

Dr Stuart Kay

New Cultivar scientific observations

Plant & Food
RESEARCH

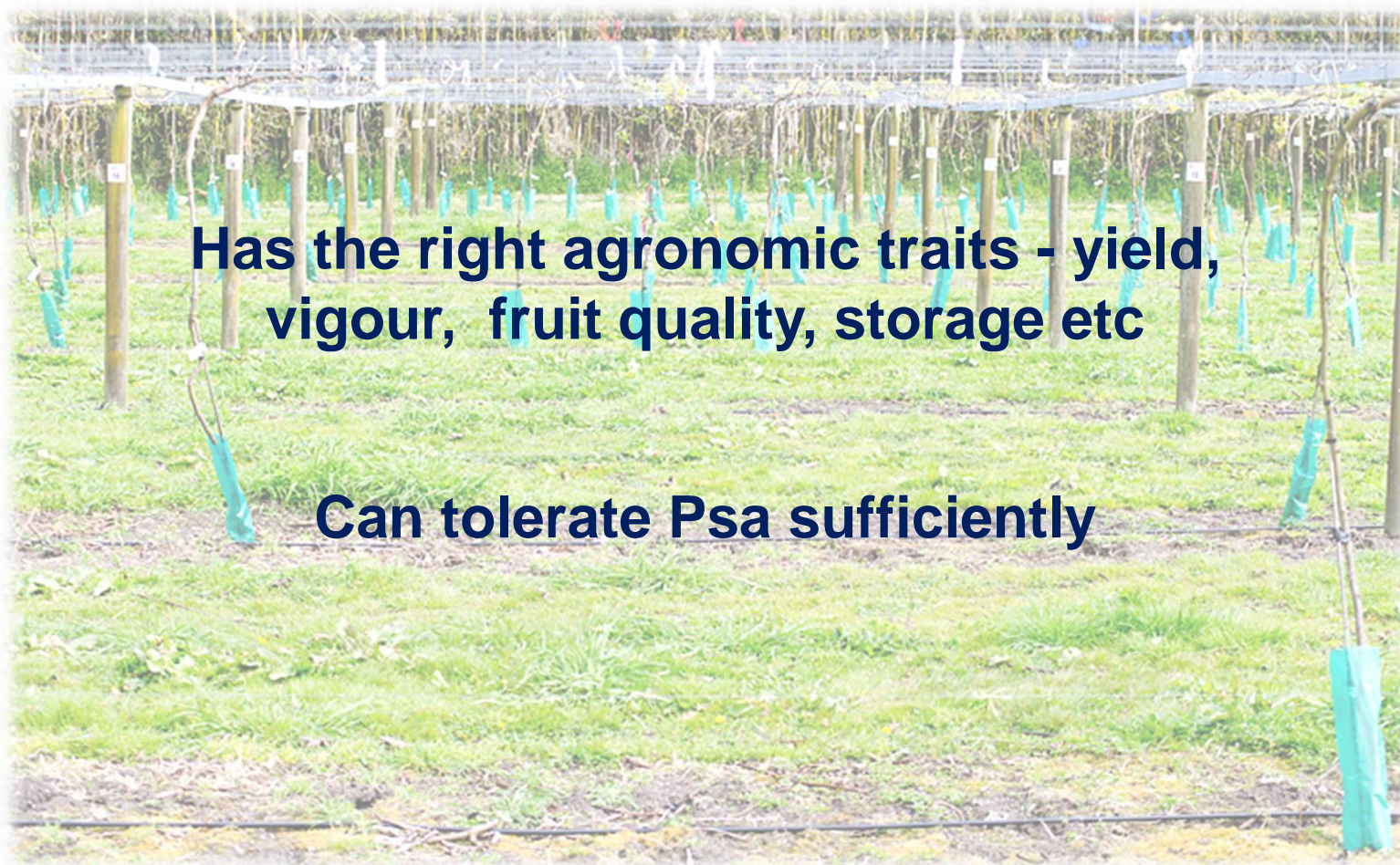
RANGAHAU AHUMĀRA KAI



Successful growing in the presence of Psa will require good orchard management in combination with good cultivars.



What's a good cultivar ?



Has the right agronomic traits - yield, vigour, fruit quality, storage etc

Can tolerate Psa sufficiently

Pieces of the puzzle



Laboratory assays

Research trials and breeding programme

Grower plantings and observations

No one piece gives you the answer

Laboratory assays



Woody stem bioassay



Woody stems from canes

Response to different Pseudomonads



Control (water)

Pss (tomato)

Psa L-V

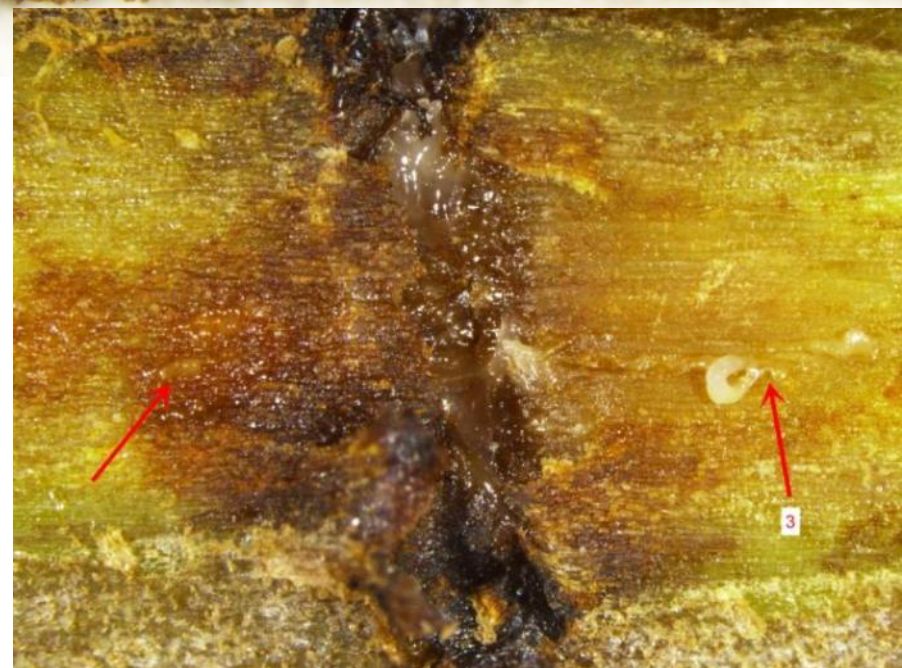
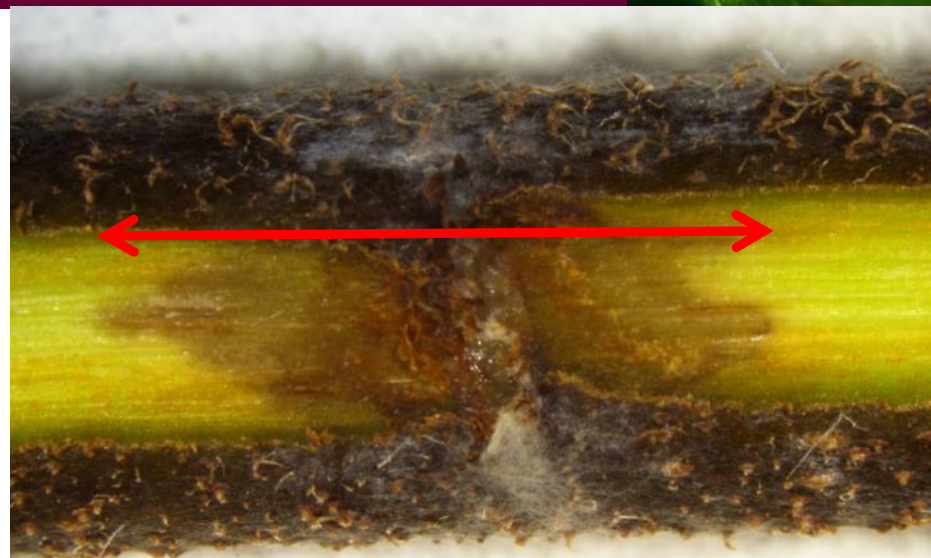
Psa V

