PROJECT REPORT

Project Title: Concentration-response Relationship of an Anthraquinone-based Repellent for American Crows.

Research Agency: United States Department of Agriculture, Animal and Plant Health Inspection Service

Principal Investigator: Scott J. Werner

Background:
The 2006 NWRC Research Needs Assessment revealed the priority for Icterid and Corvid damage management research. Specific research needs include the development of new and improved methods (e.g., repellents) to mitigate the impacts of blackbirds and crows (Bruggers et al. 2002). Gebhardt et al. (2011) estimated that the expected yield loss per damaged acre of almonds was 5.1% in California; crows were most commonly regarded as the vertebrate pests associated with California almond depredation. This study was designed to evaluate an anthraquinone-based repellent for American crows (Corvus brachyrhynchos) in captivity.

We previously estimated the threshold concentration of anthraquinone-based repellents for Canada geese offered treated corn seeds (1450 ppm anthraquinone), red-winged blackbirds offered treated oilseed sunflower seeds (1475 ppm anthraquinone), ring-necked pheasants offered treated corn seeds (10450 ppm anthraquinone; Werner et el. 2009) and common grackles offered treated confectionery sunflower seeds (9200 ppm anthraquinone; Werner et al. 2011). Similarly, our previous studies that were financially supported by CDFA (Specialty Crop Block Grant SCB10034) provided threshold concentration estimates of anthraquinone-based repellents to obtain ≥80 repellency among horned larks offered treated wheat seeds (≥ 3000 ppm anthraquinone), and male (4000 ppm anthraquinone) and female wild turkeys (5300 ppm anthraquinone) offered treated oat seeds. The purpose of our present study was to predict the threshold concentration (i.e. 80% repellency) of an anthraquinone-based repellent for American crows offered treated almonds.

Results:

American crows exposed to almonds treated with 0.5–4% anthraquinone exhibited 80–100% repellency during the concentration-response experiment (Figure 1). Actual anthraquinone concentrations for our 0.5–4% anthraquinone-treated almonds were: 2980 ppm, 7380 ppm, 14700 ppm, and 31500 ppm anthraquinone, respectively. Crow repellency (y) was a function of anthraquinone concentration (x): $y = 17.130 \ln(x) - 66.246$ ($r^2 = 0.99$, $P < 0.001$). We therefore predicted a

threshold concentration of 5200 ppm anthraquinone for American crows offered treated almonds.