

# Evaluation of Knack for Aphid Control in Green Leaf Lettuce

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## Abstract

*Knack was evaluated for its potential for regulating aphid populations in green leaf lettuce. However, Knack did not appear to be a viable control option, and probably did not work due to an inability to deliver the material where the aphids were on the underside of the lower leaves. A soil injection treatment of Admire at planting, and a foliar standard of Warrior + Endosulfan applied at the initiation of aphid colonization and again 14 later, were highly effective treatments.*

## Introduction

Aphids are a primary contaminate of lettuce grown for spring harvest. Currently, most growers use Admire 2F (imidacloprid) applied below the seed line at planting to manage aphids. Although this prophylactic tactic has proven extremely effective, during years when aphids are not numerous its cost effectiveness is questionable. Recent studies with Knack (pyriproxyfen) on cotton aphid, *Aphis gossypii*, has demonstrated that this insect growth regulator can render aphids sterile and control populations in cotton. However data is very limited and its ability to control other aphid species in other crops has not been investigated. In this trial, we report the efficacy Knack relative to Admire 2F and a standard foliar application to aphids in green leaf lettuce.

## Materials and Methods

Green leaf lettuce, 'Royal Green' was direct seeded into double rows on 42-in beds on 9 December 1998 at the Yuma Valley Agricultural Center, Yuma, AZ. Plots were 4 beds X 50 ft, bordered on each side by 2 blank beds and on each end by 5 ft alleys. The test was a randomized complete block design, with 4 replicates. Admire 2F (imidacloprid) was applied as a standard soil injected treatment at 16 oz/ac. Foliar insecticides evaluated included Knack at 6 and 8 oz/ac, applied at two different timings, and a foliar standard of Warrior (lambda-cyhalothrin) at 3.84 oz/ac + Endosulfan 3EC (endosulfan) at 1.33 qt/ac. Each rate of Knack was applied at the initiation of aphid colonization, and in another set of treatments with these rates, a second application was applied 14 days following the first. The foliar standard was applied at the initiation of aphid colonization and again as needed. All foliar treatments included the non-ionic surfactant Kinetic at 0.1% v/v.

Admire was injected 1.5-2.0 inches below the seed line just prior to planting in 10 gallons per acre total solution. Foliar treatments were sprayed using a tractor mounted sprayer. The boom covered 4 rows, with 3 hollow cone TXV-4 nozzles per row, one centered over the bed and two on angled drops on each side of the bed. The sprayer was calibrated to deliver 20 gallons per acre at 40 psi. The tractor traveled at 3 mph. Treatments were applied on 15 February and 3 March.

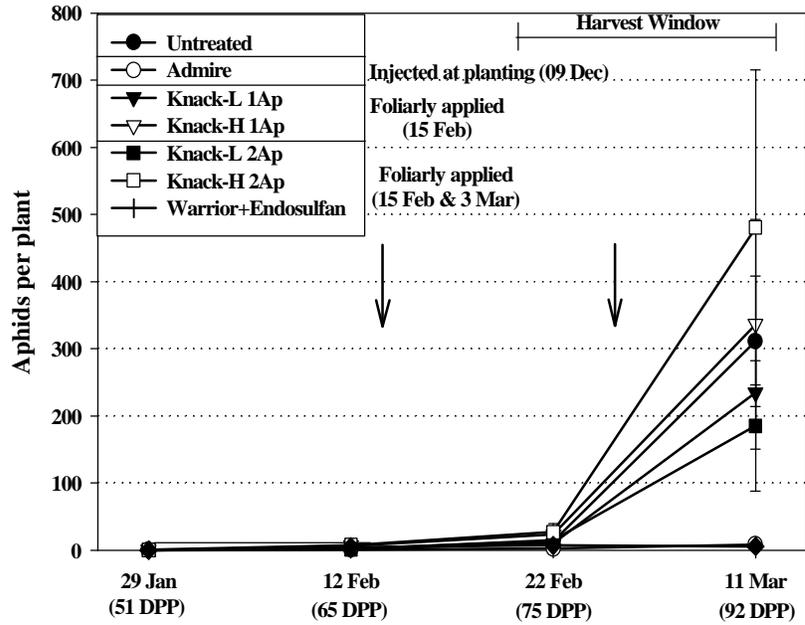
Aphid densities were estimated by counting their number on 5 plants per plot. Evaluations were made on 29 January, 12 and 22 February, and 11 March. On 11 March the percentage of plants with harvestable portions contaminated by aphids was also estimated.

