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Use of DRC-1339 and PA-14 to Control Grackle Populations in the Lower Rio Grande Valley¹

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In an attempt to reduce valley wide populations of grackles in the Rio Grande Valley of South Texas, PA-14 was sprayed over a staging area where as many as 10,000 birds were located. This attempt was unsuccessful and this method of population reduction was deemed not suitable for south Texas. Dog food bait was treated with DRC-1339 and presented to great-tailed grackles in several different situations in an attempt to control depredations to citrus by this bird. Bait presented in feedlots during winter (Nov - Feb) was readily taken by the birds, resulting in a significant reduction of numbers of birds visiting these sites, but with little apparent effect on the valley-wide population or damage to citrus. Baiting at pre- and post-roost staging sites was not effective, even when supplemented with decoys. Baiting at nest colony sites early in the breeding season (Apr - May), and at water sources during the post-breeding period (Jul - Aug) were effective in reducing damage locally.

INTRODUCTION

As part of a multi-prong approach to reducing great-tailed grackle (*Quiscalus mexicanus*) damage to citrus in the Rio Grande Valley of southern Texas, we attempted to develop methods to eliminate large numbers of birds, thereby reducing the Valley-wide population. Large numbers of grackles (> 500,000 in late winter) were known to roost in sugar cane fields from September to March. During this period grackles also tend to congregate in large numbers (> 10,000 individuals) at staging areas prior to entering roost sites. Previous research (Heisterberg et al. 1988) has documented that large numbers of roosting birds can be killed using the avian stressing agent, PA-14 [α -Alkyl (C11-C15)-omega-

hydroxypoly (oxyethylene)]. We investigated the dispensing of this material on the grackles by spraying it from an aircraft (Cessna 150 equipped with crop duster chemical tanks). When evaluating this technique we also considered the environmental and sociological hazards posed by the technique against the probability of successfully eliminating a large portion of the grackle population (Otis 1988).

Other studies (Boyd and Hall 1988) have documented success in eliminating large numbers of birds using toxic baits, specifically DRC-1339 (3-Chloro-p-toluidine hydrochloride). These studies were conducted at staging areas and roost sites of crows in Kentucky and Arkansas.

Habitat studies (Rappole et al. 1989 this volume) and previous control efforts indicate that in addition to roost sites and staging areas, large numbers of grackles feed in graineries, cattle feedlots and dairies during the winter months (Oct - March).

Results from feeding trials conducted at Texas A&I in 1987 indicated that grackles preferred dog food over most naturally occurring foods (Beasom and Schulz, in prep.). Preliminary observations have shown that this form of delivery is relatively specific to grackles with minimum acceptance by other species (unpublished data). An Experimental Use Permit was established to use DRC-1339 applied on dog food to be used in staging areas, dairies, and feedlots. In addition, attempts were made to bait birds into other situations, along flight lines, at watering holes, and at breeding colonies to determine if DRC-1339 would be effective in eliminating birds and reducing damage in local areas of high damage.

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METHODS

Grackle Population Reduction Using PA-14

During the winter months (Dec - Feb), great-tailed grackles concentrate in large winter roosts, especially in mature sugar cane fields. The sugar cane is cut through the fall and winter, progressively reducing the amount of cane available for roosting. Those birds roosting in fields that are cut tend to join birds flying to roost sites in uncut fields. As a result, by late January, when few uncut fields remain, a large portion of the grackles in the Valley may roost at a single site. This situation occurred in January and February of 1987 when an estimated 500,000 grackles, roughly 1/2 to 2/3 of the entire Valley grackle population, were roosting in a single 14-ha field of mature sugar cane just south of Donna Reservoir, Donna, Texas. For this situation, we considered using the wetting agent, PA-14, to kill birds in the roost. PA-14 is a surfactant that enhances wetting of birds when sprayed in combination with a rain shower or with water dispersed from sprinklers. The combination of water, the PA-14 wetting agent, and low ambient temperatures ($< 7^{\circ}\text{C}$) can cause death due to hypothermia in passerines. This plan was rejected because we were informed that it is illegal to use PA-14 on crops grown for human consumption. A further problem involved the proximity of the site to Donna Reservoir. It is illegal to use PA-14 near a human water supply, and the material is toxic to many aquatic life forms.

We next considered using the material on birds that were "staging". This "staging" behavior occurs as the birds approach the roost at night and again when they leave in the morning. Large numbers of birds entering or leaving the roost land at a site, forming an almost solid mass of individuals before entering the roost (evening) or dispersing to feeding sites. Staging areas at the Donna Roost were bare dirt fields where as many as 10,000 birds would alight in an area 100-m in diameter.

