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## Evaluation of Registered Sunflower Insecticides as Candidate Blackbird Repellents

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### Introduction

Blackbird damage to ripening sunflower is forcing some growers to plant alternative, albeit less profitable, crops. Currently, only Bird Shield<sup>®</sup> (a.i., methyl anthranilate) is registered as a bird repellent on ripening sunflower. However, field experiments with Bird Shield showed no consistent differences in damage levels between treated and untreated plots.

During September and October 2003, we screened five insecticide formulations for feeding repellency using individually caged red-winged blackbirds. The tested insecticides are registered and currently available for use on ripening sunflower. They were Asana<sup>®</sup> XL, Baythroid<sup>®</sup> 2, Lorsban<sup>®</sup>-4E, Scout X-Tra<sup>®</sup>, and Warrior<sup>®</sup> T.



### Methods

Hatching-year male and female red-winged blackbirds were trapped and acclimated to captivity in a roofed outdoor aviary. Two weeks before testing, birds were placed individually in cages and fed a mixture of grains in small clear glass containers placed inside larger semi-transparent plastic containers to capture spillage. Water was provided *ad libitum*.



For four days during the week prior to testing (pretest), the birds were fed 30 g oilseed sunflower achenes for the first 3 hr of daylight. They received regular rations the remainder of the day. For trial 1, birds were sorted by sex and according to the amount of achenes eaten. The birds were then assigned to each test insecticide or insecticide level so that equal numbers of male ( $n=2$ ) and female ( $n=3$ ) birds with high, intermediate, and low feeding rates were represented in each group. During the four-day test for consumption of insecticide-treated achenes, we followed the same feeding regime as in the pretest. Only males were used in trial 2.

In the initial screening, we used four insecticides: Asana XL, Baythroid 2, Lorsban-4E, and Scout X-Tra. Warrior T was added for the second trial. We mixed 1 kg of sunflower achenes with each insecticide at the label's highest recommended rate. Water was used as the diluent in all mixtures. The concentration

rates on the achenes were based on rates equivalent to an application on a field with production of 1521 kg achenes/ha.

*A priori*, we decided that if an insecticide reduced achene consumption by 80% compared to untreated achenes, we would perform follow-up tests by reducing insecticide concentrations in 50% increments until repellency was lost (Table 1).

Table 1. Application rates of insecticides tested for bird repellency.

Product	Rate of application (ml/kg) on achenes
Asana XL	0.45
Baythroid 2	0.13
Lorsban-4E (Full rate)	1.13
Lorsban-4E (1/2 rate)	0.57
Lorsban-4E (1/4 rate)	0.28
Lorsban-4E (1/8 rate)	0.14
Scout X-Tra	0.13
Warrior T	0.18

## Results

In the initial trial, blackbirds fed Lorsban-treated achenes at the full-label rate ate an average of 1.1 g per 3 hr session, much less than birds fed Scout (4.6 g), Asana (5.0 g), and Baythroid (6.4 g). Birds fed Lorsban-treated achenes reduced their feeding rate by 82% compared to birds fed untreated achenes (6.2 g); whereas, the other insecticides reduced feeding from 0% to 26% (Fig. 1). Birds fed Lorsban-treated achenes were the only birds to lose weight ( $\bar{x}$  = 2%) during the first trial. All other groups had weight gains from 2 to 4%.

In the second trial, we tested Warrior T at the full-label rate, while Lorsban was tested at 50%, 25%, and 12.5% of the full rate (Table 1). Compared to the untreated group, which consumed an average of 10.1 g of achenes per 3 hr, birds fed Lorsban-treated achenes at the 50% rate (0.57 ml/kg) ate 58% ( $\bar{x}$  = 4.2 g) less (Fig. 2). All other treatment groups had reductions of about 40% ( $\bar{x}$  = 6.0 g) (Figs. 1, 2). The birds tested on Lorsban at the 50% rate lost 7% of their weight compared to a 1% gain for birds fed untreated achenes. The other treatment groups had weight losses ranging from 2 to 4%.

