# PROGRESS ON THE DEVELOPMENT OF AN AVIAN TOXICANT (CPT)

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In North Dakota, South Dakota, and Minnesota, blackbirds cause extensive damage to ripening sunflower. In the most recent statewide damage surveys, conducted in 1979 and 1980, sunflower losses in those states amounted to $5.1 and $7.9 million, respectively, (Hothem et al. in press). Frightening and dispersal techniques are available to reduce the sunflower damage in the north-central states. Each of these, however, has limitations because of cost, logistics, or limited effectiveness.

CPT (3-chloro-4-methylbenzenamine, CAS 95-74-9) is proposed as a potential toxicant for aerial application on blackbird roosts (Mott et al. 1987). CPT concentrate (15.6% v/v) contains propylene glycol (35.9%), isopropyl alcohol (46.9%), linseed oil (1.6%), and CPT (15.6%). The avicide is formulated just before application by tank-mixing 64 gal of this concentrate with 8 lbs of a fluorescent particle marker and 36 gal of water. This formulation (10% v/v), applied at the rate of 4.3 to 11.0 lbs/a, killed 99% of the test red-winged blackbirds in the laboratory (Lefebvre et al. 1987) in 1 to 3 days (Lefebvre unpubl. data). Death is caused by the deposition of uric acid in kidney tubules and pericardium (Schafer 1979). Preliminary CPT field tests showed potential efficacy, but also identified problems related to formulations, delivery systems, and techniques of evaluating efficacy and hazards (Guarino et al. 1969).

It is extremely difficult to determine the efficacy and environmental hazards of CPT spray applications because mortality takes many hours to several days to occur. Therefore, methods of estimating the mortality of target and non-target animals under these conditions must be developed.

In October 1987, the Denver Wildlife Research Center submitted an application for an experimental use permit to the Environmental Protection Agency for evaluation of CPT aerial sprays for controlling roosting blackbirds and starlings in the mid-South and north-central states. Our objectives are (1) to develop methodology for evaluating the efficacy of CPT-Avicide spray applications to roosting blackbirds, (2) to develop methodology for evaluating the potential environmental and nontarget hazards associated with CPT-Avicide spray, and (3) to determine residual properties of CPT-Avicide spray applications under field conditions. If effective, environmentally safe, and economical, CPT could have widespread application as a management tool for reducing problem blackbird and starling populations. Here, we discuss recently completed laboratory toxicity tests and proposed experimental work to be conducted in North Dakota.

## CPT Toxicity Tests

Six toxicity tests with the proposed CPT concentrate (15.6% v/v) and two toxicity tests with the CPT formulation (10.0% v/v) were recently completed by a private laboratory to help meet registration requirements established by the EPA. These included: acute oral LD50 (rat, concentrate and formulation); acute dermal LD50 (rabbit, concentrate and formulation); primary dermal irritation (rabbit); primary eye irritation (rabbit); dermal sensitization (guinea pig); and acute inhalation LC50 (rat). Each test result was evaluated using criteria established by the EPA, and placed into one of four descriptive categories: Category I (Danger/Extremely Toxic), Category II (Warning/Highly Toxic), Category III (Caution/Moderately Toxic), and Category IV (Caution/Slightly or Relatively Nontoxic). Only one test (primary eye irritation, rabbit) resulted in a Category II rating (warning/highly toxic); two tests (primary dermal irritation, rabbit; dermal sensitization, guinea pig) were evaluated as Category IV (caution/slightly or relatively nontoxic) and the other five tests fell into Category III (caution/moderately toxic) (In Application for Experimental Use Permit for CPT-Avicide 16% Glycol Concentrate, Denver Wildlife Research Center, Denver, Colorado).

## Experimental Sites and Application

Two marsh roosting sites, containing birds that are committing or are about to commit depredations, will be selected for treatment in the sunflower growing areas from 15 August to 30 September 1988. Total acreage treated will not exceed 30 acres (maximum of 15 acres per site). Test roosts will contain 5,000 to 50,000 blackbirds. Each marsh site must (1) be a closed aquatic system with no significant water outflow, (2) not contain water that will be used for irrigation, drinking (including domestic animals), or recreation, (3) not contain aquatic plants or animals that will be harvested for food, and (4) be at least 400 yds from human residences.

Experimental sites will be restricted to areas not inhabited by endangered or rare species. Sites will be chosen that can also reasonably be expected to result in a finding of no significant impact under environmental assessments guidelines specified by the National Environmental Policy Act.

Each site will be sprayed with an agricultural spray aircraft at an altitude of 50-100 ft. The first site will be treated at a rate of 50 lb CPT/a (approx. 50 gal of the diluted product/a). The other site will be treated at 20-50 lb/a, depending on the results of the first trial. The application will occur between sunset and near total darkness, an approximate 20-30 minute application "window." The formulation will be applied directly on visible blackbird populations within the roosting marsh vegetation.

