Evaluation of eye-spot balloons in a Canterbury vineyard

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Prepared for: Pest Management Services Ltd.
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Summary

Project

A field trial was undertaken to assess the effectiveness of eye-spot balloons in reducing bird damage to grape crops. The work was undertaken in April 1993 in a Canterbury vineyard at the suggestion of Pest Management Services Ltd., who market eye-spot balloons. Fieldwork was conducted as a 4th-year project by a University of Canterbury wildlife management class.

Objective

- To measure the effect of a small group of eye-spot balloons on bird damage to grapes at various distances from the balloons and at various times before harvest.

Methods

- Six balloons were hung above a ripening crop of pinot noir grapes five weeks before harvest.
- At weekly intervals a visual assessment was made of bird damage to bunches of grapes at distances of up to 40 m from the balloons.

Results

- Bird damage increased rapidly as harvest approached and the grapes ripened and coloured.
- One week before harvest, bird damage to grapes directly beneath the balloons was only 55% of that recorded 40 m from the balloons.
- The deterrent effect of the balloons extended about 20 m during the first week of the trial, and over shorter distances thereafter.

Recommendations

- Eye-spot balloons repel pest birds, but need to be used in conjunction with other methods of bird control.
- Eye-spot balloons have little effect on birds more than 20 m from them.
- Birds begin to habituate to eye-spot balloons within 1-2 weeks. Their installation in vineyards should therefore be delayed until shortly before harvest, when the risk of bird damage is greatest.
Introduction

Birds can cause serious damage in New Zealand vineyards and orchards (e.g. Porter 1988) and growers use a wide variety of techniques to try and control them (Nelson 1990b, a). There is increasing pressure for bird control to be not only cost-effective but also humane and environmentally acceptable.

Eye-spot balloons suspended above crops exploit the innate predator-avoidance response of some bird species to eye-spot patterns (Inglis et al. 1993, Avery et al. 1988, Tripton et al. 1989). The method is humane and environmentally friendly, but its cost-effectiveness is uncertain (Porter 1992). Pest Management Services Ltd., which market eye-spot balloons, therefore suggested that Lincoln University conduct a preliminary study into the effectiveness of these balloons in protecting ripening grapes from bird damage.

A short field trial was consequently undertaken on a Canterbury vineyard in March 1993 as an undergraduate student project.

Methods

The trial was conducted in a block of young pinot noir grapes in a 4 ha vineyard located 20 km west of Christchurch. The vineyard was surrounded on two sides by macrocarpa hedges and pine trees and on the other sides by open fields. The vineyard contained other blocks of chardonnay and rhine riesling, which ripened before and after the pinot noir, respectively.

On 26th March 1993, two rows of three air-filled plastic balloons were strung in the middle of the pinot noir block, each balloon 3m from the next and 1.3 m above the vines. The balloons were 40 cm in diameter, black, with a pair of 10 cm "eyes" consisting of concentric white, yellow, black, red and silver rings.

Sample vines were tagged 0, 10, 20, 30 and 40 m from the nearest balloon. At weekly intervals from the 1 April to 28 April, the amount of bird damage on the bunches of grapes on each vine (up to a maximum of six) was scored visually on a scale of 0 - 10 (where 1 = 10% of grapes on the bunch damaged, 2 = 20%, and so on). Weekly damage scores were averaged for each distance and graphed. Means were compared statistically using one-way ANOVA.
Results

Bird damage to the crop was negligible at the start of the trial (<5% at all distances from the balloons). Bird damage began to develop in early April and increased rapidly until 82% of the crop 40 m from the balloons on 28 April, the week before harvest. Bird damage also increased on the vines directly beneath the balloons, but at a slower rate (Figure 1) so that by 28 April only 37% of these grapes had been damaged; this represented a 55% reduction in damage relative to the grapes 40 m from the balloons ($P < 0.001$).

![Figure 1. Increase in bird damage to grapes beneath eye-spot balloons (i.e., 0 m), and 40 m from them, during the 4 weeks (1 April - 28 April) preceding harvest in a Canterbury vineyard. Each data point represents the average damage to approximately 90 bunches of grapes.](image)

If the grapes at 40 m are assumed to have been relatively unaffected by the balloons, then the area of effect of the balloons can be assessed by comparing the relative damage at closer distances for each week of the trial (Figure 2). This shows that damage was reduced by at least 75% within a 20 m radius of the balloons during the first week of the trial, but that this deterrent effect was considerably reduced for the remainder of the trial.
Figure 2. Relative levels of bird damage at different distances from eye-spot balloons during the 4 weeks preceding harvest. Grapes 40 m from the balloons were assumed to be unaffected by the balloon and their damage level was standardised at 1.0. Each point represents the average damage on approximately 90 bunches of grapes.

Discussion

The eye-spot balloons reduced bird damage to nearby grapes but were not effective over large distances. The deterrent effect was also most pronounced during the first week in which the balloons were installed.

These results are broadly consistent with overseas studies on other bird species (Inglis et al. 1993, Avery et al. 1988, Shirota et al. 1983, Tripton et al. 1989). These studies suggest that it is the eye-spot rather than the balloon that has the deterrent effect. The effect depends on the eyes being large, paired, 3-dimensional in appearance, and with a strong contrast between pupil and iris.

The results of this study are also consistent with a New Zealand study by McLennan et al. (1995), who found that eye-spot balls close to a feeding table deterred birds. In a vineyard, the effect weakened with distance and was negligible at 40 m. Therefore, it seems clear that grapes more than 20 m from the balloons will receive little protection. The optimal number and layout of balloons requires further study.
In the New Zealand vineyard studied by McLennan et al. (1995), eye-spot balls reduced landings by song thrushes for 3 weeks, starlings and sparrows for 4 weeks, and blackbirds for slightly longer. These results are again consistent with our study, which showed that the increasing attractiveness of the ripening crop in combination with habituation of the birds to the balloons was associated with intensifying grape damage in the last two weeks of our trial.

Bird scaring devices rely in part on novelty to repel birds (Inglis 1980) so once birds habituate to them they become much less effective. Habituation is thought to be slower to predator eye-spots than to other stimuli (Inglis et al. 1993), but this trial suggests that it is still a significant problem for eye-spot balloons. Many growers install their balloons early in the season to discourage birds from beginning to feed in their vineyards and orchards. However, this means birds will be habituated to the balloons by the time the crop approaches harvest and is at greatest risk. We support the recommendation of McLennan et al. (1995) that these balloons be used continuously for no more than two weeks, preferably in the final fortnight before harvest, as a supplement to other forms of bird control.

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References


