

Do Sugar Caps Atop Wooden Pesticide-treated Spheres Affect Apple Maggot Fly Attraction to Spheres?

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In three preceding articles in this issue of *Fruit Notes*, we have shown that wooden or plastic pesticide-treated spheres (PTS) topped by sugar/wax discs that release a continual supply of sugar onto the sphere surface hold much promise for directly controlling apple maggot flies (AMF). More specifically, we found that discs of 2-inches diameter x $\frac{3}{4}$ -inch height (weighing 50 grams) contain and release enough sugar to endure up to about 6 inches of rainfall and/or 6 weeks of orchard exposure before the supply of sugar is spent. Ideally, to be cost-effective and appealing to growers for use in controlling AMF, discs ought to contain enough sugar to supply a sphere for the entire 12 weeks of the AMF season and do so under 12 inches or more of rainfall. This can be accomplished by increasing the size of the disc to some upper limit beyond which the shape of a sphere is sufficiently altered so as to become less attractive to AMF.

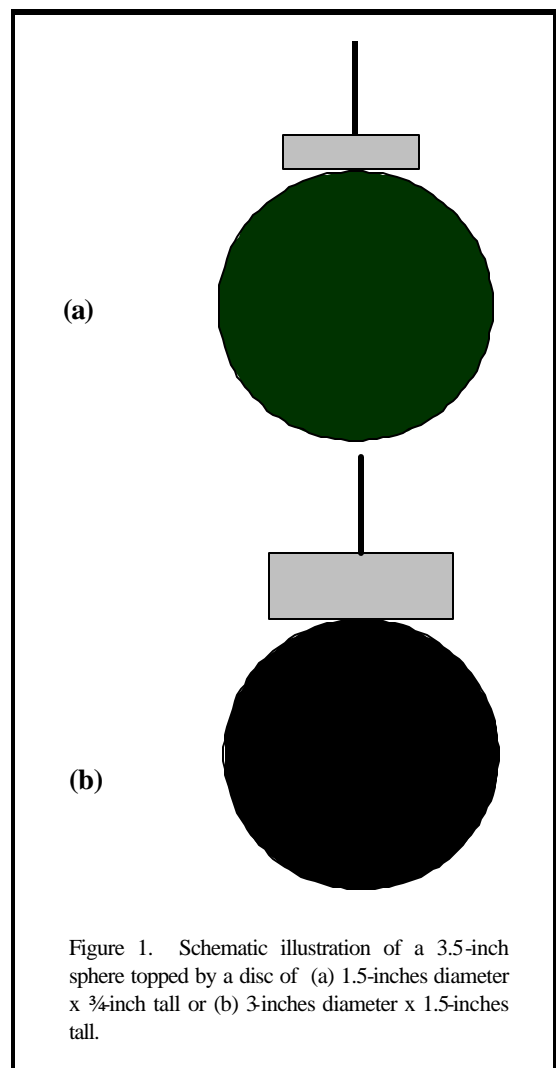
Here, we report results of a field test conducted in 2001 evaluating the impact on attractiveness to AMF of different sizes of discs atop plastic PTS.

Materials & Methods

All spheres were 3.5 inches in diameter, red in color, made of durable plastic and purchased from Great Lakes IPM of Vestaburg, Michigan. All discs were cut out from pink styrofoam insulation panels. The pink color of these discs was equivalent to initially red sugar/wax top caps that had lost about one-third of their sugar content under about 2 inches of rainfall. The size of discs ranged from 1.5-inches diameter x $\frac{3}{4}$ -inch tall to 3-inches diameter x 1.5-inches tall. All discs were centered atop plastic PTS (Figure 1). The entire surface of each sphere (but not the disc) was coated with Tangletrap to capture alighting AMF.

Spheres were hung from branches of fruiting

Delicious trees (M.26 rootstock) in an unsprayed block of apple trees at the Horticultural Research Center in Belchertown on July 31. Each of the 72 fruiting trees contained a single sphere. For each replicate, there were nine treatments consisting of eight sizes of discs plus a control sphere without any disc. Each of these nine



treatments was replicated eight times. Every two weeks until September 11, captured AMF and other insects were removed from spheres and treatments were rotated to different trees within the block of 72 trees. Besides counting the number of AMF on a sphere, we also recorded the location of each captured AMF according to top half or bottom half of the sphere.

Results

In a preliminary test involving 16 replicates, we found no difference in the number of AMF captured by spheres without a disc (1.1 AMF per sphere) and spheres topped with a disc of 1.5-inches diameter x 3/4-inch tall (1.1 AMF per sphere). This allowed us to substitute spheres without discs for spheres topped by discs of 1.5-inches diameter x 3/4-inch tall in our experimental protocol and hence distribute eight replicates of nine

Table 1. Capture of AMF on red plastic spheres (3.5-inches diameter) topped by pink styrofoam discs of different sizes.