Grackle Population Reduction using DRC-1339

DRC-1339 at Dairies

DRC-1339 treated dog food was dispensed at Miller dairy in Hidalgo County, Texas on four separate occasions between January 1988 and February 1988. The selected dairy was in the flight line of a major roost ($> 100,000$ near Donna, Texas). We applied DRC-1339 to "High-Pro" dog food, identified in earlier research (Schulz and Beasom 1989 in Prep.) as preferred bait. The staricide label calls for a mixture of 45-g of DRC-1339 to 600-ml of water for 4.5-kg of bait. We doubled the mixture to coat 9-kg of dog food. The bait was coated with DRC-1339 1 day in advance of dispersal, allowed to dry and stored in 5-gallon buckets. A crude volumetric analysis was done to determine how much poison was contained in each pellet. Based on this analysis we estimated 2.75-mg/pellet. This would be 15 times more poison than needed to kill 50% of female grackles and 9 times more than needed for males, based on an LD_{50} of 1.8-mg/kg. Although the formulation of the chemical they used was slightly different, they found the LD_{50} in boat-tailed grackles (*Quiscalus major*) to be from < 1.00 - 1.8-mg/kg. In our analysis we used 100-g for weight of females and 164-g for males. In some simple pen studies we determined that 1 pellet did contain enough poison to give an LD_{100} . We therefore believe it would be possible to reduce the concentration of the poison by at least 50%.

To minimize the possibilities of leaving poisoned bait at the dairy, attempts were made to attract animals by placing bait in large trays (236 x 114 x 13-cm) on the ground. The birds were not attracted to the bait presented in this manner. Nor were the birds attracted to bait placed on large pieces of 0.6-cm mesh screen covered with sifted soil. Finally, we spread the treated dog food on the ground in empty cattle holding pens before daylight. About 20-kg of food was used for each days treatment.

Flight line counts over the dairy were made for at least 3 days prior to and 3 days after baiting. Untreated dog food was spread in the holding pens prior to counts. In February, separate counts were made of birds flying over the pens and of birds landing in the pens to determine if flight counts and pen counts were correlated.

DRC-1339 Along Flight Lines

Decoys were tested for attracting for baiting with DRC-1339 between 1 March 1988 and 15 March 1988. The area around Donna roost was selected because of a consistent northerly flight line leaving the roost each morning. Three types of decoys were tested on 3 separate occasions: 1) black poster board silhouettes with horizontal wings, 2) black poster board silhouettes with horizontal wings and tails, and 3) 5 x 8 x 10-cm blocks of black foam. The silhouettes were placed on sticks and inserted in the ground to simulate grackles feeding. The foam blocks were placed directly on the ground. In the first test, we used 27 silhouette decoys with wings. In the second test we used 27 silhouette decoys with wings and tails. In the third experiment we used 12 foam block decoys and a moderate amount of corn scattered around the decoys. Decoys were placed 15 minutes before dawn. Counts of birds landing near the decoys were taken 40-min after the first bird left the roost.

Attempts were again made in the fall of 1988 to attract birds to bait sites. Plastic crow decoys were used in conjunction with milo, cracked and whole corn bait applied in staging areas from 13-26 October. James Glahn, Research Scientist for Denver Wildlife Research Center, helped conduct baiting experiments in December of 1988. On December 7 and 8, 3 staging sites near the Eldora roost were baited with 23-kg of cracked corn and 11-kg of dog food. Eight to 16 live decoys in cages were also used at each site. On December 9-11, 4 bait stations were established near Donna Reservoir roost site. Live and dead decoys were used at each site along with whole corn and dog food.

DRC-1339 at Citrus Groves

Beginning in the spring of 1988 and continuing through July 1988, we used DRC-1339 coated dog food in 5 selected groves. Based on our earlier pen studies we reduced the label-specified concentration of DRC-1339 by 50%.

These groves were selected because they had nesting grackles, histories of high fruit damage and some available source of water. Preliminary trials indicated that baiting near a source of water greatly increased the effectiveness of baiting. The water available to the grackles differed at each site. Three different sources of water were chosen for evaluation: constant source, water pans, and artificial pools.

Although the sources of water varied, the pre-baiting and baiting procedures were the same in each grove. Sites were pre-baited until at least 25% of the birds in the groves were coming to the stations in a 1h period. Decoys were also placed at some bait stations.

