is substitution of one or more newly-labeled compounds for organophosphates. Another complementary approach is to reduce higher costs associated with adoption of newly labeled compounds by directing spray application only onto perimeter rows of apple trees, leaving the bulk of interior trees unsprayed. Previous research conducted by ourselves and others using azinphosmethyl applied only to perimeter rows of apple trees showed much promise for effective season-long control of PC and AMF. But this approach has not yet been evaluated using any of the newly-labeled compounds for control of PC, AMF and other important insect pests of apple. The rationale underlying such an approach centers upon two facts. First, nearly all PCs and AMF that invade orchards originate from host trees and overwintering sites outside of orchards. Second, immigrant PC and AMF focus their attack first on perimeter rows of apple trees before invading interior rows.

In 2001, we initiated a four-year study aimed, during the first two years, at comparing effects of indoxacarb (Avaunt) versus azinphosmethyl (Guthion) when applied to all rows versus only perimeter rows of apple trees for control of PC, AMF, and other apple insect pests.

## *Materials & Methods*

In April of 2001, four plots were established in each of six commercial apple orchards in Massachusetts (24 plots in all). Rootstocks and cultivars varied among orchards, but all trees in a given orchard were on the same rootstock (either M.7, M.26, or M.9) and of the same cultivar (either McIntosh, Empire, Cortland, Gala, or Delicious). Each plot was about 40 x 40 yards in size and consisted of seven rows of apple trees. The perimeter row bordered woods, hedgerow, or open field and was subjected to pressure from immigrating PCs and AMF.

Growers themselves sprayed all rows of all plots with azinphosmethyl or phosmet through petal fall. Thereafter, all sprays were applied by a hired experienced applicator using our newly purchased tractor-mounted mist blower (which was not yet available at the time of petal fall). Plots in each orchard received four sprays after the petal-fall spray: 10 days and again in 20 days after petal fall against PC, and on July 18 or 19 and again on August 8 or 9 against AMF. Spray was delivered at the equivalent of 150 gallons of water per acre. Guthion (50 wp) was applied at the rate of 10 ounces of formulated material per 100 gallons against PC and 8 ounces of formulated material per 100 gallons against AMF. Avaunt (30% WG) was applied at the rate of 2 ounces of formulated material per 100 gallons against both PC and AMF.

After the petal-fall spray, plots designated as “all-row” plots received insecticide applied to both sides of trees on all seven rows, whereas plots designated as “perimeter-row” plots received insecticide sprays

