IMPACT OF SUB-LETHAL DOSES OF NEONICOTINOIDS ON GLASSY-WINGED SHARPSHOOTER FEEDING AND TRANSMISSION OF PIERCE'S DISEASE

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INTRODUCTION

The management of Pierce's disease (PD) spread by *Homalodisca coagulata*, the glassy-winged sharpshooter (GWSS) is lacking a fundamental strategy and solid tactics. Among tactics under development is the use of insecticides to minimize numbers of GWSS and inhibit their feeding to reduce their ability to acquire the bacterium from infected vines and to inoculate uninfected vines. Two aspects of insecticides are necessary for this tactic to be successful: (1) they must affect GWSS immediately after they arrive on a vine; and (2) they must remain efficacious for a long time. Since 1998, we have examined the impact of insecticides on grapevines against the GWSS (Blua et al 2000, Redak and Blua 2001). We chose to study insecticides of the chemical class known as neonicotinoids because of their reputed inhibition of feeding by sucking-insects, and their long residual activity.

Anti-feedant qualities are one of the important aspects of neonicotinoids. In a 1999 experiment conducted at the University of California, Riverside, GWSS caged on field-grown grapevines treated with Admire (imidacloprid, Bayer Inc) did not feed enough to generate visible amounts of excreta, which they normally produce in copious quantities. In contrast, GWSS on untreated vines generated a substantial volume of excreta. We concluded that Admire inhibits feeding by the GWSS. Our most recent experiments showed this effect for other neonicotinoids, including soil-applied Actara (thiamethoxam) (Syngenta, Inc) and foliar-applied Assail (acetamiprid) (Aventis, Inc) (Bethke et al 2001, Redak and Blua 2001). Most striking is our observation that neonicotinoids applied to grapevines in September of 1999 had a substantial impact on GWSS feeding almost a year later. This may, in fact, be more important to protecting plants from infectious sharpshooters then inducing mortality.

OBJECTIVES

The overall goal of our research is to determine the impact of sub-lethal doses of neonicotinoids on the spread of *Xylella fastidiosa*, the Pierce's disease bacterium, to or from grapevines by the GWSS. In support of this goal, we are examining the impact of sub-lethal doses of Admire on GWSS feeding using electronic monitoring methods under development in the laboratory of E. Backus (2001).

RESULTS AND CONCLUSIONS

Thus far, we have examined the relationship between the amount of Admire applied to potted grapevine seedlings and GWSS mortality after a 24h exposure period. We used these data to select a sub-lethal dose (3.75 mg Admire/pot) for our feeding studies (Figure 1). Ten days after treatment, this amount of Admire induced ca 50% GWSS mortality (Figure 1).

Our investigation of the impact of sub-lethal doses of Admire on GWSS feeding used a factorial experiment with two factors, each with two levels. The first factor was grapevines treatment with Admire or not, and the second factor was grapevines infected with Pierce's disease or not. Feeding behaviors of GWSS on experimental grapevines were recorded with electronic monitoring (Backus 2001). This experiment has been completed and the data are currently being analyzed.

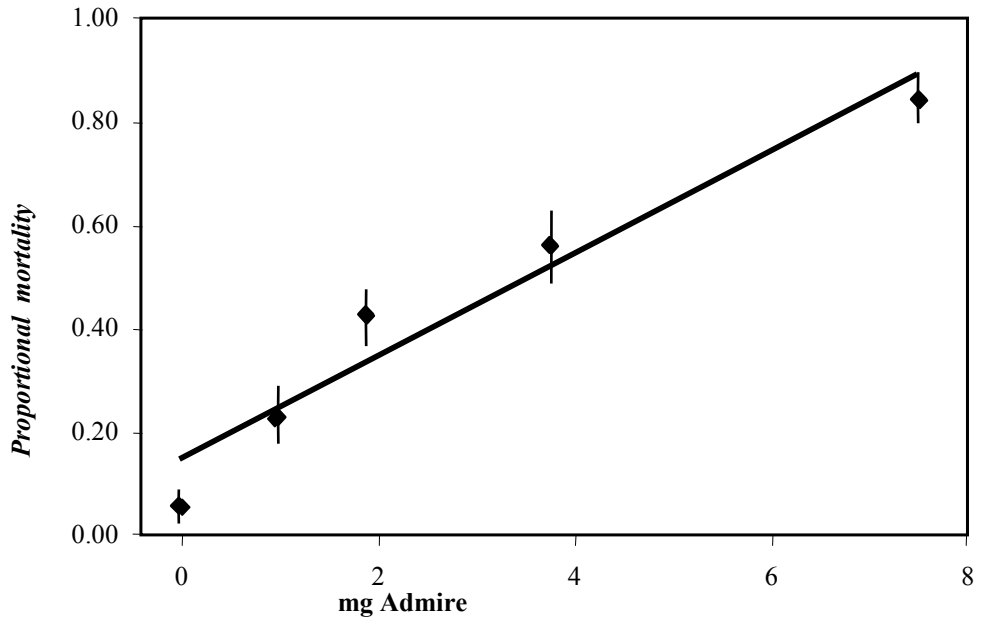

Figure 1. Mortality of *Homalodisca coagulata* as a function of Admire (Bayer, Inc) treatment of potted grapevines. Grapevine seedlings in 700ml pots were treated with 0.00, 0.94, 1.88, 3.75, and 7.50 mg Admire 10 d before *H. coagulata* adults were caged on plants. Mortality was measured 24h after exposure to plants. Points represent means $\pm$ SE (N=17). Regression equation: $y = 0.099x + 0.143$.

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