Biological Control of Aphids – Succeeding in Maryland

Vegetable transplants are a big seller for greenhouse operations. With the recovering economy, customers are planting vegetable and herb gardens. Vegetable transplants have insect problems like any other greenhouse crop. Tomato, eggplants, peppers, basil, and salvia are usually the plants that aphids can build up on rapidly, especially in warm, humid springs.

Background on the Greenhouse involved with Banker Plants

In 2009 and 2010, we worked with Denise Sharp at Waterford Farm Greenhouses in Brookeville, Maryland. It is an operation that produces plants with minimal pesticide input. They sell most of the plant material retail, but some plants are sold wholesale. They grow a mix of vegetable transplants and bedding plants in 2”, 4” and one gallon pots.

As part of their biocontrol efforts, they apply soil drenches of entomopathogenic nematodes, repeating the treatments 4 weeks later to keep fungus gnat larval populations under control. The two applications made in 2009 kept fungus gnats at minimal levels even though we experienced a very extended rainy periods in April and May in Maryland. So far in 2010, fungus gnats have not been a problem.

Aphids were a key pest on their herbs, vegetable transplants and bedding plants in 2007 and 2008. The plants most heavily infested with aphids included salvia, zinnias, peppers, cucumber, melons, basil, celery, and snapdragons. After reading about using banker plants and parasite releases, the owner, Denise Sharp, asked us to work with her in evaluating the efficacy of this biocontrol method. In previous years, melon aphid, *Aphis gossypii*, and green peach aphid, *Myzus persicae*, were the two species encountered in the greenhouse. She contacted IPM Labs, Inc., in Locke New York to supply bird cherry oat aphid,
*Rhopalosiphum padi.* This aphid feeds on grain crops and does not infest broadleaf vegetable transplants, herbs or bedding plants.

If you are thinking of trying biological control of aphids, plan to start your barley plants in February or March to get the bird cherry oat aphid population established early. It is important to get the parasitic wasp established early in the season.

Denise Sharp purchased barley seed from a farm supply store to start her own barley seedlings in 8” pots. The owners built a caged area at the end of their greenhouse to grow barley plants where bird cherry oat aphids were introduced to the young barley plants. When the barley plants were 4 – 5” tall they had IPM Labs send the bird cherry oat aphids to their greenhouse. Banker plant plugs cost approximately $15 - $20 for a tray of 16 plants. Usually it takes about three weeks for aphid populations to build up before setting out the barley plants among the greenhouse crops.

The idea is to establish a population of bird cherry oat aphids on the barley plants first, and then take the barley plants in the pots out of the screened area and introduce the parasitoids. The barley plants were grown in a screened chamber so parasites could not infest the aphids being introduced to the plants and crash the population. It is important to keep a steady supply of bird cherry oat aphids reproducing on the barley plants. When you remove the barley plants from the caged chamber there should be a good supply of aphids on which the parasites can feed. Barley plants infested with bird cherry oat aphids are placed out as needed in the 3000 ft² greenhouse.

In 2009, the aphid parasitoid, *Aphidius colemani*, was released at the rate of 500 *Aphidius* wasps released on eight barley plants. The *A. colemani* parasitic wasp was selected because it is proven to parasitize green peach aphid and melon aphid.

Another parasitic wasp that is commercially available, *A. matricariae*, which works well on green peach aphid, but it is not as effective on melon aphid. *A. ervi* is another commercially available parasitoid and works well in controlling potato aphid, *Macrosiphum*...
euphorbiae, and foxglove aphid, *Aulacorthum solani*. Since most growers don’t have the time or expertise to distinguish between the different species of aphids it would be wise to order both *Aphidius colemani* and *A. ervi*. This way you are covering most of the possibilities of aphid species populations in your greenhouse.

In 2009, we monitored the greenhouse each week from April through early June. Normally the grower had problems with aphids on salvia, peppers, zinnias and snapdragon. These plants remained clean of aphids during the period we monitored. On June 3rd we found low aphids on calendula, borage, and gomphrena. The borage had the heaviest population of aphids (4 – 6 per leaf). On examination under a dissecting microscope we found the borage was infested with potato aphid. It would have been useful to have released *A. ervi* to control this aphid species. The aphids on the calendula plants were green peach aphid and the majority were parasitized. The calendula plants were ranked in very saleable condition.

In 2010, we have been monitoring this greenhouse again. The predatory midge, *Aphidoletes aphidimyza*, was also released in this greenhouse. On May 6th, *Aphidoletes* larvae were found feeding on bird cherry oat aphids present on barley plants that were placed out into the greenhouse among the crop plants. The first pest aphids were found on May 13th: green peach aphids were damaging a few zinnia plants and potato aphids were causing damage to some okra.

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