Baker 2000).

A trial was conducted in a commercial vineyard with black, white and green netting to gauge if there was any effect on the bunches, perception of the colour of the net have been shown to affect plant growth - UVB radiation is also known to do so. A study conducted in New Zealand found that UV radiation is important in their selection of colour, and also of the amount of grapes (Kobol et al., 2013), and particularly may be implicated in sunburn of the vines (Kobol et al., 2013). These results are consistent with the findings of the Northern Hemisphere (Coman et al., 2003). UV radiation can also cause the vines to produce the compounds that are known to synthesize defence compounds. All bunches are UV exposed.

Effects of UV radiation

The study of UV radiation and its effect on the grapes is an important part of the Northern Hemisphere (Coman et al., 2003). The effect of UV radiation on the grapes can be significant. The UV radiation can cause the grapes to become sunburnt, which can reduce their quality and market value. The study of UV radiation and its effect on the grapes is an important part of the Northern Hemisphere (Coman et al., 2003). The effect of UV radiation on the grapes can be significant. The UV radiation can cause the grapes to become sunburnt, which can reduce their quality and market value.
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 by randomly selecting two bunches from each 10m length (6 bunches for each colour) on each occasion, carefully getting them out between the seven 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.

### 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,

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

<table>
<thead>
<tr>
<th>Net colour</th>
<th>Mean % damage 2005</th>
<th>Mean % damage 2006</th>
<th>Mean oBrix 2005</th>
<th>Mean oBrix 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>26.2</td>
<td>23.3</td>
<td>19.2</td>
<td>24.2</td>
</tr>
<tr>
<td>White</td>
<td>0.0</td>
<td>16.0</td>
<td>20.1</td>
<td>26.1</td>
</tr>
<tr>
<td>Green</td>
<td>20.3</td>
<td>25.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

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

<table>
<thead>
<tr>
<th>Colour</th>
<th>UVA</th>
<th>UVA  net over</th>
<th>UVB</th>
<th>UVB  net over</th>
<th>difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>14.8</td>
<td>12.1</td>
<td>3.74</td>
<td>3.42</td>
<td>0.32</td>
</tr>
<tr>
<td>Black</td>
<td>14.8</td>
<td>11.6</td>
<td>3.72</td>
<td>3.23</td>
<td>3.2</td>
</tr>
<tr>
<td>Green</td>
<td>14.6</td>
<td>12.5</td>
<td>3.73</td>
<td>2.65</td>
<td>0.19</td>
</tr>
</tbody>
</table>
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 (Sittari 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 photosynthesis and grape ripening parameters is planned.

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References:


