

COMPLETED PROJECT REPORT

Project Title: Development of crow repeller.

Research Agency: University of California - Davis

Principal Investigator: Salmon and Delwiche

Budget: \$171,238.00

Summary:

There were 3 objectives for this project:

- 1) Design a simple and effective broadcast calling system (hereafter referred to as the repeller);
- 2) Develop and evaluate an integrated control program using the repellers for crows in almonds;
- 3) Make available on a website detailed information about the repeller, the calls, and guidelines for an integrated crow control program.

Two manuscripts satisfy objectives 1 and 2. The manuscript titled "Electronic broadcast call unit for bird control in orchards" has been submitted to the Journal of Applied Engineering in Agriculture. The 2nd manuscript, "Control of crows in almonds by broadcast distress calls" has been submitted to the journal Crop Protection. Abstracts are provided below.

For the 3rd objective, a UCD Crow Control website <http://crowcontrol.engineering.ucdavis.edu/> is operational.

Control of crows in almonds by broadcast distress calls

Abstract: The American crow (*Corvus brachyrhynchos*) is a major pest in almonds. Past studies have shown that warning and distress calls are a useful tool for hazing crows out of almond orchards, but these studies have not approached the matter from an integrated pest management standpoint. A broadcasting unit was designed for this study with emphasis placed on preventing habituation and saving power. The unit would hold four 25-sec calls, play the same call every 12 min, switch to a new call every 3 to 4 days, and turn off at night. The broadcast units were deployed for 2.5 months and did not require a battery charge during that time. Some habituation was noted after about 8 wk of deployment.

Crow chick distress calls were recorded on the UCD campus. In addition, recordings of 2 dying adult crows were obtained from the National Wildlife Research Center (NWRC). When tested,

the UCD and the NWRC calls elicited desirable responses from crow flocks over 70% and 50%, of the time, respectively. We used these calls in the broadcast unit.

Six orchards, a pair from each of 3 different areas in California, were chosen for testing. In the 1st year, all of the orchards were surveyed for crow damage without the treatment. Three damage surveys were taken each year during the growing season. In the 2nd year, 1 orchard in each pair was selected for treatment and the other orchard was the control. Treatment consisted of deployment of the broadcast units, 1 unit per 1.6 ha, at the first sign of bird damage. The units were distributed uniformly throughout the orchard, and moved to a new tree about every 2 wk. Growers at each site were supplied with pyrotechnics to supplement the distress calls. The units ran until harvest.

Two of the 3 treated sites showed a significant decrease in damage due to the treatment of the broadcast units implemented with the field protocol. One site showed damage reductions from 0.84 (6.0 kg/ha) to 0.25 (1.1 kg/ha). Another site showed damage reductions from 1.54 (18.2 kg/ha) to 0.73 (4.8 kg/ha). The 3rd site was relatively undamaged in the 1st year; therefore damage reduction in the 2nd year was not possible.

Electronic Broadcast Call Unit for Bird Control in Orchards

Abstract. Birds can cause significant damage to a number of agricultural crops. Past studies have shown that warning and distress calls are a useful tool for hazing birds out of agricultural and industrial settings, and electronics have made this old technique more affordable. A new study focusing on integrating broadcast distress calls into bird management programs required the design of broadcasting units with emphasis placed on low cost, preventing habituation, and saving power. The analog circuit was built around a 120-sec sound chip set to play four 25-sec calls, wait approximately 12 min between calls, and switch to a new call every 3 to 4 days. An analog timer set the pace for the 25-sec call/12 min wait duty cycle. Call switching was achieved with a ripple counter. To save power, the circuit turned off every night using a voltage divider with a photo resistor to drive a power MOSFET switch. An audio amplifier boosted the sound signal before the loudspeaker.

A number of broadcast units were built and tested in commercial almond orchards as part of a field trial to deter American crows (*Corvus brachyrhynchos*) from causing damage. The broadcast units were deployed for 2.5 mos and did not require a battery charge. Some bird habituation was noted after approximately 8 wk of deployment. In 2 of the 3 pairs of test sites there was a significant reduction in crow damage between years due to the field protocol, with savings of approximately \$15/ha at 1 site and \$42/ha at another.

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