Comparative Level of Establishment of Released *Typhlodromus pyri* Predatory Mites in First-level and Second-level IPM Apple Orchard Blocks

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As described in the Spring 1994 issue of *Fruit Notes*, *Amblyseius fallacis* is the most commonly occurring predatory mite in Massachusetts apple orchards. Unlike orchards in many other states, few Massachusetts apple orchards harbor detectable levels of *Typhlodromus pyri* predatory mites. Previous studies in Massachusetts have shown that *A. fallacis* rarely builds to levels capable of providing effective control of European red mites until mid-July at the earliest, and often not until August. In contrast, studies in New York have shown that *T. pyri,* where established, can provide effective biocontrol of European red mites beginning as early as May.

In 1995, we released *T. pyri* into two first-level IPM and two second-level IPM block of apple trees in each of six commercial apple orchards in Massachusetts. Here, we report on the abundance of *T. pyri* in samples taken in September of 1995 and 1996 in each of these blocks as well as in adjacent first- and second-level IPM blocks where no *T. pyri* were released.

Materials & Methods

All six orchards were located in west-central or east-central Massachusetts. Each block was comprised of about 60 trees of the cultivars McIntosh, Empire, or Cortland (on M.7 or M.26 rootstock). First-level IPM blocks received pesticide sprays applied by growers timed according to pest and weather-monitoring activities that the growers themselves carried out. Second-level IPM blocks were treated identically to first-level blocks through early June. Thereafter, no pesticide of any type was applied to second-level blocks. Instead, a combination of behavioral, cultural, and biological control techniques was used.

In 1995, blossom clusters harboring *T. pyri* were picked from an orchard at the New York State Agricultural Experiment Station at Geneva, transported in a cooler by automobile to Massachusetts on the same day when picked, and placed the following day in targeted blocks. This involved using twist-ties to attach 50 blossom clusters to the central tree of each target block.

In September of 1995 and 1996, 25 leaves were picked at random from the central tree (that is, the release tree) in each block receiving *T. pyri* and 25 leaves from each of four trees nearest the central tree. A similar protocol was followed for sampling central and adjacent trees in first- and second-level blocks not receiving released *T. pyri*. Sample leaves were cooled and shipped to Geneva, New York for identification and counting of predatory mites.

Table 1. Abundance of mite predators on leaves sampled in September from first-level and second-level IPM blocks in which *T. pyri* were or were not released in May of 1995.

		Average number of predators per leaf*			
		First-level IPM		Second-level IPM	
Species	Year	Non-release block	Release block	Non-release block	Release block
T. pyri	1995	0.00 b	0.04 ab	0.00 b	0.07 a
	1996	0.02 b	0.19 ab	0.01 b	0.42 a
A. fallacis	1995	0.15 a	0.14 a	0.11 a	0.19 a
	1996	0.28 a	0.11 a	0.13 a	0.18 a

*Values in each row followed by the same letter are not significantly different at odds of 19 to 1.

Results

For *T. pyri*, the results (Table 1) show that for the 1995 samples, small but detectable numbers of this species were found in the release blocks, but none were found in the non-release blocks. For the 1996 samples, numbers of *T. pyri* in the release blocks averaged considerably greater than they did in these same blocks in 1995, suggesting that a buildup of *T. pyri* had occurred. Almost no *T. pyri* were detected in 1996 samples taken in the non-release blocks. Interestingly, when data for 1995 and 1996 release blocks were pooled, analysis indicated a significantly greater average number of *T. pyri* in second-level than in first-level IPM blocks.

For *A. fallacis*, the results (Table 1) show quite similar numbers of predators of this species present in each type of block each year. When data for 1995 and 1996 were pooled, analysis indicated no significant difference in average number of *A. fallacis* between second-level and first-level IPM blocks.

Examination of grower spray schedules revealed that no insecticides other than Guthion, Imidan, Lorsban, or Sevin (as a thinner) and no acaricides other than oil, Omite, Apollo or Savey were applied to any blocks during either year. None of these materials is known to be harmful to *T. pyri*. We believe that the significant negative effect of first-level compared with second-level IPM practices on the buildup of *T. pyri* was due to fungicide use from early June onward in the first-level blocks. Fungicides used after early June included Penncozeb, Dithane, Ziram, Polyram, Benlate, Topsin, and Captan. The first four of these materials are known to have detrimental effects on *T. pyri*.

Conclusions

Our findings indicate that by the end of the growing season of the year following their release, *T. pyri* mite predators appeared in readily detectable numbers in nearly all blocks in which they were released. The only exception occurred in one of the six orchards, where they were detected in neither of the release blocks. This orchard received 2 applications of Dithane annually in May, which might have impacted establishment of *T. pyri* negatively. It appears from our results that pesticides, particularly certain fungicides, have

a greater negative impact on buildup of *T. pyri* than on buildup of *A. fallacis*. We suggest, therefore, that growers who are considering releasing *T. pyri* to attain establishment do so only in blocks that will not be treated with pesticides that may be harsh on *T. pyri*, including pyrethroid insecticides, acaricides such as Carzol, and fungicides such as Ziram or EBDC-based materials.

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