

COMPLETED PROJECT REPORT

Project Title: Zinc phosphide residue study in alfalfa utilizing broadcasting techniques

Research Agency: National Wildlife Research Center

Principal Investigator: R. Timm

Budget: \$94,620

Background:

Zinc phosphide (2%) on oat groats is essential for the control of voles (*Microtus* spp.) in alfalfa. Application by mechanical broadcast techniques is required when fields are too muddy to be accessible by foot or when an infestation is severe and widespread deployment is necessary for effective control. Existing zinc phosphide bait registrations (Reg. No. CA 890026 & CA 890027) do not allow for direct surface broadcasting by air or ground devices in alfalfa, even though use in other crops and in non crop areas is permitted. The U.S. EPA required a residue tolerance before zinc phosphide treated grain bait could be mechanically broadcast on alfalfa by aerial or ground techniques. CDFA intended to petition for a residue tolerance based on results from this study and to expand the existing Special Local Need registration to include 2 crop applications per year by either mechanical ground or aerial broadcasting techniques.

Objectives:

To determine the magnitude of residual concentrations of zinc phosphide in alfalfa plants, after treatment with mechanically broadcast 2% zinc phosphide treated crimped oat groats.

Summary:

Two study sites were used based on the uniqueness of their geographic regions and agricultural practices. These selections obtained a range of residue data for typical uses of zinc phosphide in alfalfa in California. At the San Joaquin Co. site, east of Stockton, zinc phosphide bait was broadcast at the beginning of 2 mid-season crop intervals. At the Modoc Co. site, southeast of Tulelake, zinc phosphide bait was broadcast during early spring plant dormancy and at the beginning of the 2nd crop interval at mid-season. The bait was applied to 2 plots at 10 lb/acre (1X; 11.2 kg/ha) and 20 lb/acre (2X; 22.4 kg/ha) at both sites. A cyclone-type spreader, mounted on an all-terrain vehicle, broadcast bait from a sufficient height above ground surface to represent the possible effects of all types of mechanical applicators that may be used, including aircraft. Placebo baits broadcast in 2 nearby plots at equal rates to the treated baits provided control data.

At each predetermined sample collection, alfalfa was sampled from each of 4 measured plots

(.0.1 acres/plot) at each site, inside 3 randomly selected 1 square rod subplots; collection times were immediately prior to and following broadcast operations, at 12-13 days post-application, at 25 days post-application (and again before cutting if the crop interval was extended), and at hay baling. Thus, residue data were provided to establish the maximum expected concentrations during use, and to establish a general decline trend for potential use in determining a preharvest interval. Prior to chemical analysis, samples were frozen and stored in sealed plastic bags; storage stability tests are also being conducted to assure validity of results. Alfalfa samples were analyzed using a newly proposed US. EPA enforcement method with a gas chromatographic detection limit of ≤ 5 ppb zinc phosphide that determines the amount of phosphide, the gas product formed through acid hydrolysis of zinc phosphide.

Substantial residue of zinc phosphide existed on alfalfa immediately following bait broadcasting. The greatest concentrations were found on samples collected immediately following application, probably because of bait striking the plants and leaving particle or because airborne zinc phosphide dust was adhering to plant surface moisture. Zinc phosphide residues on the hay samples dissipated or decomposed to the extent that it was either no longer detectable or less than 50 ppb, with the exception of some samples from the 2X rate in the later San Joaquin Co. trial. Zinc phosphide rapidly decomposes when it is subjected to high levels of humidity, dew, and precipitation. Irrigation also facilitates decomposition of the zinc phosphide and cleansing of the plant. Irrigation often occurs at 1-3 days following hay baling of a previous harvest and usually again shortly before cutting.

This study, conducted under actual field conditions, demonstrated that 2% zinc phosphide crimped oat groat bait can be used safely in alfalfa fields during the growing or dormant seasons. Typical rodent control in California alfalfa occurs when plants have < 3 inches of new growth, essentially nullifying concerns over grain lodging during application. Concerns for nontarget wildlife are minimized at application time by the sparse plant cover that does not provide desirable habitat for most nontarget species. Such use provides a "built in" preharvest interval, meaning if the bait is applied at such an early stage of growth, especially during the dormant season, adequate time will elapse to decompose any residual zinc phosphide before harvest.

Last Updated: