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CONTROL OF THE TOMATO FRUIT WORM (Keiferia lycopersicella) WITH IMIDACLOPRID

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ABSTRACT. Field experiments were conducted in the Dominican Republic to determine the effect of different rates of imidacloprid on the control of the tomato fruit worm Keiferia lycopersicella. Imidacloprid was applied once at the rates ranging from 25 to 150% of the recommended dosage (0.5 kg/ha), when 80% of the tomato fruits were 2 cm in diameter. Percentage of surviving and dead larvae and percentage of damaged tomato fruits was determined. Results show that Keiferia control (85%) was achieved with 75% of the recommended rate, and that higher rates failed to provide better control.

INTRODUCTION

The tomato pinworm, Keiferia lycopersicella, is a common pest in the Dominican Republic and most tomato producing countries. Keiferia inflicts direct damage to the fresh tomatoes by perforating the fruit, as well as indirect damages by allowing the entrance of pathogens that provoke fruit decay. In processing tomato, Keiferia causes additional inconveniences, as tomato derivatives obtained from infested fruits contain worm fragments (Zalom and Jones 1994).

Although control of Keiferia has been achieved by repeated application of insecticides such as methomyl, cypermethrin, deltamethrin, permethrin, fenvalerate (Armenta 1986; Waddill 1986), these insecticides provide poor control of the most important pest of tomato in the Dominican Republic, the whitefly Bemisia tabaci. Also, there are reports of tomato pinworm populations resistant to some of these insecticides as result of continuos treatment (Schuster et al. 1996).

Imidacloprid is an insecticide intended for the control of sap-sucking insects (Elbert et al. 1996; Leicht 1996) that has been successfully used to suppress Bemisia tabaci in tomato in the Dominican Republic. It has been observed that imidacloprid-treated tomato plants usually exhibit a lower percentage of fruits affected by Keiferia lycopersicella and other fruit worms. It is apparent it would be advantageous for tomato growers to suppress both the whitefly (Bemisia tabaci) and fruit worms with the same compound. Because there are no experimental reports sustaining or refuting the validity of such observations, the objective of this study was to determine the efficacy of different rates of imidacloprid in the control of the tomato pinworm.

MATERIALS AND METHODS

Field experiments were conducted at Matanzas, Peravia province, Dominican Republic. 'Solimar' tomato was planted in single rows, where 6 plants constituted an experimental unit. Crop was grown by using standard production techniques in the region. Imidacloprid was applied once with a backpack sprayer to tomato plants when 80% of the fruits reached 2 cm in diameter. Rates of imidacloprid used were 0.125, 0.250, 0.375, 0.500, 0.625 and 0.750 kg

active ingredient/ha. An untreated control was also established. Fruits were harvested at breaking color maturity and classified as affected or not by Keiferia.

Treatments were organized in a randomized complete block design with 4 replications. Data collected was subjected to arc sin of square root transformation of % of affected fruits, and subjected to analysis of variance (ANOVA) to test for treatment effects. Regression analysis was performed to characterize possible relationships between imidacloprid rates and percentage of fruits affected.