Woody Stem Bioassay Index (WSBI)

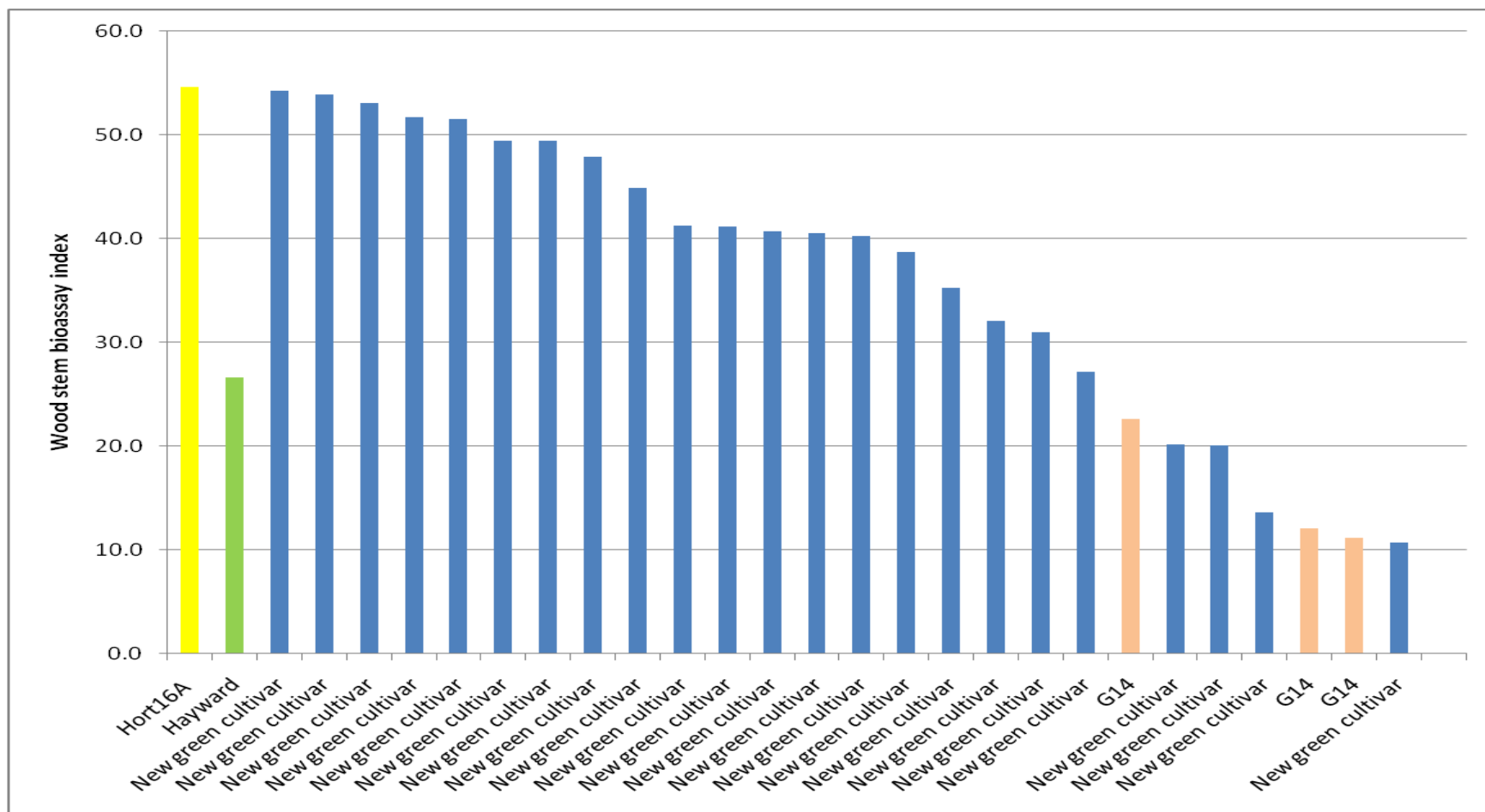


- Combines lesion size with ooze score
- Relative scale 0 – 100

lesion (mm)	Index	Ooze	Index
0-1	0	0	0.0
1-3	10	1	12.5
3-5	20	2	25.0
5-10	30	3	37.5
11-20	40	4	50.0
>20	50		