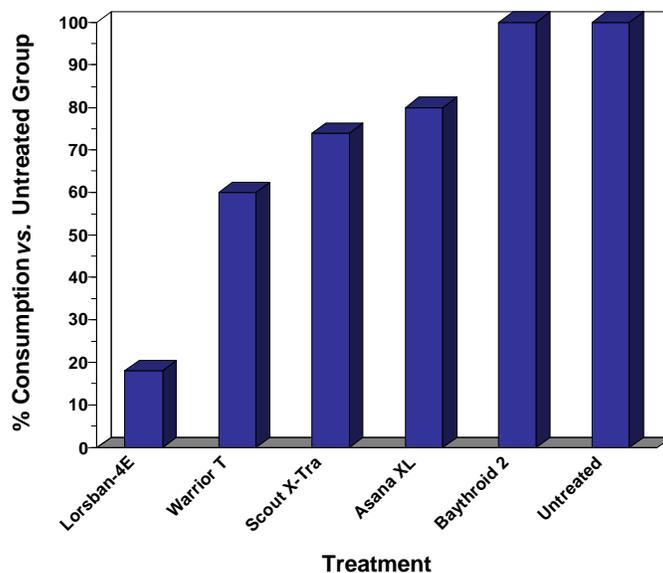


Figure 1. Percent consumption of insecticide-treated sunflower achenes compared to consumption of untreated achenes. Birds fed untreated achenes ate 6.2 g/3 hr.

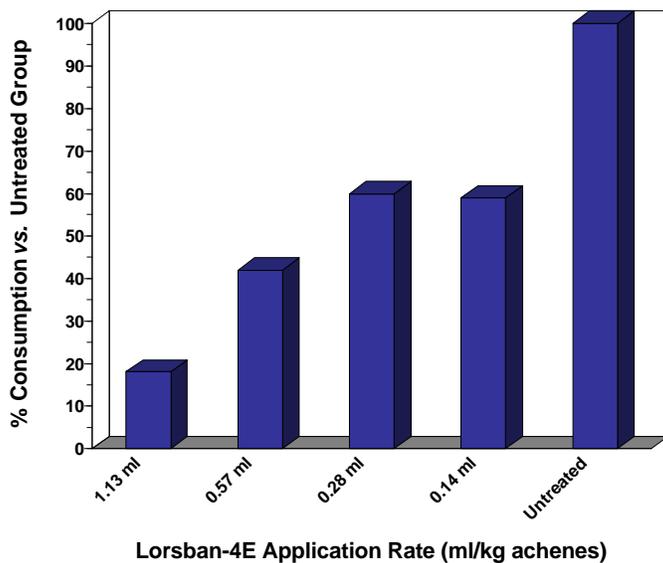


Figure 2. Percent consumption of Lorsban-treated sunflower achenes compared to consumption of untreated achenes. Birds fed untreated achenes ate 10.1 g/3 hr. The Lorsban full-label rate of 1.13 ml/kg achenes from trial 1 is also shown.

## Discussion

Lorsban-4E [chlorpyrifos: O,O-diethyl-O-(3,5,6-trichloro-2-pyridinyl) phosphorothioate] showed the best potential as a bird repellent in our cage trials. Lorsban-4E is used on cutworms, stem weevils, sunflower moths, sunflower beetles, seed weevils, and Lygus bugs. For insects, applications can be made every 7-10 days but the maximum (9 pints/acre/season) must be observed for sunflower, along with a 42-day waiting period between the last application and harvest. The active ingredient, chlorpyrifos, is a cholinesterase inhibitor and is toxic to birds. Thus, label restrictions must be carefully followed.



Additional research is needed before pursuing expansion of the Lorsban-4E registration label as a bird repellent. The next objective is to assess whether field applications will repel blackbirds. We must determine if Lorsban-4E needs to be applied directly to the achenes (as was done in these trials) or if aerial spraying of a field will achieve the same result.

We will continue our research on the efficacy and environmental effects of Lorsban and other candidate bird repellents. Providing alternative food plots will likely enhance the efficacy of any repellent or scare device and should be included in bird damage management plans.