March 1992

# AVITROL USE IN THE PROTECTION OF WINE GRAPES FROM THE HOUSE FINCH (LINNET) IN SONOMA COUNTY

Pierre Gadd
*Agricultural Biologist, Sonoma County Agricultural Commissioner's Office*

# AVITROL USE IN THE PROTECTION OF WINE GRAPES FROM THE HOUSE FINCH (LINNET) IN SONOMA COUNTY

**PIERRE GADD,** Agricultural Biologist, Sonoma County Agricultural Commissioner's Office, 2604 Ventura Ave., Santa Rosa, California 95403

ABSTRACT: Two field trials were conducted to determine the effectiveness of Avitrol® (4-aminopyridine) mixed grains 0.50% in the repelling of house finches (*Carpodocus mexicana*) from two vineyards in Sonoma County. In the first trial, two properties were prebaited for twelve and fourteen days respectively. After the removal of the prebait, Avitrol treated grain mixture was then placed in the bait troughs for a period of from two to four days. A count of the house finch (linnets) number visiting the troughs during the prebaiting and treatment phases of the trial was recorded. Subsequent linnet counts were made to determine the days of protection which were achieved from the treatment.

In the second trial the methods were similar; however, only one of the two selected properties was treated. In both trials, trapping with a modified Australian crow trap was done when necessary to census existing house finch populations and to mitigate further crop damage.

The trials indicate that Avitrol mixed grain baits can provide good long term protection to smaller vineyards with low to moderate linnet populations. In the larger vineyards with approximately 1,000 linnets, only short term control was achieved.

Proc. 15th Vertebrate Pest Conf. (J. E. Borrecco & R. E. Marsh, Editors) Published at University of Calif., Davis. 1992

## SITUATION

In this paper I shall use the name linnet interchangeably with house finch. Damage caused by house finches is a major economic problem to wine grape vineyards in the hilly areas of Sonoma County. The registration of strychnine house finch treated grain bait was suspended in 1989. Control techniques at this time are now limited to trapping, netting (see CDFA Vertebrate Pest Control Handbook page 713-1) and to the use of Avitrol[1] (4-aminopyridine) treated grain baits.

## AN EXPERIMENTAL APPROACH TO LINNET CONTROL IN SONOMA COUNTY

Avitrol mixed grain baits have been registered as a repellent/frightening agent for a number of bird species since 1978. A special local need (24-C) registration for house finches allowed experimental use of Avitrol in this county in 1989. This paper discusses the use and weighs the efficacy of Avitrol for the control of linnets in wine grape vineyards within Sonoma County. Unlike strychnine bait which is used to reduce the local problem bird population, Avitrol's use is directed at frightening the birds from the crop area, although a few birds may be killed in the process.

## MATERIALS AND METHODS

The Dawson Vineyard was the smallest of the two used for experimental purposes and was the first field to be treated with Avitrol mixed grain 0.50%. In this 3 acres of Chardonnay grapes, the linnet population was estimated to be about 300 to 400 birds. This small three acre vineyard is surrounded by trees (see sketch of vineyard site, Figure 1) which provides exceptional habitat for linnets. By August 3rd, a few linnets were beginning to feed on riper grape bunches. The average brix reading was estimated to be above 12°.

On August 3rd six bird feeding troughs were placed in the vineyard at a height of 18' above the vines. The troughs, of a type commonly used for bird control, were V shaped with dimensions of approximately 3" deep and 8' long. They were constructed of 1/2" thick soft wood (e.g. pine, redwood, fir). These troughs were baited with approximately 1/3 of a pound of prebait which consisted of two parts canary grass seed to one part rape seed. The troughs were checked daily and replenished with prebait as necessary. Prebaiting continued until August 17th when daily counts determined that the linnet feeding had reached maximum and prebait acceptance was at its greatest. No non-target birds were seen feeding in the troughs during this prebait period. During a one hour period between 8:00 a.m. and 9:00 a.m. on August 13th through the

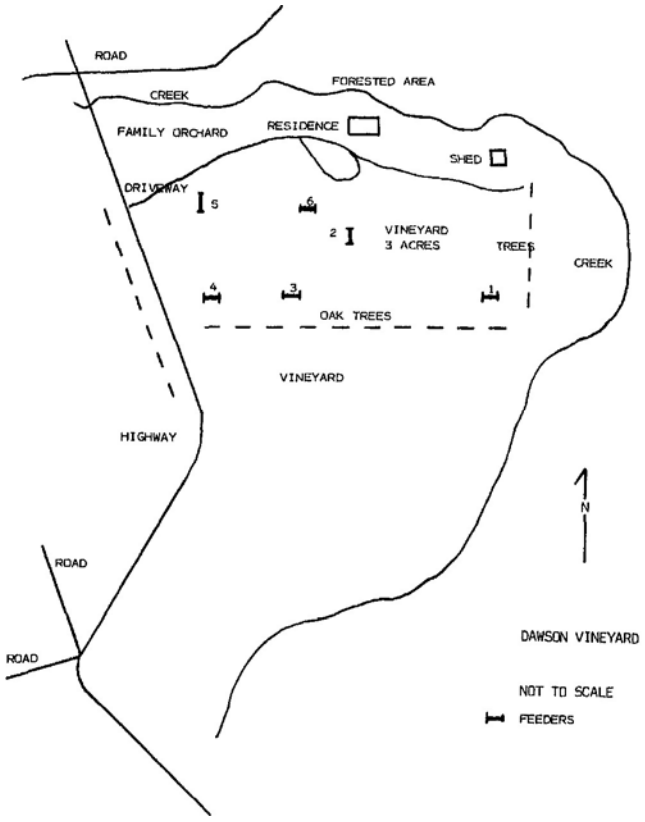


Figure 1. Sketch of the test layout at the Dawson Vineyard.

[1]Avitrol is a registered product of Avitrol Corporation, Tulsa, Oklahoma.

Table 1. Percentage reduction in house finch activity (i.e. degree of control).

| | Trial Number | | |
|---|---|---|---|
| Day of treatment | 1 | 2 | 3 |
| Bait 1 | 14.5% | 7.0% | (47.5)% |
| Bait 2 | 81.0 | 86.7 | 43.5 |
| Bait 3 | 98.1 | 97.1 | 66.1 |

16th the number of linnets visiting the troughs was counted at 10 minute intervals. Six counts were completed in a one hour time period which provided one-hour linnet indices.

The 0.50% Avitrol treated grain used was a mixture of 1/3 rape to 2/3 canary grass seed. This Avitrol treated grain mixture was then mixed with untreated prebait mixture at a ratio of two untreated per one treated seed to produce a diluted final mixture. Before daybreak on Thursday, August 17th the prebait mixture was removed and replaced with the diluted Avitrol treated grain mixture. Our planned schedule called for a 3-day period of bait exposure.

## RESULTS

During the first morning of bait exposure 90 linnets were counted. This number was only slightly lower than August 16th when 97 linnets were counted and August 15th when 112 were counted during the one hour period. On August 18th, we recorded 20 linnets, which was a marked reduction in the birds visiting the troughs. The last day of the 3-day bait exposure, August 19th, the number of birds feeding in the six troughs fell to only two linnets (Figure 2). The bait troughs were removed and formal counting discontinued. Although a few linnets would be found feeding in the vineyard, no bird build-up occurred and the grapes were harvested on September 8th.

Trial number one and two show a very consistent house finch activity reduction from days 1 through 3. In trial number three, the percentage reduction was not consistent with the others possibly due to heavy morning fog and the presence of a sharp-shinned hawk during the treatment period. (Table 1).