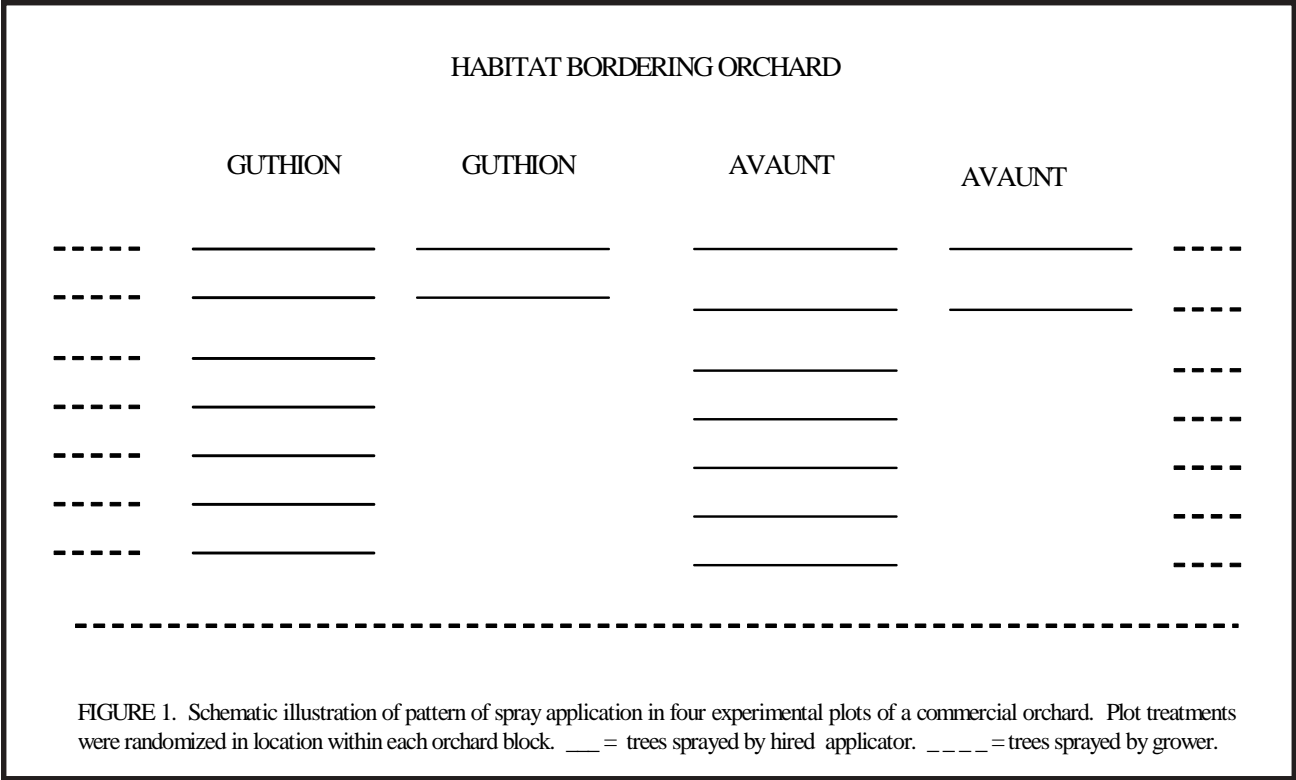


Table 1. Effectiveness of Guthion versus Avaunt against pest insects when applied to all rows versus the two perimeter rows of seven-row plots in six commercial apple orchards in Massachusetts in 2001. Values represent data averaged across all samples taken in rows 1, 3, 5 and 7 of plots.

Pest	Incidence of pest			
	Guthion		Avaunt	
	All rows sprayed	Perimeter rows sprayed	All rows sprayed	Perimeter rows sprayed
Plum curculio (% trees with fruit injury)*	4.17	4.83	4.83	5.67
Apple maggot (no. captured per sphere)*	5.50	3.50	4.00	4.40
Apple maggot (% fruit with injury)*	0.23	0.27	0.16	0.35
Summer leafrollers (% fruit with injury)*	1.15	1.35	1.00	1.52
Internal Lepidoptera (% fruit with injury)*	0.00	0.00	0.00	0.00
Potato leafhopper (% terminals with injury)**	16.70	43.30	18.70	39.30

\* No statistically significant differences among treatments at odds of 19 to 1.

\*\* Statistically fewer terminals injured in each all-row than in each perimeter-row spray treatment at odds at 19 to 1.

applied to both sides of trees of the perimeter (= first and second row but no insecticide applied to trees of the third through seventh rows (Figure 1). After the petal-fall spray, growers themselves applied azinphosmethyl or phosmet to trees in the eighth and succeeding interior rows and to orchard trees bordering plots on either side.

Weekly from petal fall until harvest in September, 100 fruit in each of rows 1, 3, 5, and 7 of each plot were sampled for injury by PC and AMF. In addition, two unbaited sticky red sphere traps were hung toward the center of each row of each plot to monitor AMF. Finally, at harvest, 100 fruit in each of rows 1, 3, 5, and 7 of each plot were sampled for injury by a variety of lepidopteran pests. At the same time, 25 foliar terminals in row five of each plot were sampled for evidence of injury by potato leafhopper.

### Results

Incidence of each pest type, as averaged across all samples of fruit, foliage or traps in rows 1, 3, 5 and 7 of each plot, is given in Table 1. Results show no

significant differences among any of the four treatments (all-row versus perimeter-row sprays of Guthion versus Avaunt) in incidence of fruit injury by PC, trap captures of AMF, fruit injury by AMF, or fruit injury by summer leafrollers (LR). No injury by internal lepidopterans was found. However, in interiors of plots where only the two perimeter rows were sprayed with Guthion or Avaunt, incidence of foliar terminal injury by potato leafhopper was significantly greater than in plots where all rows were sprayed with Guthion or Avaunt.

