



—Scientific Note—

Insecticide Lethal and Sublethal Effects on Corn Silk Flies (Diptera: Ulidiidae) following Topical Exposure

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Florida ranks second nationally in terms of sweet corn (*Zea mays* L.) production for the fresh market, being responsible for 29% of the sales in the United States (USDA–NASS, 2019). Sweet corn ranks fourth among the most valuable vegetable, berry, and melon crops in Florida representing an annual production value of 150 million dollars. Thirty-nine thousand acres of sweet corn are grown in Florida with 74% of this acreage concentrated in Palm Beach County in the Everglades Agricultural Area (USDA NASS 2017). Locally known as corn silk flies, *Euxesta stigmatias*, *Euxesta eluta*, and *Chaetopsis massyla*, are three species of picture-winged flies (Diptera: Ulidiidae) that have become the most damaging pests of sweet corn in southern Florida. Corn silk fly adults lay eggs on corn silks, and larvae injure silks and kernels. Due to the high damage potential of corn silk flies and the low tolerance for ear injury using current fresh market standards, these insects are responsible for the rejection of sweet corn loads every year.

Corn silk fly management relies on frequent applications of pyrethroids targeting adults. Because this management strategy relies on a single class of insecticides sharing the same mode of action, the possibility of insecticide resistance has become a concern, emphasizing the need for pyrethroid alternatives. Laboratory experiments were conducted on *E. eluta* to determine the effects of 20 registered and non-registered insecticides with potential activity against corn silk flies. Six pyrethroids, four neonicotinoids, four insect growth regulators, two diamides, one spinosyn, one avermectin, and one oxadiazine were evaluated.

Topical assays were conducted using a Generation III Research Spray booth to deliver commercial formulations of insecticides at high field rates to *E. eluta* adults. A first study determined *E. eluta* adult mortality 24 hours after exposure. A follow-up study was conducted on insecticides associated with less than 15% mortality to determine female *E. eluta* fertility. Twenty-four hours after insecticide exposure, females were allowed to oviposit for 3 days on artificial diet, and the number of larvae was counted

10 days after the end of the oviposition period. The cumulative female-days during 3 days of oviposition and the resulting number of larvae per female per day were determined

The first study evaluating mortality following topical exposure showed that all six pyrethroids were associated with the highest mortality (86 to 100%) whereas spinetoram exposure resulted in intermediate mortality (50%). The remaining 13 insecticides were associated with $\leq 13\%$ mortality. In the second study, among the 13 insecticides causing minimal mortality, abamectin and dinotefuran were associated with 47% and 36% reductions, respectively, in cumulative female-days. However, only abamectin negatively impacted female fertility, causing a 61% reduction in the number of *E. eluta* larvae per female per day.

Observations of *E. eluta* adult mortality after topical insecticide exposure suggest that pyrethroids remain the only viable option for foliar applications targeting adults, emphasizing the need for new insecticides. Spinetoram was associated with intermediate mortality, suggesting that foliar applications might suppress corn silk fly infestations. This insecticide caused high mortality following ingestion exposure in additional experiments. Thus, spinetoram might be an alternative to pyrethroids if delivered with baits promoting insecticide ingestion. A delayed effect on mortality was observed for both abamectin and dinotefuran, but only abamectin impacted fertility. This suggests that in the field, abamectin could aid by killing flies over time and decreasing their ability to cause larval infestations. Insecticide resistance remains a concern and should be addressed by looking into additional insecticides concentrations and types of exposure.

Literature Cited

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