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PRELIMINARY LABORATORY AND FIELD TRIALS OF CURB, A POSSIBLE AVIAN REPELLENT

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Grape growers in California lose between three and four million dollars annually from damage caused principally by two bird species: Linnets (*carpodacus mexicanus*) and Starlings (*sturnus vulgaris*) (DeHaven, 1974; Crase, et al., 1975). Few effective tools exist for the growers to use in reducing crop losses from bird damage; and current bio-political trends may preclude the use of toxicants to control local depredating bird populations, especially Linnets. The use of chemical repellents is a possible alternative.

Testing of the chemical repellent methiocarb [3,5-dimethyl-4-(methylthio) phenol methylcarbamate] to protect California wine grapes has been conducted by Denver Wildlife Research Center personnel (Guarino, 1972; DeHaven, 1974; Crase, et al., 1975; and Crase & DeHaven, 1976). Results with methiocarb on grapes appear successful on a small scale. Other researchers (Stone & Toms, 1970) investigated a compound called CURB, aluminum ammonium sulfate, and obtained limited success when used on vegetable, cereal, and fruit crops including grapes. Leinati (1968) used CURB as a seed dressing to reduce seedling pulling by pheasants. Dar (1974) completed a series of trials at eight different Israeli agricultural stations, using CURB on seedling sugar beets, cucumbers, radishes, lettuce, celery, beans, kohlrabi, and strawberries. Data indicate that CURB provides good protection for plants with large leaf surface area, but results of trials to reduce seedling pulling by birds varied too much for valid conclusions. Trials on legumes raised for seed and sorghum were encouraging.

Tests with CURB-treated wine grapes in Australia and South Africa have yielded inconclusive results about its effectiveness as an avian repellent. In Israel, specialists indicate that the metallic salts of CURB affect wine flavor (Stone, 1976). Although test results with CURB appear variable and inconclusive, General Vineyard Services in Salinas Valley, California, offered grape acreage for test plots to evaluate the potential of CURB as an avian repellent. This paper reports on preliminary cage and field trials.

CAGE TRIALS

Methods and Materials

Trials conducted with caged birds were based on methods similar to those of Crase and DeHaven (1976) for evaluating chemical repellents on grapes. Twelve cages 6' x 10' were used. Ten Starlings were put into each of six cages, and ten Linnets were put into each of the remaining six cages. Grapes were treated by dipping them for 30 seconds into a solution of one pound of CURB to two gallons of water. Two treated grape bunches and two untreated control bunches of approximately the same size were suspended by strings in each of the cages for eight hours. Water and an alternate food source were provided *ad libitum* during the exposure period. Damage was determined by counting the number of grapes damaged or missing from the bunch compared with the total number of grapes originally on the bunch.

Results

Table 1 lists results from the six cages containing Starlings. Percent damage on the treated grapes ranged from 10 to 100 percent, with a mean damage value of 66.8 percent. Damage to control (untreated) grapes ranged from 88 to 100 percent, with a mean of 94.5 percent. Damage on the treated grapes was significantly lower ($P < 0.001$) than the control grapes, based on the t-test.

Table 2 indicates the effectiveness of CURB in repelling Linnets. Linnet damage to the treated grapes ranged from 30 to 100 percent, with a mean of 52.5 percent. Damage to control grapes ranged from 50 to 100 percent, with a mean of 82.5 percent. Damage on the treated grapes was significantly lower than on the control grapes ($P < 0.05$).

FIELD TRIALS

Methods and Materials

A block of Gamay Beaujolais grapes was used for the study. Ground spray equipment was used to apply CURB plus 0.5% adhesive agent at a 30 pounds per acre rate to a one half-acre plot. The grapes were harvested by hand two weeks after treatment. Treated and untreated grapes were given to the Paul Masson Winery staff for processing. Sample batches of wine were made from treated and untreated grapes to determine if CURB would affect wine flavor. Three batches were produced, the first from treated grapes, the second from treated grapes that were washed after harvest; the third batch was from untreated grapes from the same block.

Results

Professional wine tasters reported that wine produced from the treated and the treated-washed grapes tasted the same. Both had a subtle, metallic flavor and a lower than normal pH, a condition that wine producers try to avoid. The wine tasters did not judge the wine unfavorable, however, and will allow the wine to age before further tests. The wine produced from untreated grapes was considered typical for the grape varietal.

Conclusions

Under these limited, short-term trials, there appears to be some reduction in bird damage to grapes treated with CURB. A solution of one pound of CURB to two gallons of water seems to be more effective in repelling Linnets than Starlings. CURB imparts a subtle, metallic flavor to wine and increases wine acidity at the 30 pounds per acre application rate. Further taste tests will attempt to determine if CURB-treated grapes will be acceptable for making wine. If so, further testing will be needed to determine concentrations needed to repel Linnets and Starlings and to determine the minimum application rate necessary for the chemical to be effective over extended periods.

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TABLE 1. The damage by Starlings to CURB-treated and control bunches of grapes in each of six cages.

Cage	Percent Damage	
	Treated	Control
1	27	95
2	100	100
3	22	88
4	10	100
5	76	96
6	46	89
\bar{x}	65.6**	94.5

**significant at $P < 0.001$

TABLE 2. The percent damage by Linnets to CURB-treated and control bunches of grapes in each of six cages.

Cage	Percent Damage	
	Treated	Control
1	30	50
2	40	60
3	60	90
4	100	100
5	55	95
6	30	80
\bar{x}	52.5*	82.5

*significant at $P < 0.05$