GROWERTALKS

Features

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Are All Whiteflies the Same?

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Pictured: Bemisia whiteflies on a poinsettia.

Most poinsettia growers have probably heard of "Q biotype"—a relatively new strain of whitefly in North America that's been in the news for a number of years. Just as a forewarning, some of the technical information that follows may seem a little daunting, and the story is quite complex, but it's important to understand some of the background and the relevance to successful control of Bemisia in poinsettias.

The initial thinking was that Q biotype belonged to a whitefly species called *Bemisia tabaci*. Another strain of this same species was called B biotype (variously known as silverleaf whitefly or sweet potato whitefly) and it's been a major whitefly pest on poinsettias since the late 1980s. Q biotype has been present in southern Europe and the Middle East for many years, where it's been a major pest on greenhouse vegetables. It's resistant to many commonly used insecticides, has a wide host range and can transmit a number of devastating plant viruses to greenhouse vegetable crops. In late 2004, Q biotype was discovered on poinsettias in Arizona and in the following year (2005) was found in more than 20 U.S. states, often on poinsettias. Since then, it's been found every year (at varying levels) on poinsettias in mixed populations with B biotype.

The term "biotypes" needs some explanation here. It's a word used to describe different populations of the same species that show some differences in biological characteristics (in the case of Bemisia, for example, differences in pesticide resistance and ability to transmit viruses), but are otherwise identical in appearance. In the early 1990s, soon after B biotype emerged as a pest of poinsettias, there was much debate in the taxonomic community (those scientists who identify and assign insects to their appropriate classification) about whether these "biotypes" are really the same species, or are in fact different species. B biotype was in fact identified by North American taxonomists as *Bemisia argentifolii* based on differences in its DNA

compared to other Bemisia populations.

When Q biotype was found on poinsettias in Arizona, the taxonomic discussions were renewed and it seems that a consensus has now been reached. Current thinking is that the whitefly species originally known as *Bemisia tabaci* is actually a complex of 20-plus cryptic species (cryptic meaning “hidden” because they’re impossible to tell apart based on their appearance) and that the term “biotype” is incorrect. “Q biotype” is now thought to be the original *Bemisia tabaci*, which was first described in the 1880s. The other 20-plus species in this complex don’t yet have names other than their “biotype” designations (with the exception of B. argentifolii as noted above), and “B” and “Q” cannot be easily distinguished from each other. To make the story even more complicated, the scientific community now refers to these two species as Mediterranean (formerly Q biotype or sweet potato whitefly) and Middle East-Asia Minor 1 or MEAM1 (formerly B biotype, *Bemisia argentifolii*—
silverleaf whitefly).

However, for ease of understanding and reading the rest of this article, it’s probably easiest to refer to whiteflies (in the general sense) on poinsettias as simply Bemisia. And when discussing the two species that have come to be known as “B” and “Q,” it’s probably easiest to maintain those designations (again for simplicity), which we will do in the rest of this article.

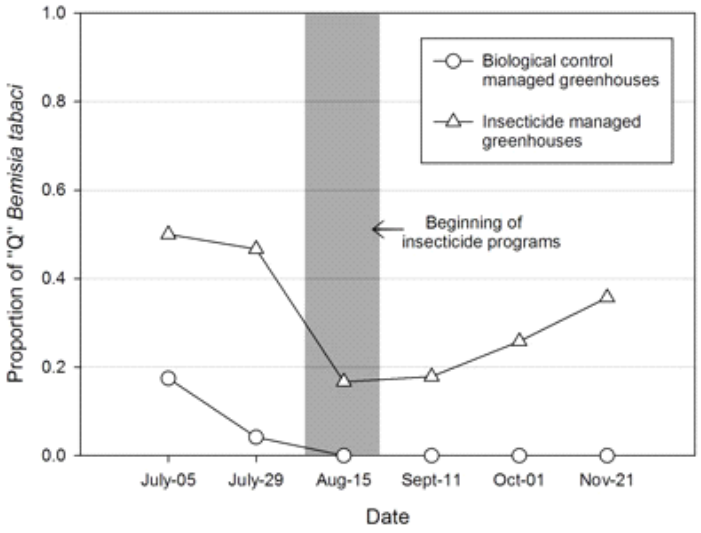

Figure 1. Proportion of “Q” Bemisia tabaci found in pesticide and biocontrol-based management of poinsettia crops. (Ontario 2012)

