# Comparing different coloured bird netting

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Sometimes we see vineyards with black nets instead of the usual white. Why is this? The general theory is that the birds do not see the black netting and therefore are startled when they fly into it and fly away.

Netting is thought to reduce the ripeness of grapes for two reasons – firstly photosynthesis may be reduced at times of the day when the sun is not hitting the net directly (such as midday with single row nets or morning and evening with multirow nets). This reduction may be up to 30% of light intensity, which has a direct effect on net rate of leaf photosynthesis (Trought et al., 1997). Secondly netting (over the row and side netting) can compress the canopy causing leaf shading of ripening grapes.

## Effects of UV radiation

All bird netting is "UV stabilised". With the intensity of UV radiation in Australia and New Zealand (compared to the Northern Hemisphere) this is important for the durability of the nets. But what does it mean for bird perception? Birds have been shown to be more sensitive to UV light than humans, and many researchers have found that UV reflectance is important in their selection of mate, and also of food. Does the colour of the net have any effect on the birds' perception of grapes within the net?

UV radiation can also cause the plant to synthesise defence compounds (Kolb et al., 2003) These are the stilbene-resveratrol compounds that are the plant's immune system and which contribute also to the health properties that wine may confer on those who drink in moderation. But UV radiation is also known to detrimentally affect plant growth – UVB particularly may be implicated in sunburn of grapes (Kolb et al., 2001), and may inhibit photosynthesis, more so in times of drought stress (Nogues and Baker, 2000).

A trial was conducted in a commercial vineyard with black, white and green netting to gauge if there was any

difference in the effect of each colour net on bird damage to grapes, and on grape ripening, measured as sugar concentration (oBrix). Subsequently the different colours were measured for UVA and UVB reflectance.

The trial was set up in the middle of a row in the middle of a block, so that any edge effect was minimised. 10m lengths of black, white and green netting were placed over a single vine row and carefully sewn together and below to eliminate gaps where the birds might enter. Three lengths of each colour were applied in a systematic design, so that each colour had a different colour on each side, and no pattern was repeated. The nets were new and there were no holes.

The nets were applied to a French hybrid grape. Measurement of damage and oBrix were collected on four dates between February and harvest in mid April. This was done

*Figure 1: Grapes seen through black netting.*

by randomly selecting two bunches from each 10m length (6 bunches for each colour) on each occasion, carefully getting them out between the sewn edges, counting the grapes for % damage, and crushing them to measure the juice in oBrix. The trial was run over two years for black and white netting, with green netting being added in the second year

Despite sewing the nets together damage was sustained. Birds can make new holes in nets and are masterly at infiltrating seemingly impermeable netting barriers. But making it more difficult meant that the birds needed to make a more determined effort to reach the grapes, thus increasing the relevance of the results.

*Table 1 – Measurement taken from grapes covered in different colour netting.*

| Net colour | Mean % damage | | Mean final °Brix | |
|---|---|---|---|---|
| | 2005 | 2006 | 2005 | 2006 |
| Black | 26.2 | 23.3 | 19.2 | 24.2 |
| White | 0.0 | 16.0 | 20.1 | 26.1 |
| Green | | 20.3 | | 25.0 |

## White netting performed best

The results appear in Table 1. White performed best in both damage and oBrix, with green next, while black had both the highest damage and lowest oBrix of the three.

While the black and white nets were identical in weave design (hexagonal) and mesh size, the green differed in being diamond weave with the same mesh size (12mm). 2006 was a warmer vintage than 2005. 2006 also had heavier fruitset than 2005, though this cultivar set quite well in 2005 compared to vinifera cultivars. Bird pressure generally in this vineyard was higher in 2005 than in 2006 (see table 1).

Interestingly the ripest grapes (under white net) suffered the least damage. Research has shown that not all birds prefer the highest sugar concentration in grapes, and that other grape attributes matter to birds (Saxton et al., 2004a, b).

The conclusion that white netting performs best as protection for grapes from bird damage may not simply be a question of visibility of the fruit. Both black and green netting revealed the grapes more clearly to our eyes and to the camera (Figures 1, 2 and 3). Research has suggested that birds, including starlings and blackbirds,

*Table 2 - UV measurements in full sunlight (Watts/m2)*

| Colour | | no screen | net over | difference |
|---|---|---|---|---|
| White | UVA | 14.8 | 12.1 | 2.7 |
| | UVB | 3.74 | 3.42 | 0.32 |
| Black | UVA | 14.8 | 11.6 | 3.2 |
| | UVB | 3.72 | 3.23 | 0.49 |
| Green | UVA | 14.6 | 12.5 | 2.1 |
| | UVB | 3.73 | 2.65 | 1.08 |

*Figure 2: Grapes seen through green netting*

can see ultra-violet radiation much more clearly than we can (Cuthill et al., 2000), and that this governs to some extent their choice of food. The wax cuticle of ripe fruit reflects UV (Siitari et al., 1999), but would the different net colour affect UV reflectance inside a net?

UV sensors were used to measure the amount of screening of UVA and UVB radiation occurred with each colour in full sunlight. The netting was stretched and held about 30cm above the sensor. Results in Table 2 indicated that white net screened out the least UVA and UVB, black screened out the most UVA while green screened out the most UVB (Table 2).

The next step in research is to discover whether UV radiation may be truly involved in grape selection by birds, and if so whether the colour of the netting impacts on their decisions. Further research on UVA and UVB radiation under different coloured netting (including red) and effects on vine photoysnthesis and grape ripening parameters is planned.

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*Figure 3: Grapes seen through white netting*