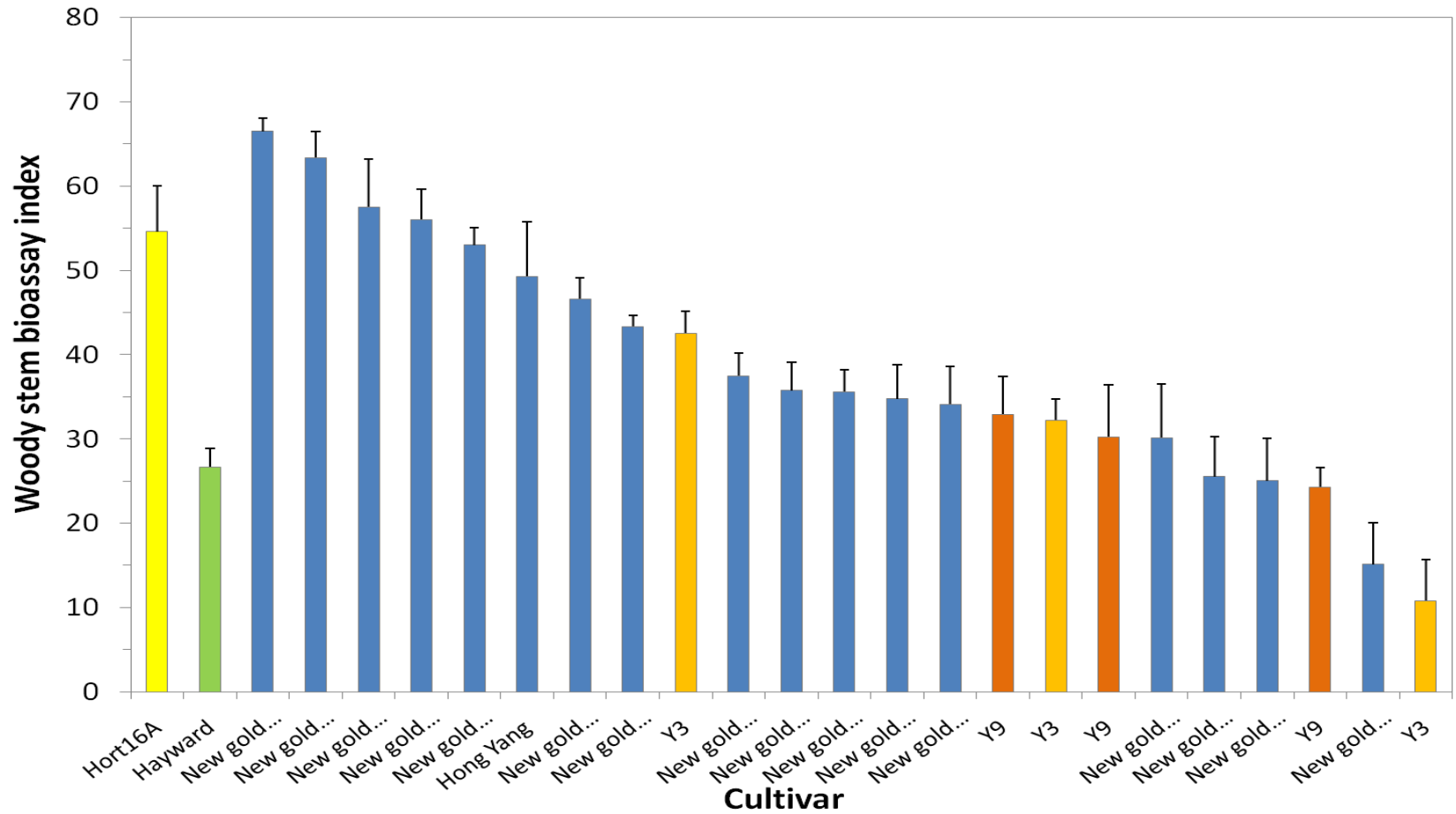


Bioassay results for Green cultivars



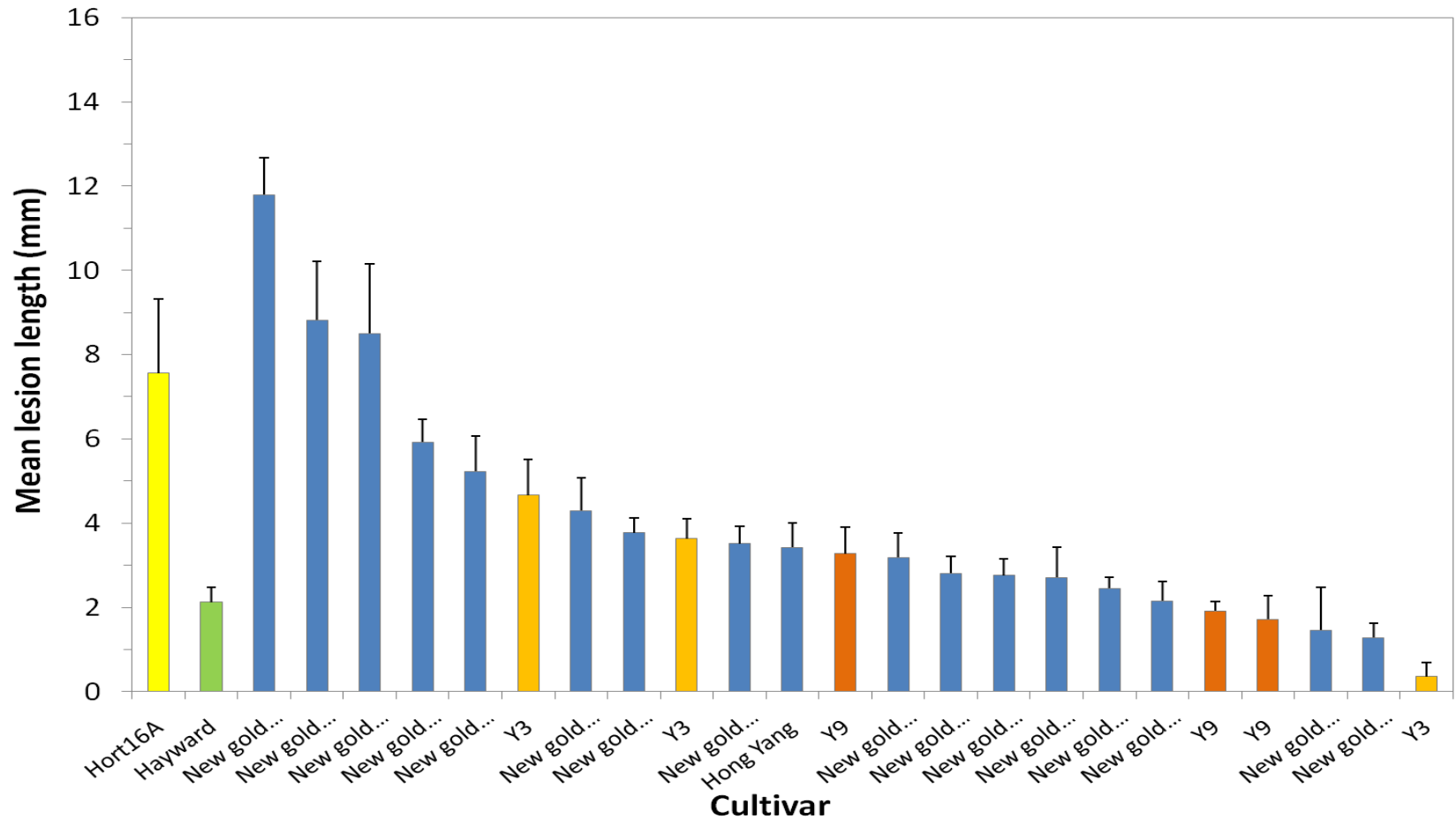
Aggregated graph of the averaged dose treatments