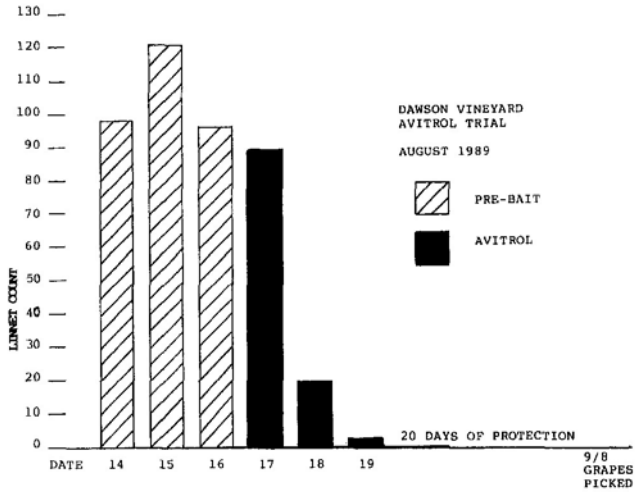


Figure 2. The number of linnets feeding in the six troughs at the Dawson Vineyard (1989).

Table 2. Significant difference[a] in house finch activity based on Duncan's range test for treatment means.

| Day of treatment | Mean percent reduction in activity |
|---|---|
| Bait 1 | (8.667) A |
| Bait 2 | 70.400 B |
| Bait 3 | 87.100 B |

[a]Level of significance 1%

Analysis of the data based on Duncan's multiple range test indicates significant difference at the 1% level between the three days of bait exposure. (Table 2).

## MATERIALS AND METHODS 1989

The Matanzas Creek Vineyard (Trial 2) is a much larger vineyard and had an estimated linnet population of between 1,000 and 1,500. This vineyard contained 19.5 acres of Chardonnay grapes (Figure 3). By the first week of August the grapes had reached an average brix above 12° and spotty berry damage could be found. On August 9th, twelve feeding troughs were placed in the vineyard. The procedures used were the same as for Dawson Vineyard. Prebaiting continued until August 21st when daily observations determined that the linnets feeding in the troughs had reached maximum prebait acceptance. No non-target birds had been observed feeding in the troughs during the entire period.

For one hour each morning between 8:00 a.m. and 9:00 p.m July 18th through August 20th a census of linnet numbers was made and the count recorded by trough locations. The number of feeding birds at each trough was counted every 10 minutes for one hours.

The 0.50% Avitrol treated grain was mixed to a mixture of 1/3 rape seed to 2/3 canary grass seed. This Avitrol treated grain was then mixed with untreated prebait mixture at a ratio of two untreated per one treated seed as in the previously described study. Before daybreak on Monday, August 21st the prebait mixture was removed and replaced with the Avitrol grain diluted blend.

The first morning of bait exposure showed very high linnet numbers feeding at the troughs. The bird counts which

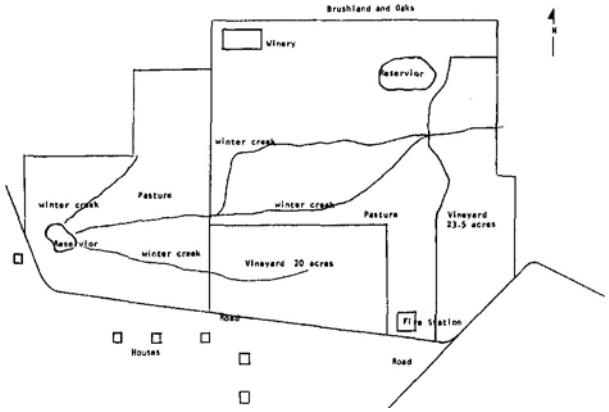


Figure 3. Sketch of the test layout at the Matanzas Creek Vineyard.