Bait stations were observed for 1h each morning and the number of grackles eating the dog food was recorded. Counts were made for at least 3 days post-poisoning.

To evaluate the effect of this technique in reducing damage to citrus, damage assessment to the groves were also conducted. Counts of damaged and undamaged fruits were made on a monthly basis on 15 randomly selected trees. Damage in 1 grove (England's) was compared with results of damage assesment from 1987. Damage for the other groves were compared with pre-treatment levels. Timing and method of evaluation of damage was detailed in (Johnson et al. 1989).

Constant Source of Water

One grove (England's grove) was chosen for its constant source of water in the form of a cattle pond (18.3 x 3.0-m) located in the middle of the grove. The grove consisted of 2.8-ha of grapefruit and 2.8-ha of oranges. Counts were made in this grove from April - November, 1988 with poisoning occurring 3 times (26 May, 18 Jul, and 5 Aug).

Water Pans and Artificial ponds

Four groves with nesting grackles and observed grackle damage were selected for artificial water devices. Water pans (236 x 114 x 13-cm) were placed in each treatment grove. Two of these sites failed to attract birds in the pre-baiting period probably because of nearby competing water sources. These groves were abandoned. Two sites were selected in Rio Farms (A and D) and 2 sites in Santa Rosa (N and S). Water pans were used in the 2 sites in Rio Farms and site S in Santa Rosa grove. For the N site in Santa Rosa an irrigation valve was cracked open and a small pool of water (4 x 2-m) was allowed to form. Dog food was scattered around the pans and at the edge of the pool. When good pre-bait acceptance was observed (75-100% pre-bait taken in 4h period) treated bait was set out. Counts were made by recording the number of birds feeding at the pans for 30 min after the first grackle arrived.

RESULTS AND DISCUSSION

Grackle Population Reduction Using PA-14

We obtained permission to use PA-14 on staging areas during the winter of 1987-88, and attempted to spray birds from an aircraft on the evening of 15 January 1988. This evening was selected because it provided the only suitable meteorological conditions for PA-14 during that entire winter. Temperatures were 5 C with a light to moderate rainfall. These conditions are very rare in the Valley, occurring only once or twice a year. The attempt was unsuccessful in any case because the birds scattered as soon as the plane began its low level spraying run. Previous flights over birds roosting in sugar cane indicated that their flight behavior was such that spraying PA-14 could have been effective. This technique might still prove effective if permission could be obtained to spray the birds while roosting in sugar cane. The number of birds in the cane fields might justify the risk and expense of finding the right environmental conditions. With the present restrictions we have to conclude that this method of control is not suitable for south Texas.

Grackle Population Reduction using DRC-1339

DRC-1339 at Dairies

After the initial poisoning at Miller dairy, 43 dead grackles were recovered. Post-counts were not made until 3 days after treatment at which time more birds were flying over than when we poisoned. After the second poisoning, 1,206 dead birds were found. Females outnumbered males 10:1. Post treatment flight line counts dropped dramatically but numbers recovered in about 15 days (fig. 1). After the third poisoning, 31 birds were recovered. Post-count numbers dropped only on the first day after poisoning. Fifty-four birds were recovered after the fourth poisoning. Flight line numbers briefly decreased as in previous trials.

The number of birds landing in the holding pens, as might be expected, was always lower than the number flying over. The response in the pens paralleled the response in the flight lines.

Since dairies attract large numbers of birds in the morning, they represent potential large natural bait stations. However, baiting at dairies was not effective in reducing local populations. The number of birds flying over the dairies differed by only 1,050 birds throughout the study period. The dairy population recovered 2 - 15 days after poisoning.

Only on 1 occasion were we able to recover a large number of birds. The newness of the bait, variable weather conditions or some undetermined factor may have affected our efforts. Because DRC-1339 may take up to 18 hours to kill the birds, the number of dead birds recovered does not reflect the number that may have actually been killed. Most of the dead birds were found along canals and/or in thick grass while large numbers could have died in sugar cane roost sites or other inaccessible areas.

DRC-1339 Along Flight Lines

Attempts to decoy birds into staging areas in spring were not very successful. Using silhouettes with wings, only 28 birds landed near the decoys although hundreds of birds flew over the test site. Using silhouettes with wings and tails, 131 birds landed. The foam block decoys were the least effective with less than 10 birds landing and about 200 birds flying over. The best results were obtained using silhouette decoys with horizontal wings and tails, however the percentage of birds landing was very low regardless of the type decoy used. This method was therefore deemed inadequate for local population reduction.