Although differences among treatments were nonsignificant, there was a trend for plot-wide incidence of injury by combined PC, AMF, and summer LR to be less in plots that received all-row sprays than in plots that received perimeter-row sprays: an average of 14% less for Guthion and 21% less for Avaunt (Table 1). When injury by these three pests was summed across all-row and perimeter-row sprayed plots, average plot-wide incidence was 12% less in plots treated with Guthion than in plots treated with Avaunt.

Data on incidence of injury by PC, AMF, and summer LR according to row are given in Figures 2-4. Results for AMF and summer LR suggest that sprays

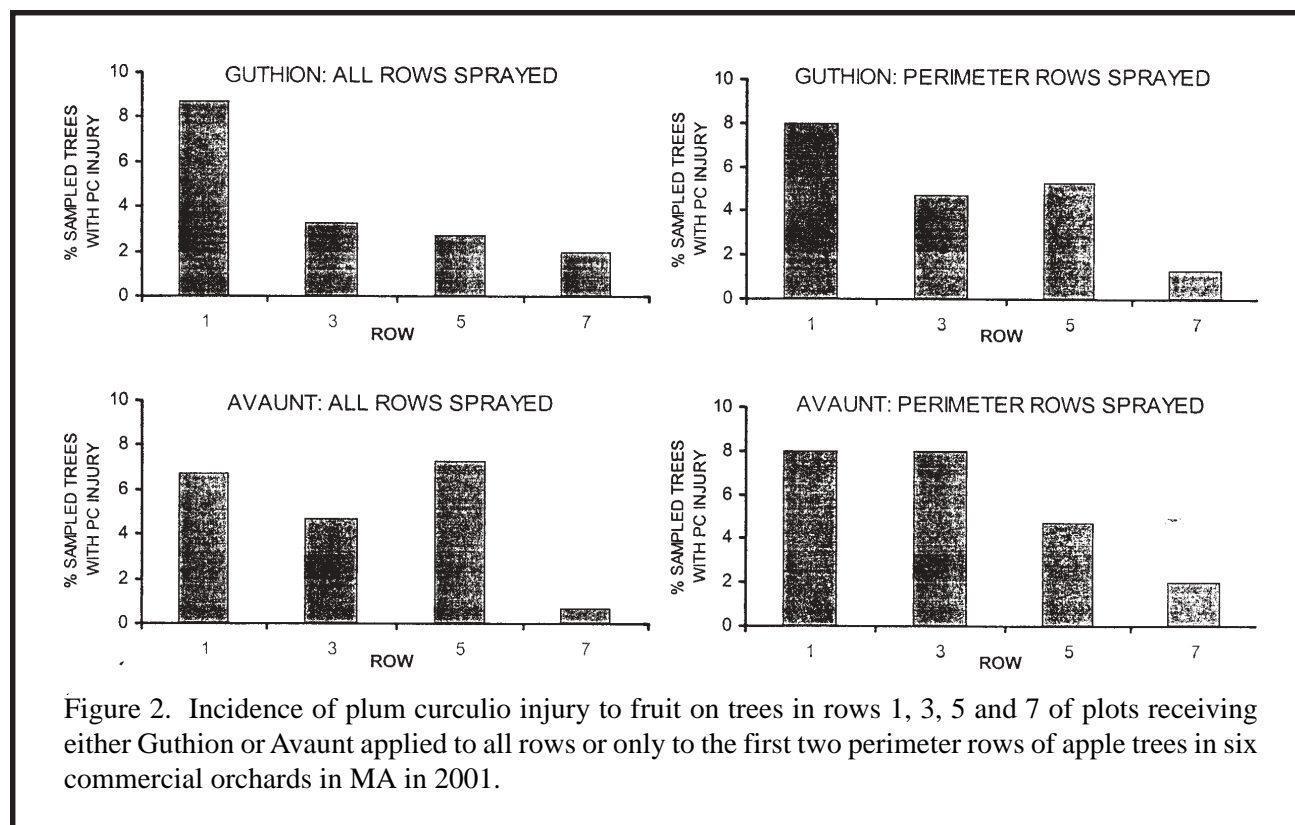
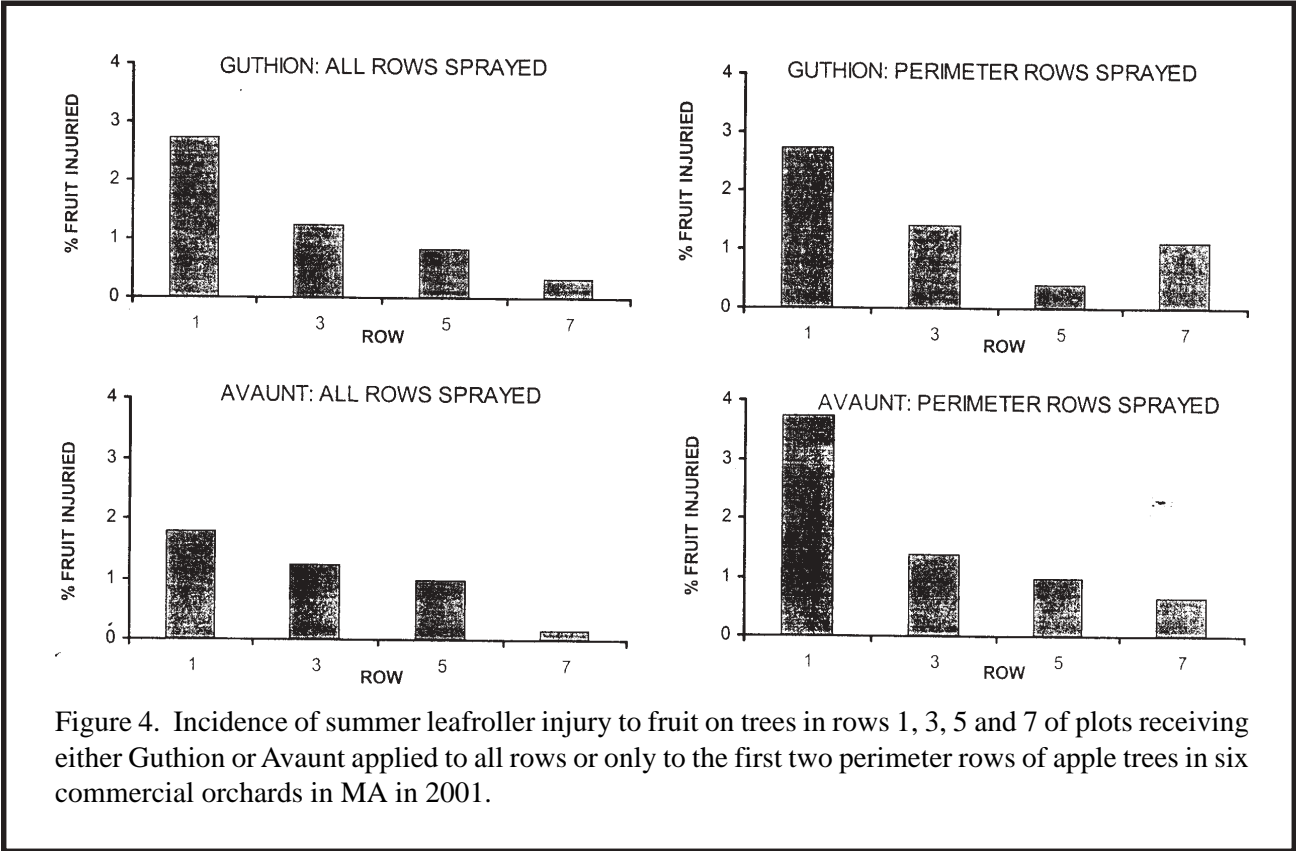
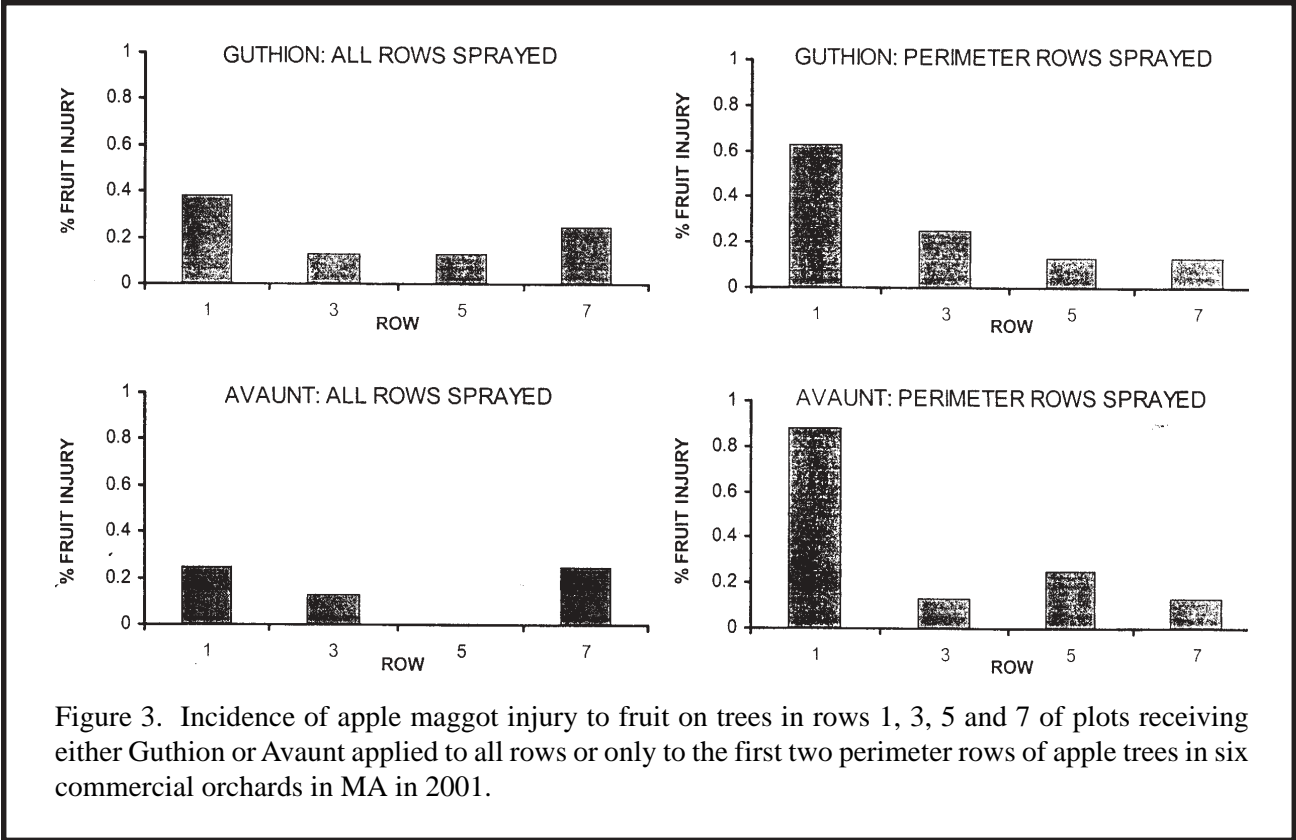