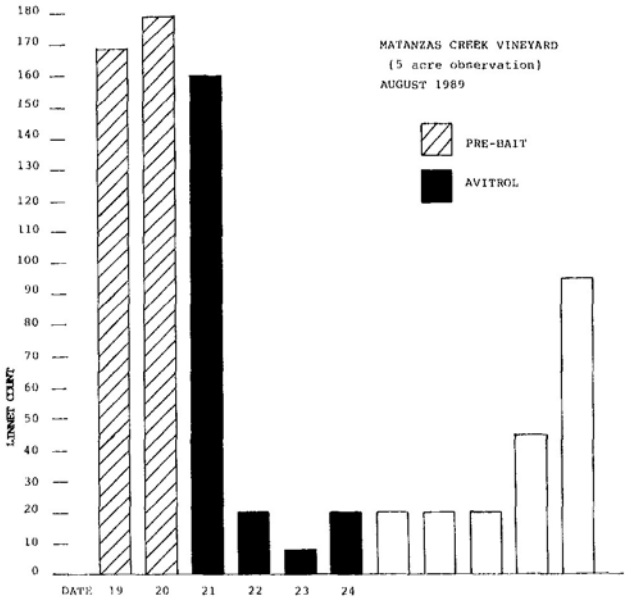


Figure 4. The number of linnets feeding in the six troughs at the Matanzas Creek Vineyard (1989).

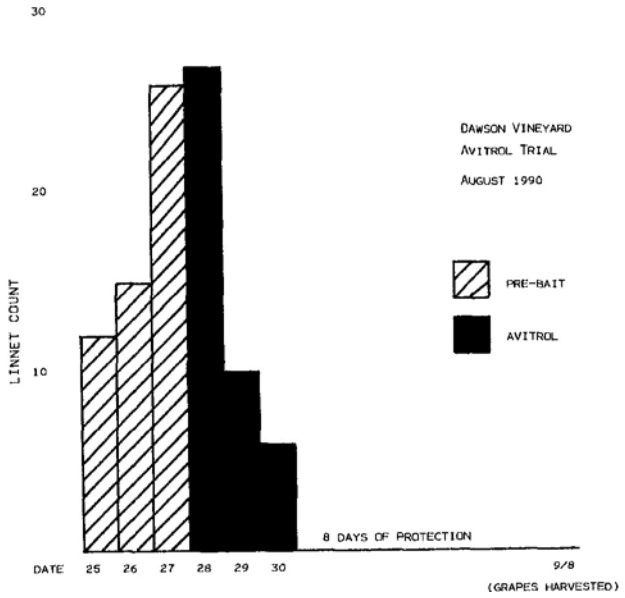


Figure 5. The number of linnets feeding in the test plot of the Dawson Vineyard (1990).

were totals from a standard one hour period approached the earlier average prebait census counts. On August 22nd from 8:00 a.m. to 9:00 p.m, the day following the first days treatment, we noticed a marked reduction in the birds visiting the bait troughs. This second day drop, in number of linnets, was expected because of our experience at Dawson Vineyard. In one six-trough series the linnets counted decreased from 208 to 16 birds, for a 92% reduction. The following day, August 23rd, the number of birds actively feeding in the six troughs, further dropped to six. On August 24th, the final day of bait exposure, the count during the one hour period was seven birds. On August 27th, three days after the baiting had ceased and all the troughs had been removed, we noticed that linnets were again entering the vineyard. We measured off an approximate five acre area in a corner of the vineyard and then counted for one hour the number of birds entering the observation plot. The count on August 28th was 41 and on the 29th we counted 101 linnets. To this point in the trial we had seven days of protection but on the eighth day the linnets were again entering the field in pre-treatment numbers (Figure 4).

Because the linnets remained a problem, two modified Australian crow traps were set up and operated to assist in reducing the grape damage. Approximately 700 linnets were removed prior to grape harvest. While the Avitrol treatment gives immediate and very short term control, the trapping efforts were probably predominantly responsible for keeping the linnet damage relatively low until harvest.

## DISCUSSION AND CONCLUSIONS 1989

Avitrol was developed and field tested by Phillips Petroleum Company in the early 1960s. It has been registered as a bird management agent (i.e. repellent) for a long time. Birds feeding upon the treated bait, which is diluted with untreated bait, may be significantly affected. The intoxicated birds of many species display a pronounced behavioral response. Affected birds may become disoriented, resulting in erratic flights and emittance of audible vocalizations. In gregarious species, such reactions cause the non-intoxicated birds of the flock to leave the area. After several such experiences the birds may avoid that feeding area for long periods. It has been found most effective on species that feed in flocks and are normally considered highly gregarious and react as a group to most mitigation techniques (e.g. gulls at a dump).

Mortality occurs in some of the affected birds as the material is toxic if consumed in sufficient amounts. In this study it was estimated that 3% to 8% mortality occurred in the depredating linnet population.

Unfortunately, linnets are not as highly gregarious as some species. Although they often move about and feed in small flocks, they do not have a strong flocking tendency. Therefore, it is not overly surprising that Avitrol did not produce a long term desired result in the Matanzas Creek Vineyard.

Several previous trials with depredating linnets in other areas produced notable results (Martin and Jarvis 1977, Clark pers. comm.). This suggests that if Avitrol is to be effective, possibly a different bailing strategy will need to be worked out. For example, the short-term effects might be enhanced with the follow-up use of other frightening techniques, or the Avitrol bait will have to be used repeatedly following periods of prebaiting. The modification of concentration and/or dilution ratios may also result in improved efficacy.

This study suggests efficacy may relate to location of the vineyard in relation to the amount and proximity of highly favorable linnet natural habitat and the size of linnet populations using the vineyard. Even in the Matanzas Creek Vineyard, where the overall results were considered the poorest, some short-term favorable results were achieved. Recognizing these factors and limitations, Avitrol bait for linnet control shows some effectiveness and appears worthy of further study. Future studies should be conducted under a more rigid experimental design with appropriate control vineyards to better appraise the effects.

## DISCUSSION AND CONCLUSIONS (1990)

After analysis of the 1989 Avitrol trial, we had hoped to develop a more rigid experimental design. However,

untreated control vineyards were not used due to high fluctuations in the linnet populations and high grape crop values. The use of both auditory and visual frightening techniques was abandoned due to past starling control experience. The linnets that had co-existed in the same vineyards with starlings were practically unaffected by mylar streamers, hawk kites, Avalarm (electronic sound), propane exploders, etc. The repeated use of Avitrol grain bait following periods of pre-baiting should be attempted, although bait shyness as with strychnine bait may occur (Figure 5).

Finally, the use of higher bait concentrations and/or dilution ratios may result in improved bait efficacy. However, higher Avitrol concentrations will probably increase mortality to both target and non-target bird species. Great care should be taken in any such future trials and bait through screen covered troughs may be necessary to exclude non-target birds.

## ACKNOWLEDGMENTS

I would like to extend sincere thanks to Avitrol Corporation for supplying the Avitrol Mixed Grains for this trial and to Jerry P. Clark and Greg Morris of the California Department of Food and Agriculture for their help with the trial protocol. Rex Marsh was also very helpful with bird monitoring techniques and the rewrite of the discussion and conclusion. The statistical analysis was compiled by Dr. Sue Blodgett and Rip Forrey of the University of California Cooperative Extension Office in Sonoma County. Finally, I wish to thank Charles Dawson and Tom Freitas for their hard work and for the use of their vineyards on which this trial was conducted. Thanks also to Eric Lauritzen and Bonnie Sallee for manuscript revision and graph design.

## LITERATURE CITED

CLARK, J.P. 1986. Vertebrate Pest Control Handbook, Division of Plant Industry, State of California Department of Food and Agriculture, Sacramento, California. 350 pp.

MARTIN, L.R., and B.U. JARVIS. 1977. Avitrol treated bait for protection of grapes from house finch damage. Division of Plant Industry, State of California Department of Food and Agriculture, Sacramento, California (In-house report, 11 pp.).