

NATURAL CONTROL OF THE LETTUCE APHID, *NASONOVIA RIBISNIGRI*, BY LARVAE OF HOVERFLIES (DIPTERA: SYRPHIDAE)

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The Lettuce Aphid, *Nasonovia ribis-nigri*, was introduced into California lettuce production in the fall of 1998 and has become the key pest of lettuce in the Salinas Valley. Naturally occurring hoverfly larvae can be important natural enemies of lettuce aphid. Organic growers typically first see a build up in lettuce aphid populations and a subsequent rise in the number of hoverfly larvae. Many insecticides have a negative impact on hoverfly populations. Selective removal of hoverflies may increase lettuce aphid populations

Lettuce aphid is problem worldwide and a primary pest of lettuce in Europe, Great Britain, Canada, and Latin America. Lettuce aphid has established throughout the Salinas Valley and has also established in other lettuce producing areas of California and Arizona. Lettuce aphid is a particularly damaging pest because aphids tend to attack the innermost leaves (the heart) and because aphids reproduce quickly with a high proportion of alate (winged) aphids. The preferred habitat of the lettuce aphid makes them difficult to contact with sprays.

Both field and greenhouse experiments were conducted in 2000 and 2001 to test the impact of some insecticides on hoverfly larvae. Field trials were conducted in grower cooperator fields. Insecticides were applied with a backpack, carbon dioxide pressurized sprayer. Efficacy was evaluated by collecting randomly chosen plants from each plot and counting aphids and other insects found on these plants. Bioassays were conducted with hoverfly larvae collected from organically grown leaf lettuce. These larvae were the native complex of hoverfly species and were chosen to be as even-aged as possible, mostly between second or third instar. Two methods were used to evaluate the effects of pesticides on hoverfly larvae, dry residue and wet solution.

Results from both types of experiments demonstrated that some insecticides are highly toxic to hoverfly larvae as wet sprays and can cause aphid populations to increase compared to untreated controls. One such product was Success®, a material that does not provide aphid control, but does have high contact toxicity to hoverfly larvae. The implications for growers might be significant if hoverfly larvae are present in fields requiring management for pests other than aphids.

Ideally hoverfly populations arrive in a given field and finish their desired task of removing the lettuce aphid populations and exiting the field prior to harvest. Growers cannot currently manipulate hoverfly colonization. Therefore biological control of lettuce aphid is unpredictable. The unreliable nature of this scenario leaves most

conventional growers unwilling or unable to rely upon hoverflies, but hoverflies may be the only option for organic growers.