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GENERALIZATION OF METHIOCARB-INDUCED FOOD AVERSIONS BY CAPTIVE HOUSE FINCHES

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ABSTRACT

Individually caged House Finches (*Carpodacus mexicanus*) were tested to determine if exposure to methiocarb applied to one type of food would enhance the repellent effect of the chemical when it was subsequently encountered on a different food type. Initially, 24 adult finches were each offered two grape bunches during a series of 2-h feeding trials. Birds exposed to one treated bunch and one untreated bunch ate significantly less ($p < 0.05$) grapes than did birds given two untreated bunches. One week later, the same group of birds was tested in a similar manner using treated and untreated safflower seeds. Among the finches exposes to treated seeds, we found no significant ($p > 0.05$) differences in consumption between those that had previously experienced methiocarb-treated grapes and those with no prior methiocarb experience. This finding implies that in areas where more than one type of crop is exposed to the same populations of depredating birds, previous exposure to methiocarb on one crop will not affect the birds' subsequent response to methiocarb encountered on a second crop.

INTRODUCTION

Very few studies have examined the responses of individual birds over time to foods treated with the chemical repellent methiocarb. Even less well studied is the behavior of birds encountering a second treated item after first having experienced methiocarb on a different type of food. Rogers (1978) showed that red-winged blackbirds (*Agelaius phoeniceus*) exposed initially to commercial bird food treated with methiocarb quickly learned to avoid eating rice treated with the repellent. More recently, Mason and Reidinger (1983) demonstrated that red-winged blackbirds trained with methiocarb to avoid food paired with red or green colors later generalized their experiences and reduced their consumption of the same food when it was paired with colors similar to those used in training. In both of these studies, all of the birds tested had previous experience with methiocarb, so the effect of prior exposure to the chemical on the subsequent behavior of the birds could not be assessed.

In this study, we wanted to determine in house finches (*Carpodacus mexicanus*) if preexposure to methiocarb on one type of food item affected their response when the chemical was subsequently encountered on a different type of food. We consider this of interest, because in some places several different crops are exposed to the same populations of depredating birds. For instance, in California there are areas where rice, sunflowers, and corn are all potentially subject to damage by the same flocks of blackbirds (mostly red-winged blackbirds). At other sites, cherries, grapes, and sunflowers are readily available to house finch flocks. Thus, it seems pertinent to know whether treatment of one crop with methiocarb might enhance the repellent effect to the same birds when they encounter the chemical on a second crop.

METHODS

Capture and Maintenance of Birds

Wild house finches were captured with decoy traps in Napa and Yolo counties, California in the fall of 1981. The birds were kept for about 12 months in a 4.9 x 2.5 x 2.5 m outdoor communal aviary before testing. A commercially available seed mixture, grit, and water were provided *ad libitum*, except during feeding trials.

The finches were brought indoors and placed indvidually in wire cages 0.61 m on a side about one month prior to the start of testing. Fiberboard partitions between adjacent cages visually isolated the birds. A 12 hour light/12 hour dark photoperiod was maintained throughout.

Treatment Groups

Twenty-four birds were randomly allocated to four treatment groups of six birds each. Group UU received untreated grapes and untreated safflower; group TU received treated grapes and untreated safflower; group UT received untreated grapes and treated safflower; and group TT received treated grapes and treated safflower. Because some birds failed to eat the test foods, groups TU and UT were subsequently reduced to three and four birds, respectively.

Grape Trials

Six days of pre-test trials were immediately followed by six days of testing. On the day before each feeding trial, 15 minutes before the onset of the dark period, the maintenance food was removed from each cage. The next morning, 1.25 hours after the lights came on, two bunches of grapes were suspended from the top of each cage and left for 2 hours. During pre-testing, all grapes were untreated. During the test phase, groups TU and TT received one untreated bunch and one treated with methiocarb. The bunches were weighed immediately before and after placing them in the cages

Grape bunches in each pair were similar in size and appearance. Prior to each feeding trial, any damaged berries were trimmed from the bunches. The sugar content of each bunch was estimated with a hand-held refractometer to ensure each bird received two bunches of comparable sweetness. Treated grape bunches were prepared 1.5 hours prior to testing by immersing them for 3 seconds in a suspension containing 2.0 g methiocarb (Mesrurol® 75% WP) in 2.0 ℓ deionized water.