Results of baiting and decoys in fall of 1988 also left some doubts as to the value of this technique. Only 12 birds were decoyed by the caged birds and bait at the sites near the Eldora

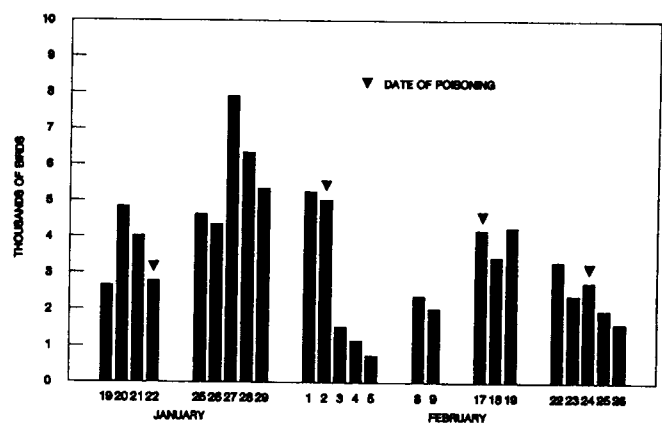


Figure 1.—Grackle use of Miller Dairy.

roost. At one of the sites near Donna Reservoir large numbers of birds fed for about 15 minutes each evening before they entered the roost. The other 3 sites were not used by birds.

DRC-1339 at Citrus Groves

Populations coming to the bait stations in the groves usually dropped immediately after poisoning (fig. 2-5). Populations returned to pre-bait levels within 2 weeks to 1 month after poisoning. Damage to fruit in the groves was reduced in England's grove when compared with damage levels from 1987 (table 1). Damage levels in the other groves remained low except in the Santa Rosa N site.

Table 1.—Effects of DRC-1339 on damage rates to citrus fruit.

Grove	Year	Mean damage % by month			
		Jul	Aug	Sep	Oct
England - T	1988	5.5	5.2	12.6	4.4
England - C	1987	1.9	6.6	17.8	14.6
(temporal pair)					
Santa Rosa Site N	1988	2.9	2.7	4.1	9.4
Santa Rosa Site S	1988	8.8	8.9	21.4	31.6
Rio Farm Block A	1988	6.0	5.2	3.1	5.8
Rio Farm Block D	1988	0.8	0.6	0.4	1.4

The individual characteristics of the groves determined the success of the baiting program. Groves with canals and or sorghum fields nearby had poor results in attracting birds. For example, in a 3.2-ha grove with a canal and sorghum field nearby, less than 10 birds from a population of approximately 200 during the peak of the nesting season were enticed to the bait stations in a 3 month period.

However bait stations used in areas with artificial water sources or small pounds were successful in attracting birds and reducing damage.

CONCLUSIONS

Contrary to results obtained in control efforts in other parts of the country, the solution to the grackle problem in south Texas does not seem to lie in techniques aimed at eliminating large number of birds to reduce the Valley-wide population.

Use of the PA-14 wetting agent is not a viable alternative in the Valley for several reasons. A high human population along with extensive agricultural and residential development limits the number of places where the method could be used. Weather in the Valley is normally warmer and dryer than is necessary for the method to work, with the exception of perhaps 1 or 2 nights during the entire year. In addition, the behavior of the birds is such that the only place where they are vulnerable to spraying is when they are on the roost, after dark. Since roosts are normally located in sugar cane or near water, they are not suitable for application of

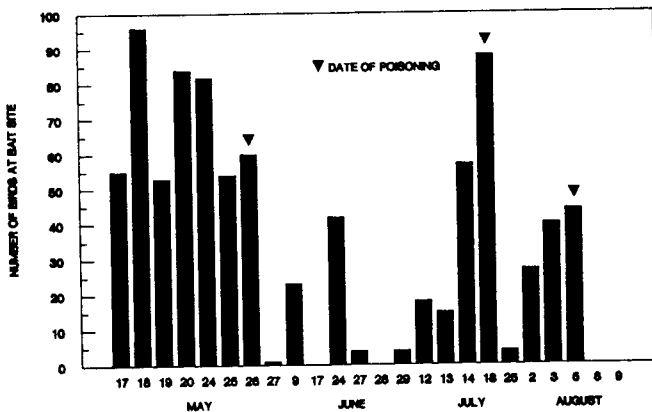


FIGURE 2.—Grackle use of England's Grove.

