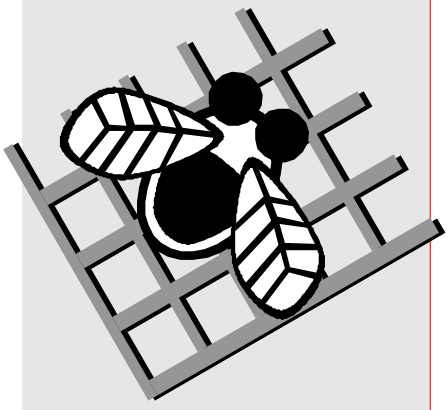
CUTT

Mike's Research

The results of this collaboration are an extraordinarily detailed knowledge of how well halofenozide can disrupt the development of Japanese beetle, oriental beetle and European chafer. This knowledge is of tremendous practical importance to turf managers, since we showed that this product is most useful when directed against Japanese beetles, less active against oriental beetles, and isn't likely to be useful against European chafer.



What Lies Beneath

My interaction with Mike Villani started in 1990 when I was a newly hired faculty member at the University of California, Riverside. The California Department of Agriculture was (and still is) greatly concerned that Japanese beetles (JB) might enter that state, so they requested research to investigate how well various conventional insecticides would perform against JB in California soils. Of course, we couldn't bring Japanese beetles to California to do laboratory tests, so Mike and I teamed up to do the bioassays in Geneva with soil samples shipped from sites in California at risk of JB entry in California.

Mike's approach to this work was characteristically gung-ho. His exceptional team of workers would dig thousands of larvae from turf sites in the Finger Lakes area, so large experiments were then feasible. Once the experiments had taken place and yielded its data, Mike looked at each iteration of journal article and data analysis to be sure that nothing of possible importance was left out. Because of his guidance, I can now say that I am a better scientist. Instead of simply collecting data and reporting results, I ask the important questions: Why did the results turn out the way they did, and what critical experiments could be conducted to follow up on new leads suggested by those results?

Mike was an exceptionally generous scientist. While some scientists like to be the expert in their field, and will try to protect their "turf" from perceived competitors, Mike unselfishly shared his work with others. An example is when he shared his research on halofenozide with me. To be honest, perhaps the drudgery of running all the statistics wasn't as exciting to Mike as it is for me. In any case, Mike handed me completed dose- and time-response series data for various species of white grubs exposed to halofenozide, allowing me to analyze, graph, and report on the results from these important tests.

The results of this collaboration are an extraordinarily detailed knowledge of how well this growth regulator compound can disrupt the development of JB, oriental beetle and European chafer. This knowledge is of tremendous practical importance to turf managers, since we essentially showed that this product is most useful when directed against JB, less active against oriental beetles, and isn't likely to be useful against European chafer. In our most recent work, Mike helped to show that Asiatic garden beetle larvae are insensitive to halofenozide (Mach 2 or GrubEx). Mike found it especially noteworthy that the results from the bioassay cups in the laboratory were entirely consistent with results observed from field trials.

The over-arching message from Mike's work on applied projects with white grubs is as follows: Expect interactions between the species and stage of white grub, the environmental conditions, and the control agent. This view of white grub management makes sense out of data that otherwise might look contradictory, and permits a better understanding of turf ecology.

The easiest way I have found to illustrate these concepts of interactions is by borrowing and adapting the "disease triangle" from plant pathologists (Fig. 1). Most practitioners understand that disease cannot take place in a plant unless you have (1) a susceptible host, (2) presence of the disease organism and (3) environmental conditions favorable for infection. In the case of white grub management, we can look at an analogous interaction between (1) the grub, (2) the control agent and (3) the soil environment.

The grub's susceptibility will be influenced by its species and developmental state. The control agent might be a chemical, fungus, or insect pathogenic nematode, and the qualities of this agent are obviously changing over time. The soil environment involves moisture, temperature, organic matter, and texture. When all three components are considered together, then the likelihood of achieving mortality from the three-way interaction can be visualized. For example, greater soil moisture (an environmental variable) will influence grub behavior so that it feeds closer to the soil surface. This allows a greater interaction between the grub and any applied control agent, thus leading to greater potential mortality.

As a practical matter, turf managers (including homeowners) need exactly the kind of data that Mike was able to provide, to have a more complete understanding of the strengths and weaknesses of the tools available to them.

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