## Results and Discussion

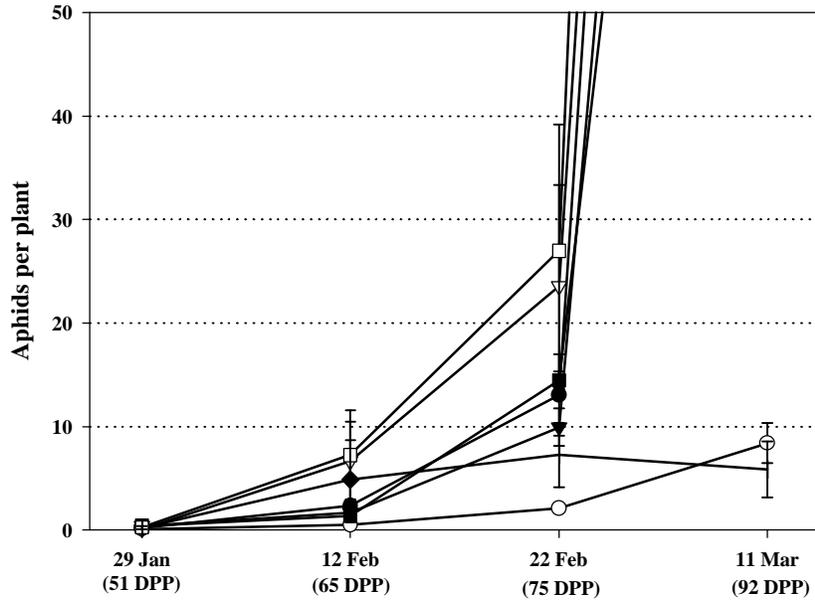
Aphid populations were low until late February. Green peach, *Myzus Persicae* (Sulzer), was the predominate species until mid-February when potato aphid, *Macrosiphum euphorbiae* (Thomas), began to dominate. By March, potato aphids became very numerous, very few green peach aphids could be found, and although lettuce aphids, *Nasonovia ribinigri*, were encountered in this field, their numbers were very low. In mid-February, potato aphids were beginning to colonize many of the plots that had not been treated with soil injected insecticides, thus triggering the first application of foliar insecticides on 15 February (Figure 1). At 75 days post-planting (DPP) and 7 days after the first set of foliar treatments (DAFT), aphid populations were still low, but began to rapidly increase shortly thereafter (Figures 1 & 2). At this time, only Admire and Warrior + Endosulfan contained significantly fewer aphids than the untreated plots. However, since Knack is an insect growth regulator, and based on previous field trials on aphids in cotton, we did not expect to see a dramatic decrease in aphid numbers at this time.

Because aphid populations continued to increase following the first foliar application, Warrior + Endosulfan and were applied again on 3 March (16 days after the first application). Treatments scheduled to receive two applications of Knack were also treated at this time. On 11 March, 92 DPP, 24 DAFT (app. 1) and 8 DAFT (app. 2), the aphid populations continued to rapidly increase in the untreated and Knack-treated plots, but remained low and stable in the Admire and Warrior + Endosulfan treatments (Figures 1 and 2). Results were similar when evaluating contamination of harvestable portions. None of the Knack treatments differed from the untreated, while Admire and Warrior + Endosulfan were similarly free of significant aphid infestation (Figure 3).

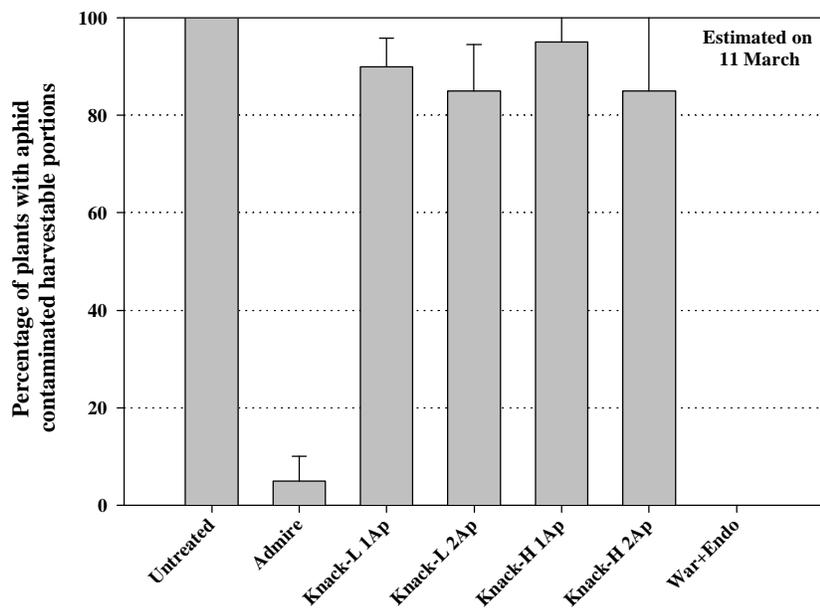
In conclusion, Knack does not appear to be a viable aphid control option on leafy vegetables. The reason Knack failed in lettuce while demonstrating activity in cotton is probably due to coverage and where these different aphid species prefer to feed on the plant. In cotton, the cotton aphid prefers to feed on young leaves and terminal growth while the potato aphid refers to feed on the underside of the lower leaves on lettuce. Since Knack is not systemic, the aphids in this test were probably never exposed.



**Figure 1** Seasonal development of aphid populations (mean  $\pm$  SEM) per plant on green leaf lettuce treated with two rates of Knack applied as single (1Ap) or double (2Ap) applications relative to an untreated and the standards of Admire and Warrior + Endosulfan..



**Figure 2** Same data as Figure 1., but is a more detailed view of insecticide treatments.



**Figure 3** Percentage of plants with aphids infesting harvestable portions on 11 March 1999.