# THE ROLE OF CHEMICAL CONTROL IN AN INTEGRATED PEST MANAGEMENT OF THE NEOTROPICAL WALNUT SHOOTBORER, *GRETCHENA GARAI* (LEPIDOPTERA: TORTRICIDAE) IN ECUADOR

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**GARA, R.I., SARANGO, A. &c CANNON, P.G. 1991. The role of chemical control in an integrated pest management of the neotropical walnut shootborer, *Gretchena garai* (Lepidoptera: Tortricidae) in Ecuador.** Carbofuran, oxydemeton-methyl, and acephate were field tested in Ecuador for control of the neotropical walnut shootborer, *Gretchena garai*. Carbofuran and oxydemeton-methyl successfully controlled the tortricid for at least a month. Accordingly, in Ecuadorian agroforestry programs, is possible that these two successful insecticides could become part of a remedial control effort within an integrated pest management (IPM) system.

Key Words: Agroforestry - control of neotropical walnut shootborer - *Gretchena garai* - IPM context

## Introduction

Agroforestry schemes in the Latin America tropics often involve mixtures of corn and leguminous crops interspersed with high value, fast growing trees ( Bishop 1979, Heuveldop & Lagemann 1984). A particularly desirable hardword is the neotropical walnut, *Juglans neotropica*, with wood qualities similar to black walnut, *J. nigra*. Neotropical walnut ranges from southern Mexico through Central America and south along the Andean slopes of Colombia, Ecuador, Peru and Argentina (Chudnoff 1984). The species usually occurs around 1500 to 2000 m in cool moist sites with moderate levels of available soil moisture; it can even withstand light frosts. During the past decade, the Ecuadorian Forest Service (DINAF) has been encouraging farmers to plant walnut in Ecuador as one of the species of choice together with various cropping and pasturing systems (Bishop 1979). Unfortunately, Gara and Littke (1983) found that about 40% of 3-y-old walnuts planted at a DINAF nursery in northern Ecuador had leaders killed

by a terminal boring tortricid causing subsequent lateral growth to produce badly formed trees. This problem was later found in agroforestry plantations with walnut throughout the Ecuadorian highlands and even in walnut plantations of the country's northwestern tropical-moist forests at elevations of about 1500 *m* (Gara & Onore 1989). Miller (1987) considered the tortricid as a new species and named it *Gretchena garai*.

The shootborer is a multivoltine insect and spends most of its life cycle in terminal shoots. It lays its eggs at the base of new leaves where after eclosion the larvae travel to termainal shoots and proceed to bore down the axis of the stem (Sarango 1987).

In an effort to determine if locally available systemic insecticides might be of use in controlling the shootborer, we installed field tests of three products. These tests began on the August 22, 1989 in an agroforestry plantation near the Ecuadorian village of Nanogalito, about 60 *km* northwest of Quito and at an elevation of about 1600 *m*. There, a 5-y-old *J. neotropica* plantation was almost completely decimated by continual shootborer attack.

## Methodology

In this preliminary study, we established the boundaries of three irregular plots containing 88 (plot 1), 105 (plot 2), and 147 (plot 3) trees respectively. The number of tortricid damaged and undamaged trees in each plot was determined ocularly with the presence of fresh frass or gummy extrusions being used as evidence of attack. As the tortricid is multivoltine, it is difficult to ascertain whether or not the observed damage actually contains actively boring larvae. It is for this reason that the number of trees which currently had active larvae was estimated by destructively sampling an additional 193 damaged trees within an adjacent plot (plot 4). There, by carefully dissecting each terminal, branch and bud that appeared to be damaged we found that 75.3% of these trees, growing in this adjacent plot, had active larvae.

Insecticides were then applied with a back pack sprayer as follows: all trees in plot 1 were given a soil drench with carbofuran (Furadan 3F™) at a rate of 3 *kg* actual/*ha* foliage of all trees in plot 2 were sprayed with oxydemeton-methyl (Metasystox-R 25™) at a rate of 0.5 *kg* actual/*ha*, and; the foliage of all trees in plot 3 were sprayed with acephate (Orthene 50™) at 0.5 *kg* actual/*ha*. A month after treatment, we again determined the number of newly attacked trees as well as unattacked ones in the test plots and the percentage of trees newly attacked in the adjacent plot 4 that had active larvae, which turned out to be 70.2%. Percent control, therefore, equals (number of attacked pre-treatment trees) (.753) minus (number of newly-attacked post-treatment trees) (.702) divided by (number of affected pre treatment trees) (.753). In other words:

$$\% \text{ control} = \frac{(\text{attacked trees pre-treatment})\ (.753) - (\text{newly attacked post-treatment})\ (.702)}{(\text{attacked trees pre-treatment})\ (.753)}$$

## Results and discussion

A month after treatment most of the trees were protected from subsequent shootborer infestations in plots 1 and 2 as there was a 95.4 and 91.5% control respectively; the acephate-treated plot had only a 71.7% control (Table 1). Two months after insecticide applications, the plots were revisited, and the treatment effects had disappeared as many additional trees were under attack in all of the plots.

**Table 1.** Efficacy of three systemic insecticides in controlling the neotropical walnut shoot borer; *Gretchena garai*, in a plantation near Nanogalito, Ecuador: plot 1 treated with carbofuran, plot 2 with oxydemeton-methyl and plot 3 with acephate

| | Number of attacked trees × correction factor[1] | | |
|---|---|---|---|
| Plot number | Pre-treatment | Post-treatment | % Control |
| 1 | 61 (.753)=45.93 | 3(.702)=2.10 | 95.4 |
| 2 | 77 (.753)=57.98 | 7(.702)=4.91 | 91.5 |
| 3 | 89 (.753)=67.02 | 27(.702)=18.95 | 71.7 |

[1]See text for explanation

These results indicate that carbofuran and oxydemeton-methyl could be used to control *G. garai* however, applications during the egg laying season would have to be almost bimonthly to avert problems. Such frequent applications would be uneconomical. On the other hand, if a usable integrated pest management (IPM) system were devised to control the shootborer then both carbofuran and oxydementon-methyl would be candidates for a remedial treatment— especially after precise timing of applications is determined. Perhaps these chemicals could be even more promising in an IPM system if sustained released formulations were used (Allan *et al.* 1973). In fact, Allan *et al.* (1974) were able to control the mahogany shootborer, *Hypsipyla grandella*, for over a year when carbofuran-polyamide capsules were placed near the roots of Spanish cedars, *Cedrela odorata*. Experimentation for such a possibility is being planned.

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