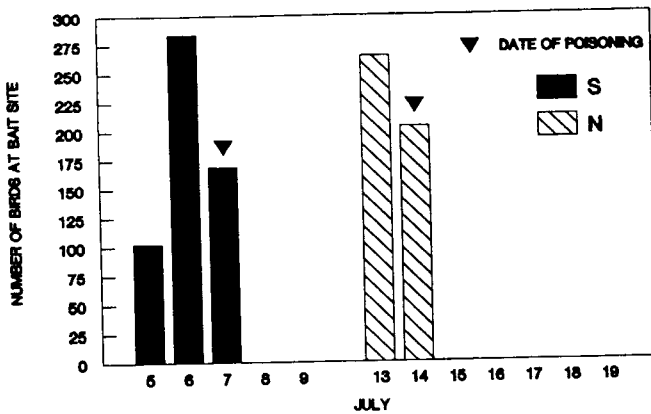


Figure 3.—Grackle use of Santa Rosa N and S.

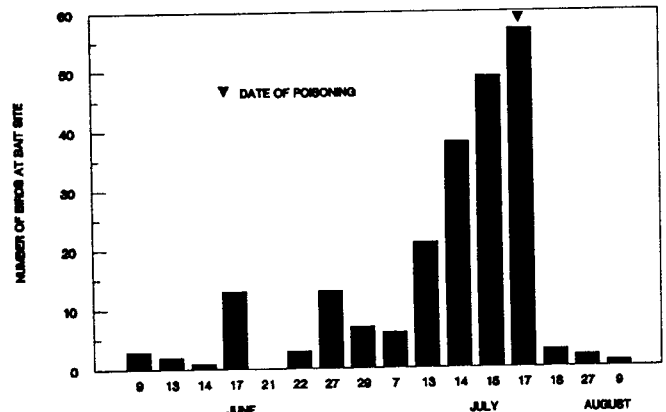


Figure 4.—Grackle use of Rio Farms Block D.

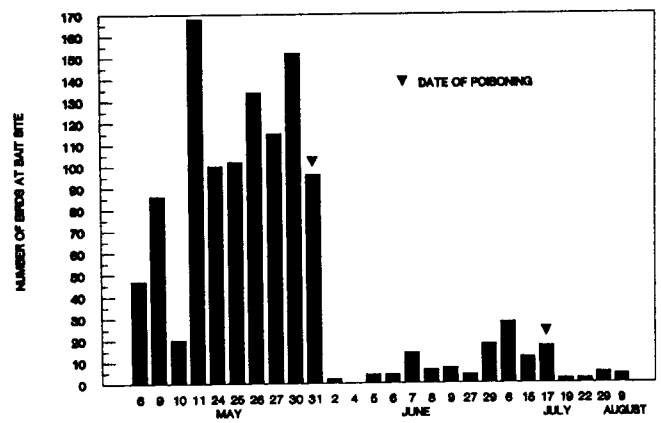


Figure 5.—Grackle use of Rio Farms Block A.

this poison with present restrictions. Even if all of these problems could be solved, it is unlikely that killing grackles with PA-14 or DRC-1339 at central collection points, e.g. roosts or feedlots during the winter, would reduce damage to citrus in summer and fall. Reduction of damage would require a significant reduction in the entire Valley-wide population, since birds at this time forage over several km² and fly as far as 10-km to roost. This process would require killing several hundred thousand birds. Such a reduction, even if achievable, is unlikely to be cost-effective. Control at this time is best directed specifically at groves that are experiencing significant damage to fruit by grackles, rather than wasting resources on the Valley-wide population of grackles, most of which are not involved in causing the damage.

The environmental conditions around citrus groves and the seasonal acceptance of bait, dictate the success of using DRC-1339 in groves or nesting colonies. For groves with no source of continuous water near the grove, the use of DRC-1339 coated dog food with a water source offers a viable technique to reduce grackle populations in groves that suffer damage during and immediately following the breeding season (May - Aug) when the birds will remain in the groves. Proposed research for the 1989 growing season will be directed toward establishing bait stations in groves with high levels of nesting grackles or in groves near nesting colonies. Baiting will be started earlier (Apr - May) than in 1988, before the nesting birds become established in the groves. Birds that survive the poisoning will be eliminated with shotguns to try and eliminate nesting in or near these groves. Damage assessment will be conducted in these groves in October of 1989.

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