

NZWIG cultivar trial planted 2005: Blight counts in 2022

Background

No blight measurements were carried out during the 2005 trial. However, blight susceptibility is an important metric for assessing new cultivars. A brief opportunity arose in January 2022 to visit the two Canterbury trial sites, as we had personnel available. Ideally, we would have multiple years of data across all sites, but we hope that this one dataset will give us some indication of blight susceptibility for the varieties.

Method

We followed the blight counting method developed during the NZWIG blight research projects of the early 2000s. This is briefly described here.

Black blight lesions begin to show up on walnut husks from early to mid-December, depending on walnut variety, orchard management, and climatic conditions that season. The worst affected nuts may begin to fall off trees in late December. Visible lesions and nut loss are later for varieties with lower blight susceptibility, or in a dry/low-blight year. We schedule blight observations for about mid-January. By this stage lesions should be visible on blighted nuts, but only limited numbers of nuts should have fallen – and those will usually still be present on the ground where we can see them.

A nut is counted as having blight even if the lesion on the husk is very small (> 5mm). For each tree we look at a sample of 20 nuts and assess how many of them have blight lesions. The sample is selected in such a way that all sides of the tree are included, and the observer is not consciously choosing which nuts to look at. The observer looks at 5 nuts on each of four sides of the tree. On each side, they draw an imaginary plane between themselves and the tree trunk (reaching up into the canopy as far as it is practical to get a good view of the nuts). The sample comprises the 5 nuts that are closest to that plane.

We also did a simple ranking of the fallen nuts:

- 0: low – less than 4 nuts under a quarter of the canopy area
- 1: some – in between the other two ranks
- 2: lots – more than 20 nuts under a quarter of the canopy area.

Situations at trial sites

The blight count was done in the afternoon of 15 January 2022, with five people present at the Thomas/Olykan site (Canterbury-Springston), and seven people at the Savage/Slee site (Canterbury-Kirwee), in both cases including the block owners.

At the Thomas/Olykan site, the block was mowed on 26 December, and the owners did not see many nuts on the ground at the time. The Savage/Slee trial block was mowed around 3 January, and there were already some nuts on the ground under the '1340' (116) and 'Diana' (120) varieties, but few elsewhere.

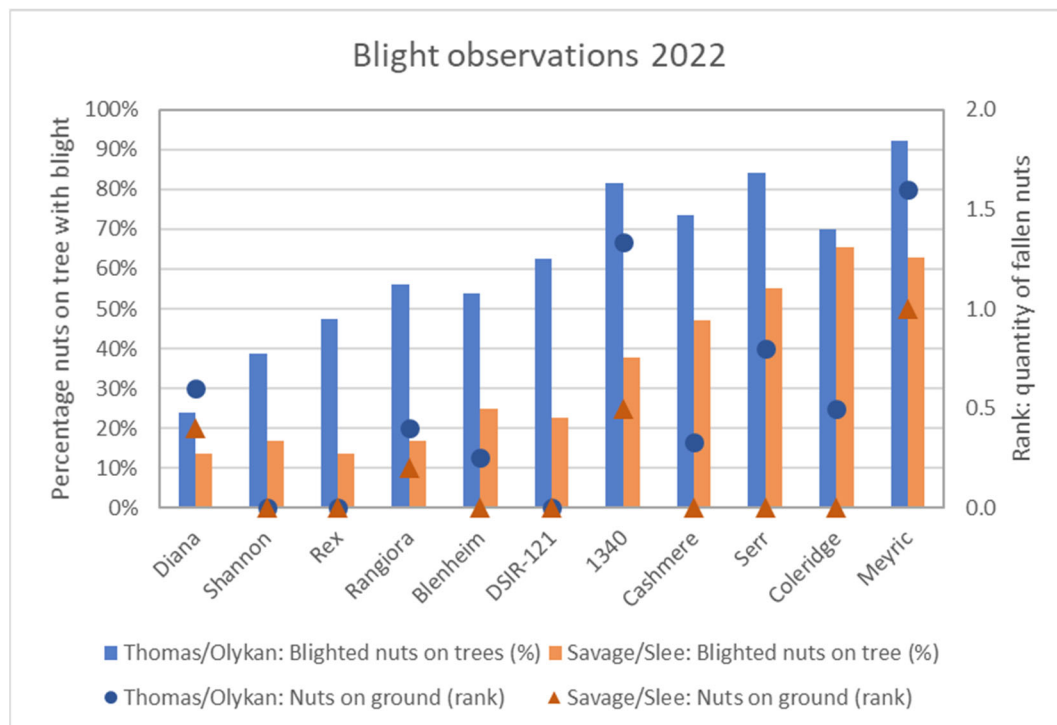
The trees are now almost 17 years old, and the canopies are quite high, which made it difficult to see the nuts close up, i.e. to inspect all sides of each nut when looking for lesions. Thus, the observers had to look up into the canopy in some cases, and judge as best they could.

However, the trees are smaller at the Savage/Slee orchard, and the canopy is quite open, compared to the Thomas/Olykan orchard where the canopy is almost closed. Thus, we could expect higher blight pressure at the Thomas/Olykan block due to the damper, less ventilated conditions.