Figure 2. Incidence of plum curculio injury to fruit on trees in rows 1, 3, 5 and 7 of plots receiving either Guthion or Avaunt applied to all rows or only to the first two perimeter rows of apple trees in six commercial orchards in MA in 2001.



of Avaunt applied only to perimeter rows were about as effective as sprays of Guthion applied only to perimeter rows and about as effective as sprays of either Guthion or Avaunt applied to all rows in preventing injury to fruit on unsprayed rows 3, 5, and 7. Results for PC suggest that sprays of Guthion applied to all rows were slightly more effective than sprays of the other three treatments in preventing injury to fruit on rows 3, 5, and 7, but differences among treatments in such injury were not significant.

### ***Conclusions***

Results of this study suggest that under the weather and pest pressure conditions that existed in six commercial orchards in Massachusetts in 2001, sprays of Avaunt (at standard recommended rate) were nearly as effective as sprays of Guthion in controlling PC, AMF, and summer LR. Moreover, sprays of either of these insecticides applied only to the first and second perimeter rows of plots were about as effective in preventing injury by AMF and summer LR in unsprayed interior rows of plots as were sprays of these

insecticides applied to all seven rows of plots. Perimeter-row sprays were slightly less effective in preventing penetration and injury by PC and were ineffective in prevention penetration and damage by potato leafhoppers on unsprayed interior rows of trees.

Recent studies in other states suggest that Avaunt is just as effective as Guthion against PC but performs inconsistently against AMF. Hence, for 2002, we plan to repeat this study in the same six orchards to acquire a second year of data on the performance of Avaunt under Massachusetts conditions.

### ***Acknowledgements***

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