Delays in harvest reduce walnut quality in a cool-climate

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Background

- Walnut quality influences nut value. Value is maximized with extra-light kernel colour and no internal spoilage of the nut; both these factors are adversely affected by delays in harvest.
- Walnut harvest requires the hull and kernel to be mature; however, in warm-climates, 1) the kernel of early maturing cultivars can mature up to three weeks before hull maturity, 2) kernel colour can rapidly degrade within the first nine hours of harvest and, 3) prolonged exposure to damp soil can increase the susceptibility of nuts to moulds.
- This study investigated the development of nut maturity, and the effect of harvest delays upon nut quality in a cool-climate in Australia.

Key findings

Kernel and hull maturity

- **Kernel maturity was earlier in Lara although hull maturity was similar in both cultivars (Table 1); the number of days for 95% of walnuts with mature kernels and 80% mature hulls was less in Vina**.

Table 1. Number of days (predicted), from 1st January, for 95% of walnuts to have mature kernels (PTB) and 80% mature hulls (hullable), and the number of days from 95% PTB to 80% hullable (drop-time) for two years in Tasmania.

Year	Cultivar	95% PTB (days)[1]	80% hullable (days)[1]	Drop-time (days)
2009-10	Lara	81	94	13
	Vina	87	94	7
2011-12	Lara	77	90	13
	Vina	82	89	7

[1]Predicted values were derived from simple linear regression models of the observed values (*y*) against the number of days from 1-Jan (*t*) for each cultivar.

Details of 'kernel and hull maturity' surveys

Surveys were conducted in Vina and Lara over two years in hedge-row orchards in Tasmania. Each survey had plots of fifty trees (n = 4), made up of two adjacent tree-rows of 25 trees each. Ten fruit per plot were removed and assessed for kernel maturity, defined when the packing tissue next to the kernel turned brown (PTB). Fifty fruit per plot were removed and assessed for hull maturity, defined as the separation of 95%, or more, of the hull from the shell. PTB and hullability assessments were conducted at 4-7 day intervals.

Details of 'nut location' and 'delays - between shaking and harvesting' trials

Trials were conducted in Vina, Lara, Howard or Chandler over two years in hedge-row orchards in Tasmania. Hulled nuts, arbitrarily selected from beneath shaken trees, were placed into 10 kg breathable poly-mesh bags and then randomly assigned; 1) under tree canopy (ground), 2) in grass inter-rows (grass) or 3) in tree canopy 1-2 m above ground level (tree). Prematurely dropped nuts were removed prior to nut selection. Fifty nuts per plot (n = 4) were removed at specific time intervals (Fig. 3) and dried to 8-9% moisture content prior to assessments for extra-light kernel colour, yellow pellicle and kernel moulds (e.g., Fig. 1).

Figure 1. 'Yellow pellicle' (left) and 'extra-light' (right) kernel colour

Key findings

Nut location – tree, ground or grass

- **Yellow pellicle and kernel mould was more prevalent in nuts that remained on the ground or grass after shaking of trees, compared to nuts that remained in trees (Fig. 2).**

Delays – between shaking and harvesting

- **Nuts that were on ground and grass after shaking rapidly lost kernel quality i.e., within 7 and 4 days in 2009-10 and 2011-12 respectively (Fig. 3); nut quality continued to reduce with further delays.**

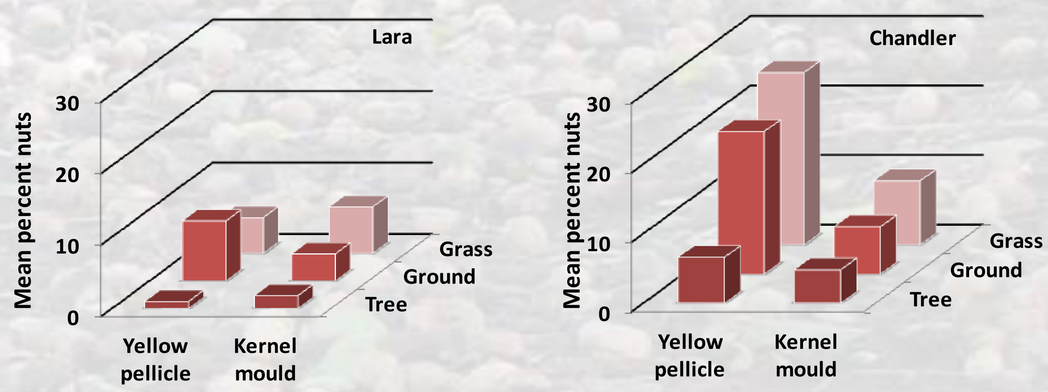

Figure 2. Mean percentage of nuts, pooled from all sample days i.e., 0, 1, 2, 4, 8 and 16 days, with yellow pellicle and kernel mould according to location i.e., within the tree canopy (tree), underneath the tree canopy (ground) and in the inter-row (grass) for two cultivars in Tasmania in 2011-12.

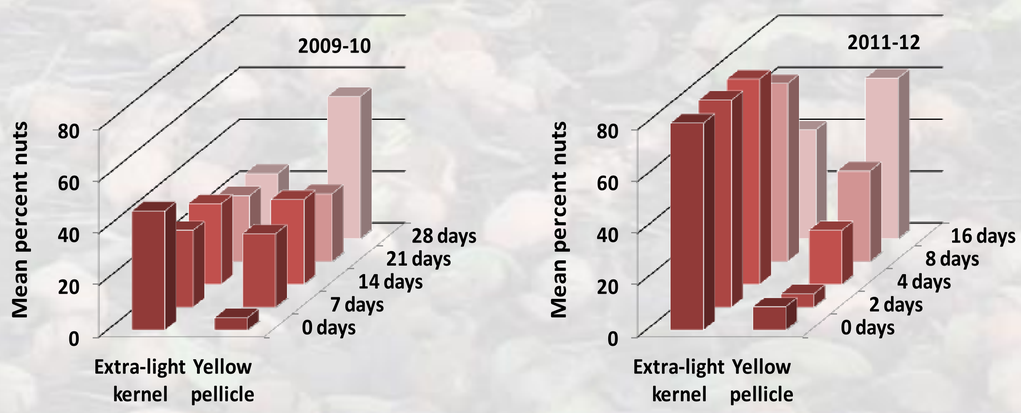

Figure 3. Mean percentage of Chandler nuts with extra-light kernels and yellow pellicles, for nuts located on the ground underneath the tree canopy (left) and on the ground and grass inter-row in 2011-12 (right), from 0 to 28 days after hull maturity in Tasmania.

Conclusions

- **Differences in kernel and hull maturity between Lara and Vina were minimal in Tasmania. As maturation is affected by climatic conditions, further surveys may show greater variation than found in this study.**
- **Minimizing the time between shaking of trees and harvesting and drying of nuts appears critical for reducing yellow pellicles, kernel moulds and darker kernels.**
- **Research into factors that reduce nut quality are ongoing in Tasmania.**

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