Bioassay results for Gold cultivars



Aggregated graph of the low dose treatments

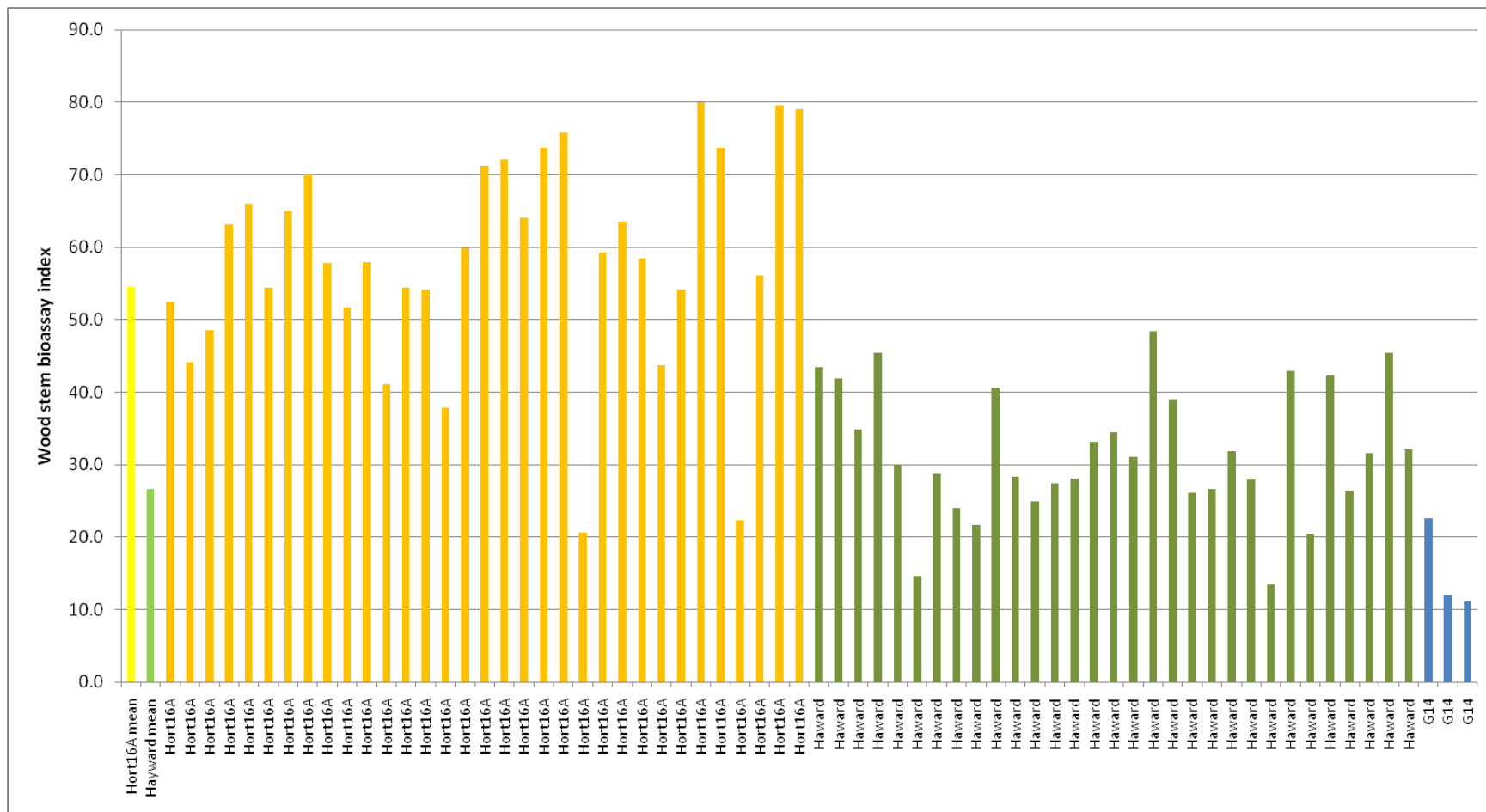
Bioassay results for Gold cultivars



Aggregated graph of the low dose treatments

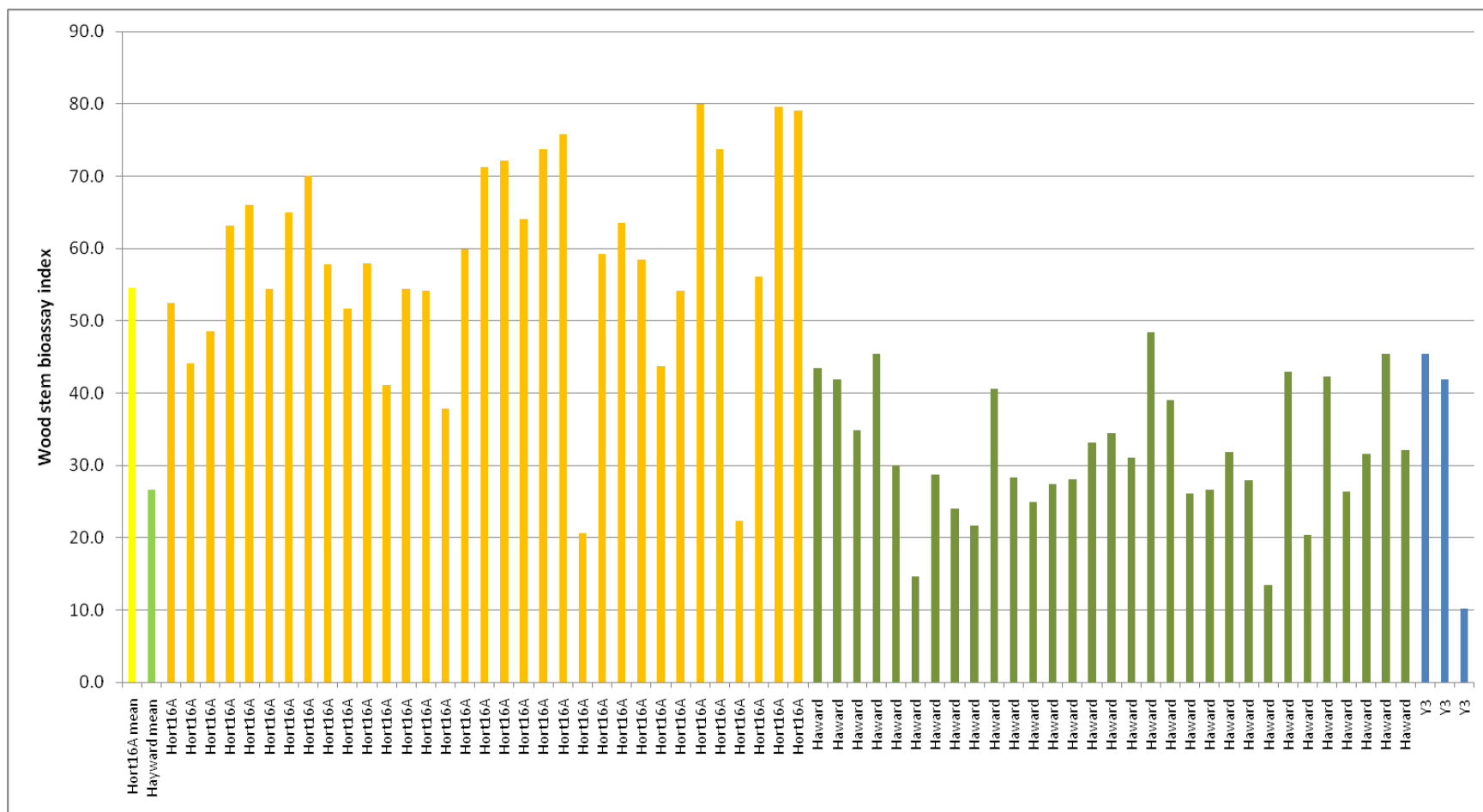