On the day of treatment, thin layer chromatography (TLC) sheets and water sensitive spray cards will be placed along transects within and around the roost to (1) estimate the amount of formulation applied, (2) evaluate droplet size, and (3) determine coverage of the spray particles. TLC sheets and spray cards will also be positioned outside of the roost



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to help estimate the extent of spray drift. From these data the total volume and distribution of liquid sprayed on the roost can be estimated.

### Estimation of Efficacy

CPT is a slow-acting toxicant, thus we anticipate that most mortality will occur from 1-4 days postspray at locations at and away from the experimental sites. Several methods of evaluation will be tested to determine the most appropriate one(s) for estimating efficacy and hazards at subsequent experimental sites.

Periodic estimates of the population size and species composition of the target roost will be made pre- and posttreatment to assist in evaluating changes in bird populations due to treatment. Because some of the birds treated with CPT are expected to die in the roost, plots will be randomly located along pre-established transects to estimate mortality within the roost. Each plot will be searched down to the waterline for dead animals. The species and sex of each animal will be recorded.

Two factors will be considered when estimating mortality in the roost; the ability of the searchers to find dead birds and the removal of carcasses by scavenging animals. In 1987 an experiment in North Dakota was conducted to measure differences in searcher ability to find dead birds at low (2 birds/plot) and high (8 birds/plot) densities and in two different marshes. There were no differences among four searchers in the percentage of birds found in 6 x 15 ft plots, in the percentage of birds found between low and high density trials, nor between marshes. In a second study in 1987, blackbird carcasses were placed in 8 blackbird roosts in North Dakota to assess differences in scavenging between high and low densities of carcasses. We placed 15 carcasses in haphazardly selected locations in 4 marshes and in 4 other marshes, 5 carcasses were placed in each of 15 6 x 15 ft plots (a total of 75 birds per marsh). We found that an average of 7% of the carcasses were removed daily. There was no difference between densities in the percentages of carcasses remaining at the end of 7 days.

Caged birds will be used to determine the fate of birds treated in the roost. Before treatment, blackbirds will be live-trapped in the vicinity of the roost. A representative sample of the roosting species will be haphazardly assigned to compartmentalized cages. Cages will be randomly placed at the top of the roosting vegetation along pre-established transects in the test roost and in a control roost. Immediately following the exodus of birds from the roosts the morning after treatment, the test and control groups of birds will be transferred to holding pens and inspected daily for dead birds. Mortality rates of each species in the captive bird population will be calculated.

Radio-tagged (RT) blackbirds will be released into the roost just prior to treatment to help determine the percent of birds that die in and out of the roost. These birds will be located several times daily to determine the behavior and movements of birds sprayed in the roost. RT birds verified by necropsy and presence of fluorescent particle marker as CPT related mortalities will be used to estimate the percentage of the total roost population killed by CPT. Recovery locations of dead RT birds will also provide an estimate of the size of the kill area.

Blackbirds leaving the sprayed roost will be collected by live-trapping, placed in holding pens, and daily mortality determined. These data will be used to support estimates of mortality obtained by other methods. A sample of blackbirds will be shot as they leave the roost the morning after treatment and later examined for the presence of fluorescent marker to determine the percentage of birds in the roost contacted by the CPT spray.

The effect of CPT on the local bird population will be measured by monitoring blackbird numbers within the foraging range of the roost. Because roosts are commonly located in close proximity to each other, only blackbirds visible from all-weather roads located within 2 mi of the target roost will be censused. Pre- and posttreatment treatment observations will be made by driving along these roads and counting all blackbirds located on either side of the road. The habitat and number, species, and behavior (flying, feeding, watering, or loafing) of all blackbirds observed will be recorded.

A route to be traveled on foot will be established around the periphery of the treated roost to obtain an index of nontarget birds and mammals at the roost site pre- and posttreatment. The number of animals observed per route per day during the pretreatment period will be compared with those observed posttreatment. Owl populations will be monitored pre- and posttreatment using tape-recorded calls at the roost. The number of hawks seen on the survey routes will also be monitored pre- and posttreatment. Finally, dead nontarget birds and mammals will be noted on the transects in the roost pre- and posttreatment.

All dead nontarget animals will be retained for necropsy or residue analysis. Necropsies will consist of an examination of the heart, liver, gizzard lining, and kidney for CPT-related abnormal appearance, and other physical characteristics that may help establish cause of death. A small percentage of target animals found dead in or in the vicinity of the marsh or in cages will also be necropsied.

Pre- and posttreatment soil/sediment, water, and vegetation samples will be collected for residue analyses along transect lines in each roost.

Data collected in 1988 will be used to determine the usefulness of various evaluation techniques for predicting target and nontarget mortality resulting from the aerial application of a slow-acting toxicant. Once the methodologies are shown to be reliable, research in 1989 and subsequent years will be used to gather data to support a registration of CPT as an avicide for roosting blackbirds and starlings.

### LITERATURE CITED


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