The classical definition of a species is a group of organisms that can mate and produce fertile offspring. By this definition, “B” and “Q” should not be able to reproduce. What researchers have found however, is that not only can’t they reproduce, but when mixed populations are maintained in cages, over time “B” displaces “Q” until the population is completely “B.” The reasons for this are thought to be related to mating interference between the two species—an interaction that favors “B.” Conversely, in mixed populations where pesticide pressure is applied, “Q” remains in the population. Recall that “Q” is more resistant to pesticides than “B.”

To return to the commercial poinsettia situation, between 2007 to 2011, many Ontario growers used biocontrol to manage their whitefly populations with excellent levels of success. At various times the populations were evaluated for the presence of “B” and “Q”; specifically in 2007, where samples from seven greenhouses found that approximately 80% were “Q”; in 2009, where samples were tested from two greenhouses, one of which was 100% “B” and the other 100% “Q”; and in 2010, where a single sample tested was 100% “B.” It should be noted that testing of Bemisia populations from poinsettias in the U.S. during the same period showed the presence of both “B” and “Q” at varying levels each year.

Whitefly survey

In 2012, we decided to carry out a more thorough survey of whitefly populations in Ontario poinsettia crops to determine whether there were any differences in individual greenhouses resulting from different management practices. As it happened, that year proved to be a bad one for whitefly and in certain varieties of poinsettias, significant whitefly populations could be found even in the unrooted cuttings.

Six greenhouses were surveyed every three to four weeks (July 5, July, 29, August 15, September 11, October 1 and November 21) from the beginning of the crop when unrooted cuttings were first received until November. Three greenhouses used biocontrol as their primary strategy for whitefly management from the beginning of the crop and three used pesticides exclusively. Additionally, a one-time survey of seven additional greenhouses was carried out at the end of the season on December 12 (five of which had used biocontrol and two had used pesticides). All whiteflies collected were brought to the University of Guelph and identified as either
"B" or "Q."

Figure 1 shows the graph of the proportion of "Q" whitefly identified in the regular monitoring of biocontrol-based and pesticide-based poinsettia crops. Note that almost 20% of whiteflies in the biocontrol greenhouses and approximately 50% in the pesticide greenhouses were "Q" on the first monitoring date. In the biocontrol greenhouses, the percentage of "Q" decreased to less than 10% at the second monitoring date and couldn't be found at the third monitoring date in mid-August or any time thereafter. By contrast, in the pesticide greenhouses, the proportion of "Q" decreased at the second and third monitoring, but then increased in subsequent samplings to finish the season at almost 40% of all whiteflies collected.

These results suggest that "B" is capable of displacing "Q" in a greenhouse environment in the absence of pesticide pressure. Even in the pesticide greenhouses, the initial reduction in the proportion of "Q" over the first three sampling dates is likely due to the minimal use of pesticides during that early period of the crop. The first insecticide applications for each greenhouse were between August 7 and August 22. The increasing proportion of "Q" after the mid-August sampling corresponds to the beginning of pesticide use.

In the seven greenhouses that were sampled one time only at the end of the crop, 95 individuals were collected from the five greenhouses that used biocontrol. No "Q" individuals were found. In the two pesticide greenhouses, 24 individuals were collected of which eight (33%) were "Q." The results from this one-time sampling support the conclusions of the routine, season-long monitoring in the other six greenhouses.

The ability of "B" to displace "Q" under a biologically based management program may increase the effectiveness of pesticide cleanup applications if they're necessary. Even under a pesticide-based program, delaying the first application as long as possible could provide an advantage in terms of greater pesticide efficacy. This may be even more important if the starting population of whiteflies has a greater proportion of "Q" than found during this survey. **GT**

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