Bioassay results for Green 14



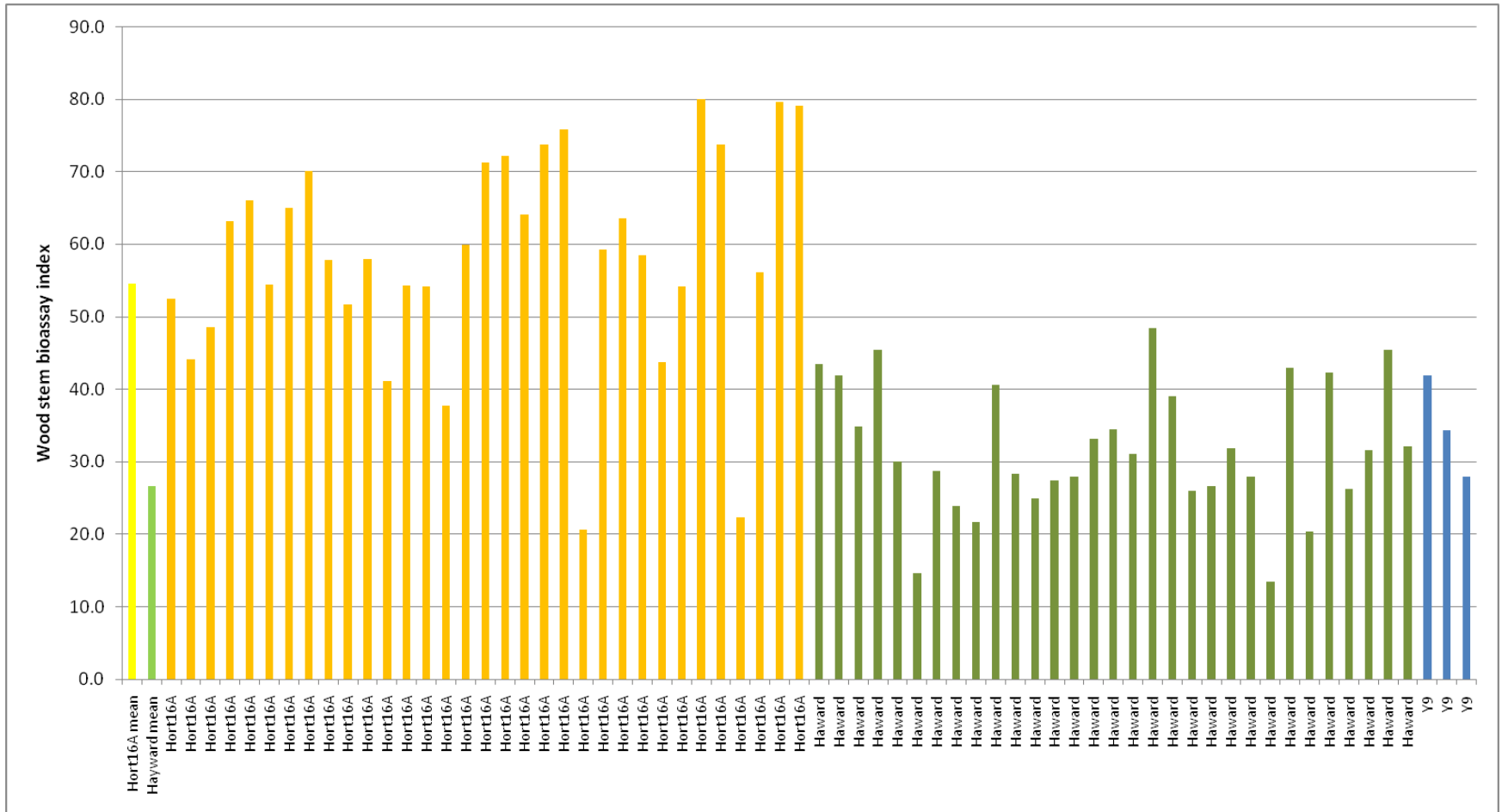
Aggregated graph of the averaged dose treatments. Means as at 1 Feb 2012.

Bioassay results for Gold 3



Aggregated graph of the averaged dose treatments. Means as at 1 Feb 2012.

Bioassay results for Gold 9



Aggregated graph of the averaged dose treatments. Means as at 1 Feb 2012.

Field data – TPRO clonal block

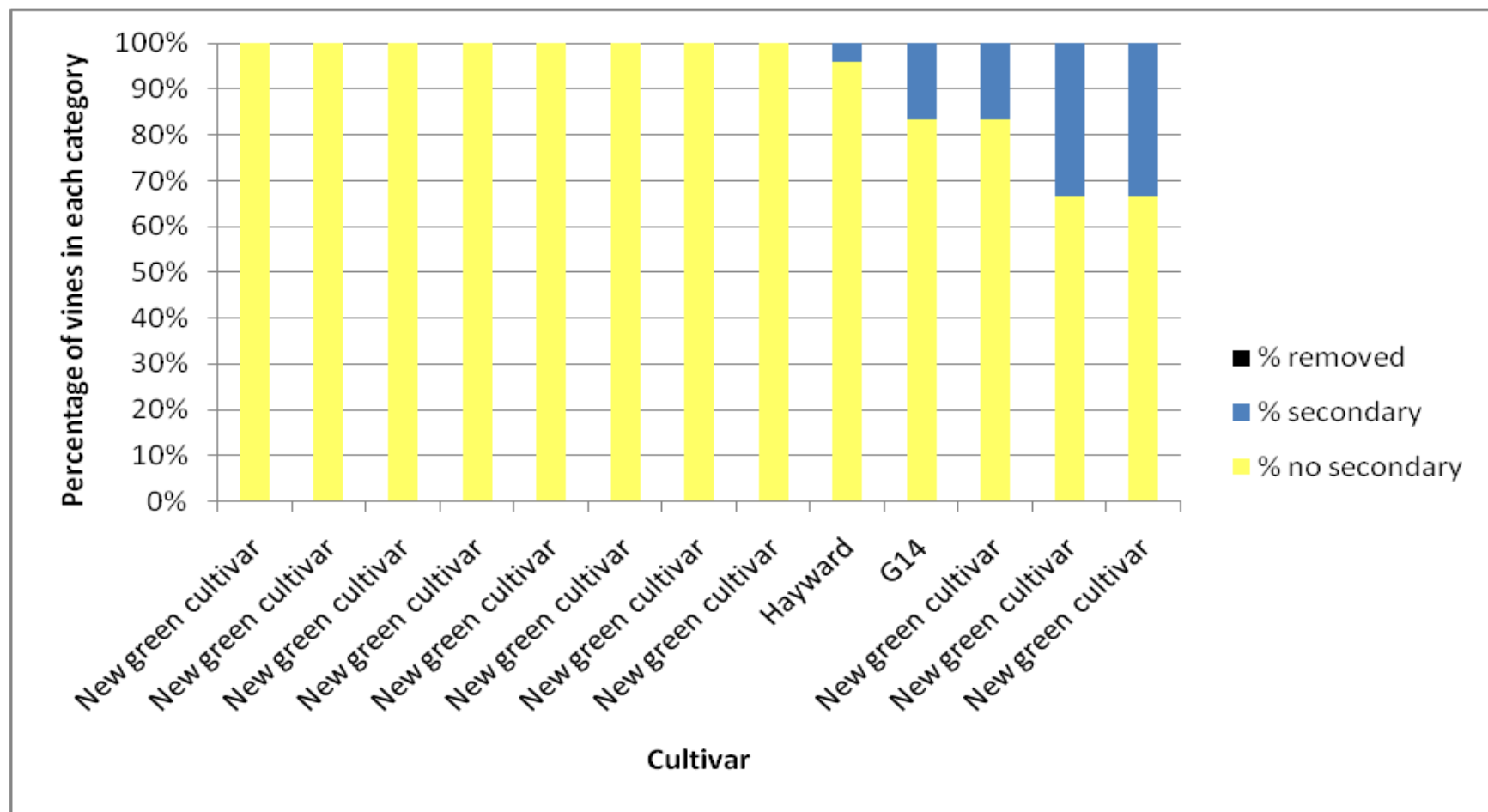
Bay	Pos	1	2	3	4	5	6	7	8	9	10	11	12	13	Bay	Pos
0	b		Male	King	Cheiftan	Male	King	Cheiftan	Male	King	Male	Male	Male	Liz Popowski	0	b
1	a		King	Green	Male	Green 14	Male	Green	Green	Green	Green	Green	Green		1	a
1	b		Cheiftan	Green	Male	Green 14	Male	Male	Green	Green	Green	Green	Green		1	b
2	a		Hayward	Male	Green	Green	Hayward	Green	Hayward	Male	Green	Male	Green		2	a
2	b		Hayward	Green	Green	Green	Hayward	Male	Hayward	Hayward	Green	Male	Green		2	b
3	a		Green	Male	Green	Male	Male	Red	Green	Hayward	Green	Hayward	Green		3	a
3	b		Green	Green	Green	Cheiftan	Male	Red	Green	King	Green	Hayward	Green		3	b
4	a		Green	Green 14	Hayward	Hayward	Hayward	Bruce	Hayward	Green	Green	Green	Hayward		4	a
4	b		Green	King	Hayward	Hayward	Cheiftan	Cheiftan	Hayward	Green	Green	Green	Hayward		4	b
5	a		Hayward	Green 14	Green	Male	Green 14	Gold	Green	Male	Green	King	Green		5	a
5	b		Hayward	Male	Green	Male	Green 14	Gold	Green	Green	Green	Cheiftan	Green		5	b
6	a		Red	Red	Red	Red	Male	King	Green	Green	Hayward	Green	Green		6	a
6	b		Red	Red	Red	Red	Male	Male	Green	King	Hayward	Green	Green		6	b
7	a		Hong Yang	Bruce	Hort16A	Bruce	Red	Gold	Gold	Green	Green	Male	Green		7	a
7	b		Hong Yang	Male	Hort16A	Sparkler	Red	Male	Gold	Green	Green	Male	Green		7	b
8	a		Gold	Sparkler	Gold	Red	Red	Gold	Cheiftan	Sparkler	Male	Hong Yang	Green		8	a
8	b		Gold	Gold	Gold	Red	Red	Gold	Male	Gold	Male	Hong Yang	Green		8	b
9	a		Gold	Male	Hort16A	Sparkler	Hort16A	Sparkler	Red	Gold	Red	Hort16A	Gold		9	a
9	b		Gold	Gold	Hort16A	Bruce	Hort16A	Red	Red	Male	Red	Hort16A	Gold		9	b
10	a		Gold 3	Male	Gold 9	Gold	Bruce	Red	Gold	Red	Gold	Male	Gold		10	a
10	b		Gold 3	Male	Gold 9	Gold	Male	Male	Gold	Red	Gold	Male	Gold		10	b
11	a		Red	Red	Gold	Sparkler	Gold	Male	Gold	Bruce	Gold	Red	Red		11	a
11	b		Red	Red	Gold	Hort16A	Gold	Male	Gold	Hong Yang	Gold	Red	Red		11	b
12	a		Gold	Sparkler	Hong Yang	Hort16A	Seedling	Bruce	Red	Hong Yang	Hort16A	Sparkler	Gold		12	a
12	b		Gold	Male	Hong Yang	Male	Red	Hort16A	Red	Male	Hort16A	Male	Gold		12	b
13	a		Red	Gold 3	Gold	Gold 9	Gold	Hort16A	Gold	Gold	Red	Gold	Red		13	a
13	b		Red	Male	Gold	Gold 9	Gold	Male	Gold	Gold	Red	Gold	Red		13	b
14	a		Gold	Gold 3	Gold	Red	Male	Gold	Male	Sparkler	Red	Male	Red		14	a
14	b		Gold	Gold	Gold	Red	Bruce	Gold	Male	Hort16A	Red	Male	Red		14	b
15	a		Red	Male	Red	Sparkler	Hort16A	Sparkler	Hort16A	Hort16A	Hong Yang	Red	Red		15	a
15	b		Red	Gold	Red	Male	Hort16A	Gold	Hort16A	Hort16A	Hong Yang	Red	Red		15	b
16	a		Gold 9	Red	Gold 3	Red	Gold	Gold	Red	Red	Gold	Bruce	Novel		16	a
16	b		Gold 9	Red	Gold 3	Red	Gold	Male	Red	Red	Gold	Male	Novel		16	b
17	a		Hort16A	Hort16A	Red	Bruce	Red	Hong Yang	Male	Red	Gold	Gold	Gold		17	a
17	b		Hort16A	Hort16A	Red	Male	Red	Hong Yang	Male	Red	Gold	Gold	Gold		17	b
18	a		Bruce	Sparkler	Male	Male	Sparkler	Bruce	Male	Male	Male	Male	Gold		18	a



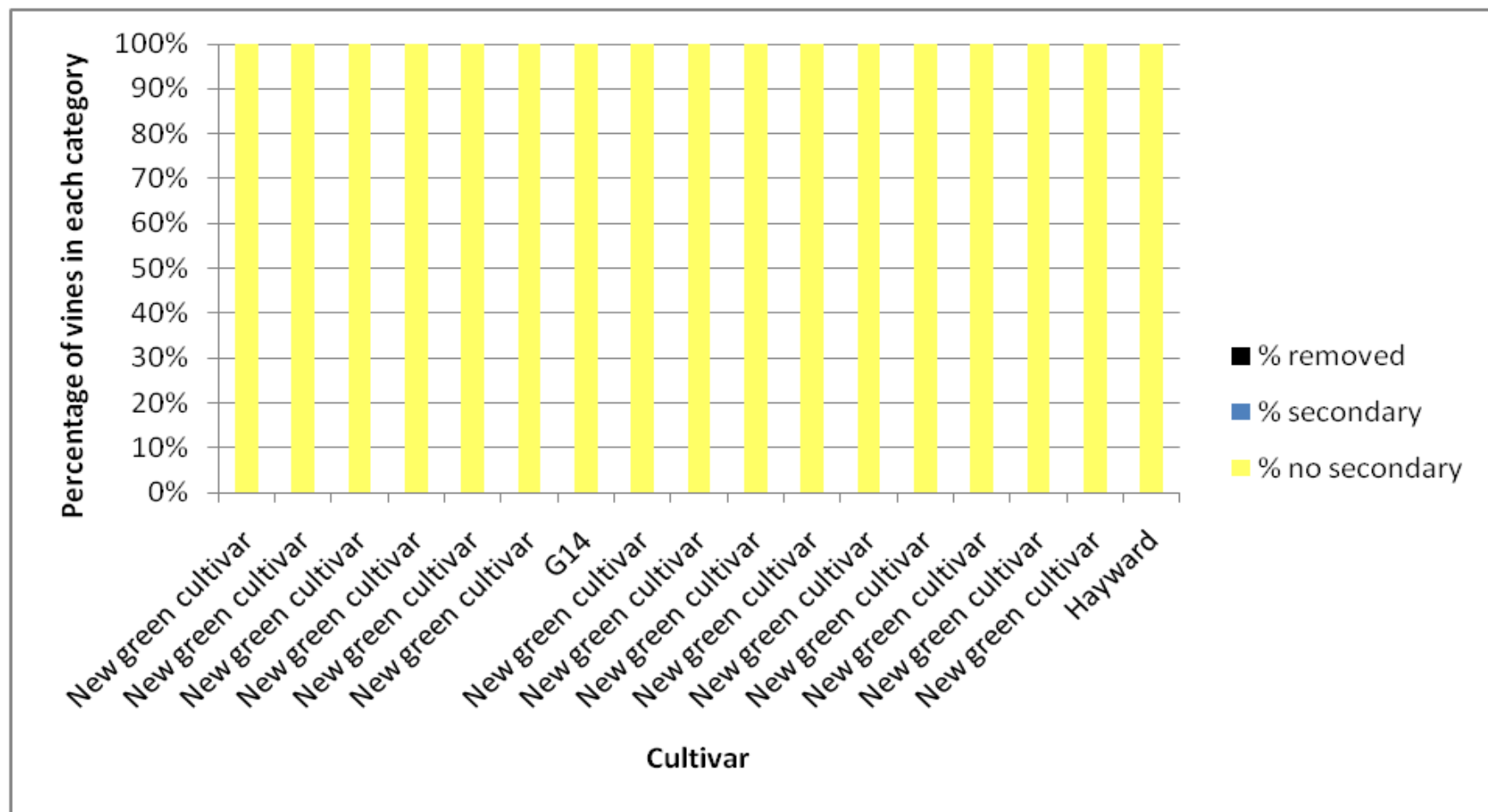
Field data – Te Puke clonal block

Bay Plant	F 43	44	F 45	Row 46	F 47	48	F 49	F 50	51	F 52	Row 53	F 54	55	F 56	57	Bay Plant
1 a	m		m		m		m	m		m		m		m		1 a
1 b	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	1 b
1 c	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	1 c
2 a		m		m		m		m		m		m		m		2 a
2 b	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	2 b
2 c	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	2 c
3 a	Hayward		Male			m		m				Male		Gold		3 a
3 b	Hayward	King	Green	Green		x	x	x		Hor16A	Hor16A	Gold	Gold	Hong Yang	Sparkler	3 b
3 c	Hayward		Green	Green		x	x	x		Hor16A	Hor16A	Gold	Gold	Hong Yang		3 c
4 a		Male		King		m						Male		Gold		4 a
4 b	Hayward	Cheifan	Green	Green		x	x	x		Hor16A	Hor16A	Gold	Gold	Hong Yang	Male	4 b
4 c	Hayward		Green	Green		x	x	x		Hor16A	Hor16A	Gold	Gold	Hong Yang		4 c
5 a	Male		Cheifan		m		m					Bruce		Hor16A		5 a
5 b	Male	Male	Green	Green	x	x	x			Hor16A	Hor16A	Gold	Gold	Red	Bruce	5 b
5 c	Male	Cheifan	Green	Green	x	x	x			Hor16A	Hor16A	Gold	Gold	Red	Bruce	5 c
6 a	Male	Male	Green	Green		m						Sparkler		Hor16A		6 a
6 b	Male	Male	Green	Green		x	x	x		Hor16A	Hor16A	Gold	Gold	Red	Sparkler	6 b
6 c	Male	Male	Green	Green		x	x	x		Hor16A	Hor16A	Gold	Gold	Red	Sparkler	6 c
7 a		King		Green		m		m				Bruce		Gold		7 a
7 b	Hayward	Hayward	Green	Green		x	x	x		Gold 3	Gold 3	Red	Red	Red	Gold	7 b
7 c	Hayward	Hayward	Green	Green		x	x	x		Gold 3	Gold 3	Red	Red	Red	Gold	7 c
8 a		King		Cheifan		m						Sparkler		Gold		8 a
8 b	Hayward	Hayward	Green	Green		x	x	x		Gold 3	Gold 3	Red	Red	Red	Gold	8 b
8 c	Hayward	Hayward	Green	Green		x	x	x		Gold 3	Gold 3	Red	Red	Red	Gold	8 c
9 a		King		Green		m		m				Male		Gold		9 a
9 b	Green		Green	Green		x	x	x		Red	Red	Gold	Gold	Gold	Sparkler	9 b
9 c	Green		Green	Green		x	x	x		Red	Red	Gold	Gold	Gold	Sparkler	9 c
10 a		King		Green		m						Sparkler		Male		10 a
10 b	Green	Male	Green	Green		x	x	x		Red	Red	Gold	Gold	Gold	Bruce	10 b
10 c	Green	Male	Green	Green		x	x	x		Red	Red	Gold	Gold	Gold	Bruce	10 c
11 a		Cheifan		Hayward		m		m				Bruce		Male		11 a
11 b	Green	Male	Hayward	Hayward		x	x	x		Red	Red	Gold	Gold	Red	Red	11 b