There had been spring frost damage at the Slee/Savage orchard leading to crop reduction for some varieties. On trees where fewer than 5 nuts per side could be found, the count was done out of whatever number of nuts were visible.

Results

In the graphs and figures below, all replicates of each cultivar (usually 5, but sometimes fewer) on each trial block are used to calculate for each cultivar: (1) average percentage of nuts on the trees that have blight lesions; (2) average ranking for quantity of nuts on the ground. All results are shown in the figure below, ordered from those with the least blight on the trees to those with the most.



The graph shows that quantity of fallen nuts is not always correlated with blight levels on the trees. Two further notes are that: (1) fallen nuts will be underestimated in this graph for cultivars '1340' and 'Diana' on the Savage/Slee orchard, because the earlier ones would have been removed by mowing; (2) the fallen 'Diana' nuts mostly did not appear to have blight lesions, so we wondered if they fell for some reason other than blight.

The expected difference in blight levels between the orchards can be seen in the graph. However, we are not primarily interested in the differences between orchards, but in which cultivars are relatively better than others, across orchards. Thus, as in the final report on the 2005-planted trial, a ratio-based analysis method was used. This compares each cultivar against the overall average for the orchard, with numbers above 1 showing that a cultivar has more blight than average for the orchard, and numbers smaller than 1 indicating less blight than average.

We then average the ratio values, as in the bottom row of the table below, and order the cultivars from best to worst according to the average ratio. The green shading shows cultivars that have significantly lower blight in the trees than average (ratio ≤ 0.7) and the orange shading shows those with significantly more blight than average (ratio ≥ 1.3).

BLIGHT ON TREES	120	117	121	112	115	114	116	118	119	113	122
RATIOS	Diana	Shannon	Rex	Rangiora	Blenheim	DSIR-121	1340	Cashmere	Serr	Coleridge	Meyric
Thomas/Olykan: Blighted nuts on trees (%)	0.39	0.62	0.76	0.90	0.87	1.01	1.31	1.18	1.35	1.13	1.48
Savage/Slee: Blighted nuts on tree (%)	0.40	0.49	0.40	0.49	0.73	0.66	1.10	1.37	1.61	1.91	1.83
Average	0.39	0.56	0.58	0.70	0.80	0.83	1.21	1.28	1.48	1.52	1.66

Keeping the order and the coloured shading, but substituting back in the actual blight percentages (in the trees), gives us the table below. This is also the order of cultivars used for the graph above.

BLIGHT ON TREES	120	117	121	112	115	114	116	118	119	113	122
PERCENTAGES	Diana	Shannon	Rex	Rangiora	Blenheim	DSIR-121	1340	Cashmere	Serr	Coleridge	Meyric
Thomas/Olykan: Blighted nuts on trees (%)	24%	39%	48%	56%	54%	63%	82%	73%	84%	70%	92%
Savage/Slee: Blighted nuts on tree (%)	14%	17%	14%	17%	25%	23%	38%	47%	55%	65%	63%
Average	19%	28%	31%	36%	39%	43%	60%	60%	70%	68%	77%

The same analysis method was used for the fallen-nut rank values, leading to the table below, ordered from best to worst average ratio of the rank values (noting that the first three are all equal on 0). In this case ratios ≤ 0.25 were shaded green and ratios ≥ 1.5 were shaded orange (ratio values not shown here). The circled figures are those that will be underestimates, because of the prior mowing. As noted, though 'Diana' has one of the higher rankings for fallen nuts, we do not know if blight is the cause of this.

FALLEN NUTS	114	117	121	115	118	113	119	112	120	116	122
RANK	DSIR-121	Shannon	Rex	Blenheim	Cashmere	Coleridge	Serr	Rangiora	Diana	1340	Meyric
Thomas/Olykan: Nuts on ground (rank)	0.0	0.0	0.0	0.3	0.3	0.5	0.8	0.4	0.6	1.3	1.6
Savage/Slee: Nuts on ground (rank)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.5	1.0
Average	0.0	0.0	0.0	0.1	0.2	0.3	0.4	0.3	0.5	0.9	1.3

Conclusions

In this dataset, the most blight-prone varieties appear to be 'Meyric', 'Coleridge' and 'Serr', with '1340' also included if we consider the significant number of early-falling nuts from this variety. The least blight-prone are 'Diana', 'Shannon' and 'Rex', with 'Rangiora' also quite low. However, in our observations, 'Diana' lost a substantial number of nuts in early nut-fall. The cause is not known, as most fallen 'Diana' nuts did not have obvious blight lesions on them. One nut cut open did reveal a black and rotten kernel, but we could not determine if this was the cause of the nut falling, or whether it happened later, on the ground.

We have only a single year's observations, and from two trial sites only. However, the results are broadly consistent with experience in commercial orchards – 'Rex' being much less blight prone than 'Meyric' and 'Serr' – and 'Shannon' showing low levels of blight as it did in the Waikato NZTCA trial¹.

¹ Nelson Parker N 2009. Final report on Waikato walnut blight trial. NZ Tree Crops Association.