Section I
Invasive & Emerging Pests

ADULTICIDAL EFFECTS OF NEONICOTINOIDS ON *DROSOPHILA SUZUKII* AND OVICIDAL EFFECTS THROUGH TRANSLAMINAR UPTAKE INTO BLUEBERRIES

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Neonicotinoid pesticides were tested as a contact adulticide and translaminar ovicide for SWD control. Neonicotinoid residuals have low efficacy against adults; however dip trials have shown that they may suppress egg deposition and hatching through translaminar absorption into fruit.

Adulticidal effects were tested by submitting lab-reared flies to probit analysis. Four labeled formulations of neonicotinoids were used: Actara 25WG, Assail 30SG, Provado 1.6F, and Scorpion 35SL, and arranged in a complete randomized design, indoors at 21°C, ±1°C. Concentrations of the pesticides were based on 0.5, 1, 2, 3, and 4 times the high field rates. Ten adult SWD flies per treatment were anesthetized and put into Petri dishes. They were immediately sprayed in a Potter Sray Tower and then transferred to clean Petri dishes. Each dish included a piece of growth media and a piece of dental cotton wetted with DI water, which provided food and water necessary for keeping adults alive four days or more. Adults were evaluated each day until 5DAT – however flies were not able to be kept alive in the controls at 5DAT so data at 4DAT was evaluated.

Dip trials to evaluate the translaminar effect of neonicotinoid pesticides on SWD were performed on storebought organic blueberries. Four labeled formulations of neonicotinoids were used: Actara 25WG, Assail 30SG, Provado 1.6F, and Scorpion 35SL. In the second trial, the adjuvant R-56 was added to each treatment and included as an additional control, for a total of six treatments. Berries were dipped for 5 seconds, dried, and held at 20°C. Berries were pinned to dense cotton plugs attached to the inside of 2 oz. condiment cups. To keep flies alive long-term, 2 mL of 10% sucrose solution innoculated with yeast was added to each cotton plug. A single gravid adult female was added to each cup. Ten experimental units per treatment were prepared each day, for a total of six days after treatment (DAT), for 0DAT – 5DAT. Each set was checked for morbidity at 24 hour intervals.

Results of the probit analysis showed that even at 4x concentrations of pesticides, mortality did not reach 50% at 4DAT for any treatment. Percent mortality for each treatment at the 3-4x high rates were: Actara (a.i. 299.6 ppm) 8% ± 5.83 SEM, Assail (a.i. 357.2 ppm) 14% ± 6.78, Provado (a.i. 435 ppm) 34% ± 5.92, and Scorpion (a.i. 410.2 ppm) 18% ± 11.14. These data were normalized on a log concentration scale to determine the LC_{50} for each pesticide. Provado had the highest mortality for its concentration at all levels. In another trial which allowed exposure to pesticides on a large surface area (i.e. applied to one side of a petri dish) mortalities did reach higher percentages. Residues on large surface areas better simulate a natural

environment where blueberry bushes have been sprayed, so higher mortality might be expected for a field application if treated leaves were used for bioassays.

At the end of 5 days, adults were removed and eggs in each fruit were counted. Blueberries were destructively sampled two weeks after females were initially added, to determine percent of infested fruit. Virtually no adult mortality was observed in treated and control samples. Overall, fewer fruit were infested in Assail and Scorpion treated berries than other treatments. Scorpion suppressed infestation more, but Assail had a longer residual effect. Dead eggs were found under blueberry epidermises during destructive sampling, suggesting an ovicidal effect. The number of eggs laid and the infestation rate were lower for the second trial and the cause of this is unclear; however the inclusion of R-56 does not appear to have had an effect when the two controls are considered. During the winter, more translaminar trials will be performed to further investigate the ovicidal effects of neonicotinoids on SWD.