PROJECT REPORT

Project Title: Controlling resistant voles in artichokes.

Research Agency: University of California - Davis

Principal Investigator: Salmon

Budget: $101,598.00

Summary/ Abstract of Final Report:

The final report was completed in August 2006.

Summary of Study

California meadow voles, Microtus californicus, are the primary vertebrate pest in the artichoke fields of Castroville, California. Complaints from growers over the effectiveness of the only available rodenticide, chlorophacinone-treated artichoke bracts, led to the examination of baiting strategies in 2001. Laboratory feeding trials revealed an inconsistency in the dose response correlation and suggested resistance to chlorophacinone.

This project was initiated to determine if there was anticoagulant resistance and if so, to what extent. Results show that there does appear to be a strong genetic resistance to chlorophacinone in Castroville meadow voles, with ~50% of the population able to survive a lethal dose. This resistance prevents effective control of the most severe vertebrate pest in the artichoke fields. As no other toxic bait is currently available for use as an alternative, the 2nd part of this study examined alternate toxicants and management strategies. Results indicate that zinc phosphide-treated artichoke bracts would be the best and most appropriate alternative to chlorophacinone treatment.

Summary of Recommendations

1. If chlorophacinone must be used before alternative toxicants become available, it should be used no more than 1X/yr, and on the most limited basis possible. However, 2 treatments within a short period of time, (i.e., within 1 week) might be more effective for control than a single treatment.

2. Effective bait timing should be evaluated with respect to vole population dynamics.

3. A monitoring program for susceptibility should be established for any anticoagulant used in the artichoke fields. Whether it is a feeding test, blood coagulation response test, or genetics test,

the prolonged use of chlorophacinone or another anticoagulant will greatly depend on proper management decisions that can only be made with a monitoring program.

4. Use an alternative toxicant with a different mode of action immediately. From available data it appears that zinc phosphide on fresh bract bait would be suitable. There does not seem to be a much greater cost associated with using this bait, which is often the reason alternatives are not employed. Zinc phosphide should be used wisely. Do not assume that some form of resistance, tolerance, or aversion to it is impossible.

5. Work with appropriate agencies (EPA, CDFA) to develop a plan for testing and registering a second generation anticoagulant for field use.

6. Whether through the chlorophacinone manufacturer, government agencies, or growers, the fitness costs of chlorophacinone resistance gene should be evaluated in future research if chlorophacinone is to be retained.

7. Continue the use of aluminum phosphide pellets. This fumigant should be evaluated for efficacy to examine the possibility of increasing its use if it is economically beneficial.

8. A population monitoring index should be implemented in all field control operations. This is a simple way to tell if treatment controls are working and can help to identify potential problems (such as zinc phosphide failure).

9. Examine other research options as mentioned above that utilize different modes of actions or different cultural practices. Growers are instrumental in determining if the increased control is worth the cost of developing new methods. They should take an active part in deciding research needs and evaluating alternative baiting strategies.

Last Updated:

08/14/2009