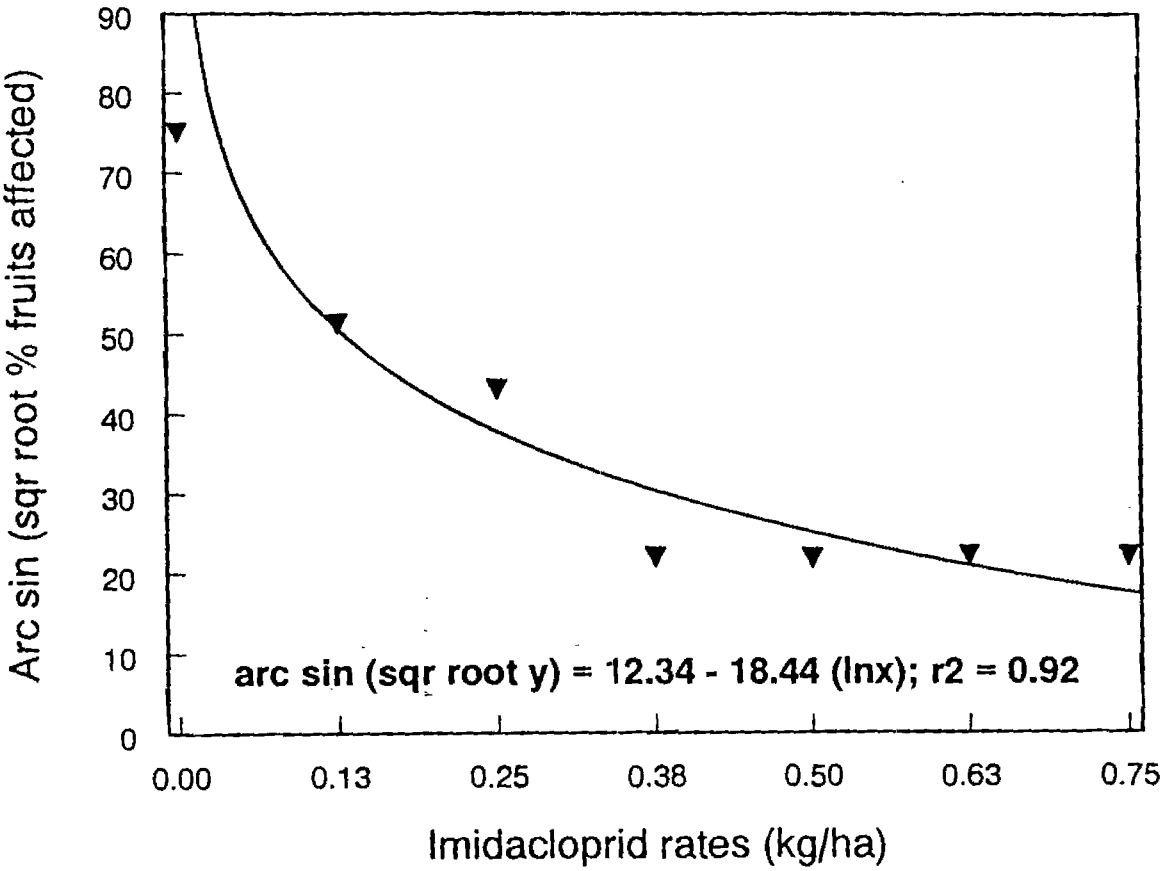

Figure 1. Effect of imidacloprid on the percentage of tomato fruits affected by Keiferia lycopersicella.

RESULTS AND DISCUSSION

Imidacloprid rates significantly reduced the incidence of Keiferia on tomato fruits. In general as rates increased, there was an increase in the percentage of larvae control with a maximum attained at a rate of 0.375 kg a.i./ha with no further increase in efficacy as rates increased. As shown in figure 1, a logarithmic relationship characterized the dependency of percentage of fruits affected with imidacloprid rates (arc sin [square root y] = 12.34 – 18.44 ln x; $r^2 = 0.92$).

Table 1. Imidacloprid effect on Keiferia lycopersicella incidence on tomato fruits.

Imidacloprid (Kg/ha)	% of control	Fruits affected (%)
0	-	93.4
0.125	34.8	60.9
0.250	49.9	46.8
0.375	84.9	14.1
0.500	85.1	13.9
0.625	84.7	14.3
0.750	84.8	14.2

As shown in Table 1, an average of 85% of control was achieved corresponding to approximately 14% of fruits affected when rates of 0.375 kg a.i./ha or greater where applied. Control plots had approximately 93% of the tomato fruits affected by Keiferia. Results show that maximum control (85%) was obtained with 75% of the current imidacloprid recommended rate (0.50 kg/ha). This finding may allow tomato farmers to utilize less commercial product to control Keiferia and therefore save economic inputs. At the same time, it appears that imidacloprid can be a means to control both Bemisia and Keiferia simultaneously. Further studies should be carried out in different locations to assess the impact of imidacloprid on local populations of Keiferia.

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