Safflower Trials

The safflower trials began four days after the end of the grape trials and followed a similar regime, except that the safflower trials lasted only one hour, the pre-test and test phases consisted of four consecutive feeding trials each instead of six.

At the start of each trial, two seed cups, each containing 5 g of seed, were placed on opposite sides of each bird's cage. Consumption was determined by weighing the contents of the cups before and after each trial.

Treated seeds were prepared by dissolving the appropriate quantity of methiocarb in 20 ml of acetone and thoroughly mixing the solution with the proper weight of seeds. The slurry was air-dried for at least 48 hours to allow complete evaporation of the acetone before the seeds were used.

Data Analysis

We evaluated the effectiveness of the methiocarb treatments by measuring the reduction in consumption when birds were exposed to treated safflower seeds compared to pre-test levels when only untreated seeds were offered. For each bird we calculated both the reduction in total safflower consumption and the reduction in the proportion taken from the treated cup. For each measure, we subtracted the pre-test consumption from the test phase consumption and divided the difference by the pre-test consumption. We used the Mann-Whitney U test to make the following pairwise group comparisons: UU vs. UT, TU vs. TT, and UT vs. TT. The first two comparisons

provided a control for the prior experience of the birds and were to determine whether methiocarb treatment on the seeds actually reduced consumption. We predicted that birds in the UT group should reduce their safflower consumption more than birds in the UU group, and similarly for the TU and TT comparisons. The UT vs. TT comparison was our primary interest. A significant difference ($p < 0.05$) between the UT and TT groups would indicate that prior experience with methiocarb on grapes affected subsequent consumption of safflower treated with the repellent.

RESULTS

There was no significant difference between UU and UT in reduction of total safflower consumption (Figure 1). The consumption of both groups was 25-30% less during the test phase than during pre-test trials. However, when just treated side consumption was considered, the UT group reduced its consumption significantly ($p < 0.05$) more than did the control group, UU.

There were significant differences in the reduction in consumption of both total and treated side only safflower between groups TU and TT (Figure 2).

Neither total safflower reduction nor treated side only consumption reduction were significantly different between the UT and TT groups (Figure 3).

DISCUSSION

Birds presented with methiocarb-treated seeds reduced their consumption more than did the finches presented with only untreated seeds. This is not surprising, because previous findings involving various species of birds and assorted food types have also demonstrated the effectiveness of methiocarb in reducing food consumption. However, our test failed to demonstrate any effect on the consumption patterns of the house finches due to preexposure to methiocarb on a different food item. Both in terms of total safflower consumption and proportion taken from the treated side, the group that had been preexposed to methiocarb on grapes did not differ statistically from the group that had received only untreated grapes.

We think the most reasonable explanation of our results is that the finches associated their illness not simply with one factor, such as the taste of the repellent, but with the entire feeding situation, including the size, shape, color, and location of the food item being eaten. Grape bunches suspended from the top of the cage are totally different from cups of safflower seed at the sides of the cage, and the situational factors may have been so disparate that a noxious experience involving one type of food (grapes) was not relevant to the birds when they encountered the other food item (safflower). A major similarity between the treated grapes and the treated safflower was the presence of methiocarb, but apparently this sameness was not relevant to the birds and was overshadowed by the many differences between the two feeding experiences. In other experiments with house finches (Avery, 1984; Tobin, 1984), we have found no evidence that taste plays a role in food aversion learning with methiocarb, and the results presented here are consistent with that view.

This explanation implies that house finch flocks in the field will respond to each methiocarb-treated crop independently and will not generalize their experiences with the repellent from one crop to another. However, these results are preliminary, and much more work needs to be done to evaluate fully the effects of preexposure on methiocarb-induced food aversions.

SUMMARY

Twenty-four individually caged adult house finches were each offered two grape bunches during a series of 2-hour feeding trials. Some birds were exposed to one methiocarb-treated bunch and one untreated bunch while the rest were given two untreated bunches. Two weeks later, the same birds were tested in a similar manner using treated and untreated safflower seeds. Among the finches exposed to treated

seeds, we found no significant ($p > 0.05$) differences in consumption between those that had previously experienced methiocarb-treated grapes and those with no prior methiocarb experience. This finding suggests that in areas where more than one type of crop is exposed to the same population of depredating finches, previous exposure to methiocarb on one crop will not affect the birds' subsequent response to methiocarb encountered on a second crop.

