

A NEW LOOK AT APHID CONTROL

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Abstract

A new method of controlling aphids is described. It is based on a sudden change in their one and only food source, which is plant juices in leaves and tender portions of host plants.

By employing discreet combinations of ions known to speed the movement of sugars in plants, aphids become disturbed, pull out their sucking mouth parts and begin moving on the plant and usually continue downward till they reach the ground or fall to the ground. Both actions have been observed.

By exact changes in the formulations, the period of reduced sugar content in leaves and tender parts of host plants may be prolonged or shortened in order to best meet a given situation with respect to various types of infestations; whether light, medium or heavy as well as whether the aphids have appeared very recently or have been on plants for somewhat longer periods of time. Such changes may be produced to offset weather conditions as well.

Aphids are peculiar creatures. Their young are born alive. They do not lay eggs. No male has ever been observed. Their sole food source is plant juices or liquids which are mostly triose, pentose and hexose sugars which are the earliest products of the photosynthetic process. In fact, their very physiognomy bears out this adaptation. For instance, they must consume so much sugar in order to take in enough protein to promote growth and reproduction that some method of rapidly getting rid of the excess sugary liquid becomes a necessity.

This is accomplished by means of two "tail pipes" located posteriorly on the abdomen. They are called cornicles and it is through these that excess sugar water called "honeydew" is exuded.

It is precisely on these physiological characteristics that this new approach to control is based. At the onset of this investigation some 9 years ago, it was reasoned that if we could suddenly alter the one and only food source, we might be able to create havoc in the aphid's world.

Because aphids are slow-moving and most are wingless, they cannot leave an unfavorable situation rapidly, as some other insects which can either crawl away rapidly or fly away. Being small and soft-bodied, when they fall to the ground, they cannot get back up on the plant in order to try to resume feeding. In hot weather, they usually die on the hot soil beneath the plant.

Sudden reductions in aphid numbers give the lady beetles a better chance to gain control and stay in control. Lady beetles are not killed or even affected in any way by this treatment. In fact, nothing is killed; not even aphids.

Since this method depends heavily on the photosynthetic process, its efficiency is affected by such things as temperature, length of daylight and cloud cover.

This treatment is not limited to cotton; hence the change in title of this presentation. It has been tried on a number of plant types including sorghum, okra, tomatoes, peas, green beans, peppers, watermelon, cantaloupe, pecan and oak trees and several ornamentals to mention a few.

In addition to those factors already mentioned, efficiency, i.e. speed of action, is dependent upon another variable; that of leaf surface area. The fastest reactions we have observed are on sorghum leaves. Often within 7 or 8 minutes, greenbugs will be gone from a sorghum leaf and all be on the ground. Cotton leaves may be clear in 15 to 20 minutes while small-leaved plants such as pecan and oak trees and ornamentals will take somewhat longer.

This process was granted patent number 6,051,043 on April 18, 2000 and was granted EPA pesticide registration No. 44688-1 on June 5, 2000.

Aphids, if not controlled can and do wreak economic havoc. Not only do they rob a growing, producing plant of vital nutrients thereby stunting its growth, the honeydew they produce can fall on open cotton bolls producing "sticky cotton" which is always refused by spinning mills.

Aphids can reproduce very rapidly. Under favorable conditions, one female can give birth to live young at the rate of from 50 to 85 in a three-week life span. It isn't difficult to see how they can reach astronomical numbers in short order.

Because of this rapid reproduction rate, they are able to produce several generations during only one growing season. Simply because of this rapid reproduction rate, they are able to breed up resistance to any chemical thrown at them in a short time.

Control then becomes a matter of using stronger and more toxic chemicals in order to effect anything like acceptable control. With respect to toxicity to humans, animals, bees, fish, birds as well as aphids, we have about reached the limit. When aphids become resistant to the most toxic material there is, what then? What will we use?

This very fact was a prime mover in our attempt to find another method of control; one we hope aphids cannot develop a resistance toward.