Size of disc (in)		No. AMF captured per sphere*		
Diameter	Height	Top half	Bottom half	Total
No disc	-	3.8	4.4	8.2
1.5	1.2	3.1	5.5	8.6
1.5	1.5	4.0	4.1	8.1
2.4	0.75	7.1	8.1	15.2
2.4	1.2	6.3	6.9	13.2
2.4	1.5	5.5	6.6	12.1
3.0	0.75	4.0	6.4	10.4
3.0	1.2	5.6	8.6	14.2
3.0	1.5	4.5	7.0	11.5

* There were no significant differences among treatments in total captures of AMF at odds of 19 to 1.

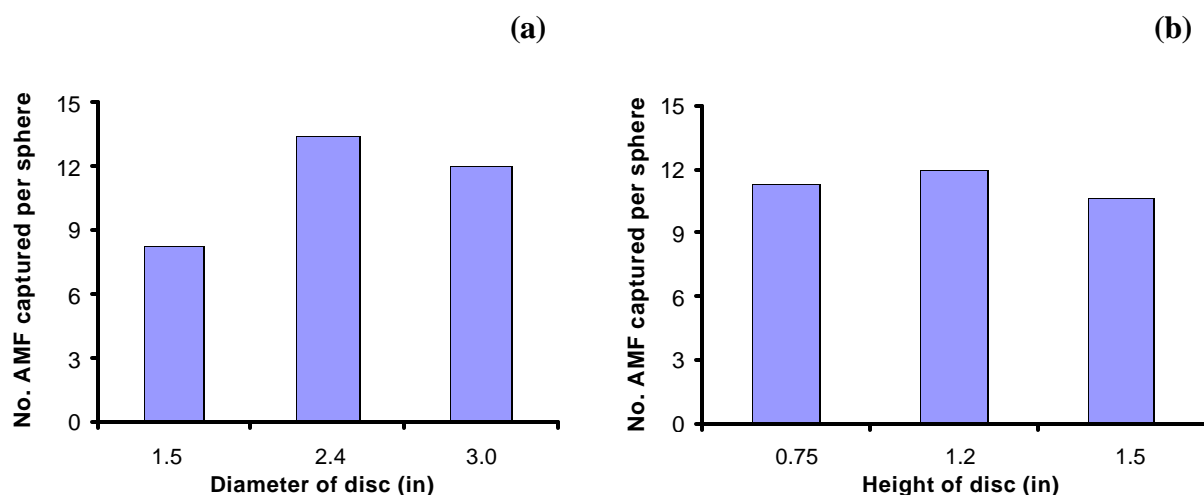


Figure 2. Capture of AMF on spheres topped by (a) discs of different diameters (averaged across discs of different height) or (b) discs of different heights (averaged across discs of different diameters).

treatments among the available 72 fruiting trees.

Although there were no significant differences among spheres topped by different sizes of discs in total AMF captured, data in Table 1 are suggestive of some trends. The three types of spheres capturing the fewest AMF were control spheres without discs and spheres topped by discs of 1.5-inches diameter. As a group, these spheres captured only 60% as many total AMF as spheres topped by discs of 2.4-inches diameter and only 67% as many total AMF as spheres topped by discs of 3-inches diameter (Figure 2). Also, as a group, spheres topped by discs of 1.2-inches height captured about 6% and 14% more total AMF than spheres topped by discs of ¾-inch and 1.5-inch height, respectively (Figure 2).

With respect to capture of AMF on the top half versus the bottom half of spheres, data in Table 1 show the following: for spheres having discs of ¾-inch, 1.5-inch, and 3-inch diameter: 55, 53, and 62%, respectively, of all captured AMF were found on the bottom half of spheres.

Conclusions

To our pleasant surprise, spheres topped by discs of 2.4 or 3 inches in diameter caught more total AMF than spheres without discs or spheres topped by discs of 1.5-inch diameter. Height of disc had little effect

on fly captures. Somewhat more AMF were captured on the bottom half than the top half of spheres.

Together, these findings bode well for future use of sugar/wax discs that are larger than the 2-inch diameter x ¾-inch tall discs we used in our 2001 laboratory and field tests. It appears that we could increase the size of sugar/wax discs to 3 inches in diameter x 1.2 or 1.5 inches in height and by doing so actually enhance sphere attractiveness to AMF. Furthermore, our findings here that most AMF alight on the bottom half of spheres suggest that post-alighting AMF would have increased probability of encountering sugar on the sphere surface, which tends to collect more on the bottom half of spheres. Finally, information from another test revealed that all 50 AMF observed alighting on spheres topped by sugar/wax discs (2-inches diameter x ¾-inch tall) did so on the spheres themselves and not on the discs. This ensures that alighting AMF would encounter pesticide and sugar on the sphere surface rather than pesticide-free sugar discs atop spheres.

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