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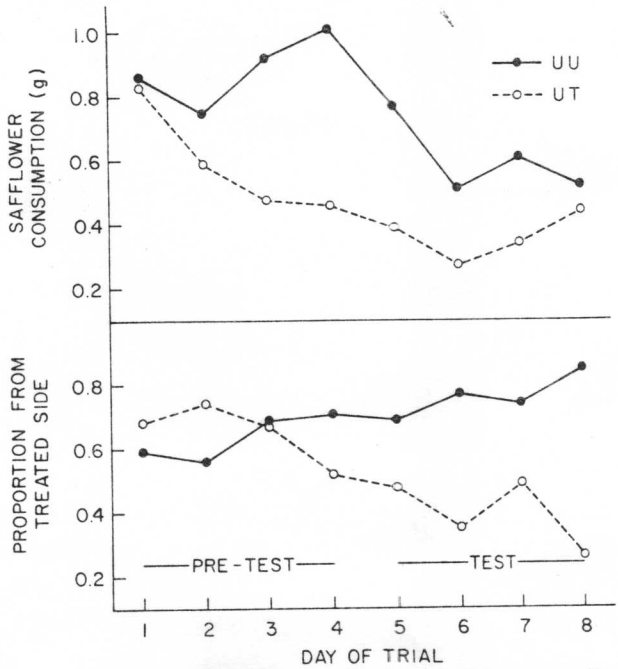

FIGURE 1.Total safflower consumption (top) and the proportion taken from the "treated" seed cup (bottom) by two groups of house finches during daily 1-hour feeding trials. Group UU (6 birds) received only untreated seeds throughout, while group UT (4 birds) received untreated seeds in the pre-test phase but was given methiocarb-treated seeds in the "treated" cup during the test phase. Both groups had been exposed previously to grapes without methiocarb.

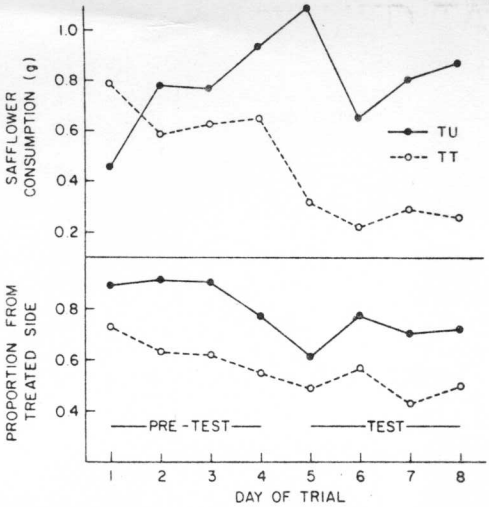

FIGURE 2. Total safflower consumption (top) and the proportion taken from the "treated" seed cup (bottom) by two groups of house finches during daily 1-hour feeding trials. Group TU (3 birds) received only untreated seeds throughout, while group TT (6 birds) received untreated seeds in the pre-test phase but was given methiocarb-treated seeds in the "treated" cup during the test phase. Both groups had previously received grapes treated with methiocarb.

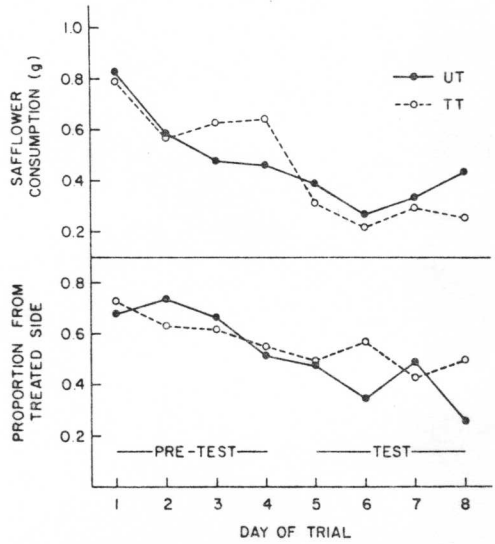

FIGURE 3. Total safflower consumption (top) and the proportion taken from the "treated" seed cup (bottom) by two groups of house finches during daily 1-hour feeding trials. Both groups received only untreated seeds in the pre-test phase, but were given seeds treated with methiocarb in the "treated" seed cup during the test phase. Group TT had been exposed previously to methiocarb-treated grapes, while group UT had no previous experience with methiocarb.