11 c	Green	Male	Hayward	Hayward		x	x	x		Red	Red	Gold	Gold	Red	Red	11 c
12 a		Cheifan		Male		m						Sparkler		Sparkler		12 a
12 b	Green	Male	Hayward	Hayward		x	x	x		Red	Red	Gold	Gold	Red	Red	12 b
12 c	Green	Male	Hayward	Hayward		x	x	x		Red	Red	Gold	Gold	Red	Red	12 c
13 a		King		Green		m		m				Sparkler		Bruce		13 a
13 b	Green	Green	Green	Green		x	x	x		Red	Red	Gold	Gold	Red	Red	13 b
13 c	Green	Green	Green	Green		x	x	x		Red	Red	Gold	Gold	Red	Red	13 c
14 a		King		Cheifan		m						Male		Gold		14 a
14 b	Green	Green	Green	Green		x	x	x		Red	Red	Gold	Gold	Red	Red	14 b
14 c	Green	Green	Green	Green		x	x	x		Red	Red	Gold	Gold	Red	Red	14 c
15 a		Cheifan		Male		m		m				Bruce		Sparkler		15 a
15 b	Green 14	Green 14	Green	Green		x	x	x		Red	Red	Gold	Gold	Red	Red	15 b
15 c	Green 14	Green 14	Green	Green		x	x	x		Red	Red	Gold	Gold	Red	Red	15 c
16 a		Male		King		m						Sparkler		Bruce		16 a
16 b	Green 14	Green 14	Green	Green		x	x	x		Red	Red	Gold	Gold	Red	Red	16 b
16 c	Green 14	Green 14	Green	Green		x	x	x		Red	Red	Gold	Gold	Red	Red	16 c
17 a		King		Cheifan		m						Male		Male		17 a
17 b	Hayward	Hayward	Green	Green		x	x	x		Gold	Gold	Red	Red	Hor16A	Hong Yang	17 b
17 c	Hayward	Hayward	Green	Green		x	x	x		Gold	Gold	Red	Red	Hor16A	Hong Yang	17 c
18 a		Cheifan		Male		m						Sparkler		Male		18 a
18 b	Hayward	Hayward	Green	Green		x	x	x		Gold	Gold	Red	Red	Hor16A	Hong Yang	18 b
18 c	Hayward	Hayward	Green	Green		x	x	x		Gold	Gold	Red	Red	Hor16A	Hong Yang	18 c
19 a		King		Green		m						Bruce		Male		19 a
19 b	Green	Green	Green	Green		Male	Male	x		Red	Red	Red	Red	Male	Male	19 b
19 c	Green	Green	Green	Green		Male	Male	x		Red	Red	Red	Red	Male	Male	19 c
20 a	43		Cheifan		King							Sparkler				20 a
20 b		Green	Green	Green	Male	Male	x			Red	Red	Red	Red			20 b
20 c		Green	Green	Green	Male	Male	x			Red	Red	Red	Red			20 c
21 a		Male		Green		Male	Hayward	Male		52	53	54	55	56	57	21 a
21 b		Green		Green		Hayward	Hayward	Cheifan		Male	Bruce	Male				21 b
21 c		Green		Green		Hayward	Hayward	Cheifan		Male	Bruce	Male				21 c
22 a			King		Cheifan					50	51					22 a
22 b			Green		Green											22 b
22 c			Green		Green											22 c
23 a			Green		Green											23 a
23 b			Green		Green											23 b

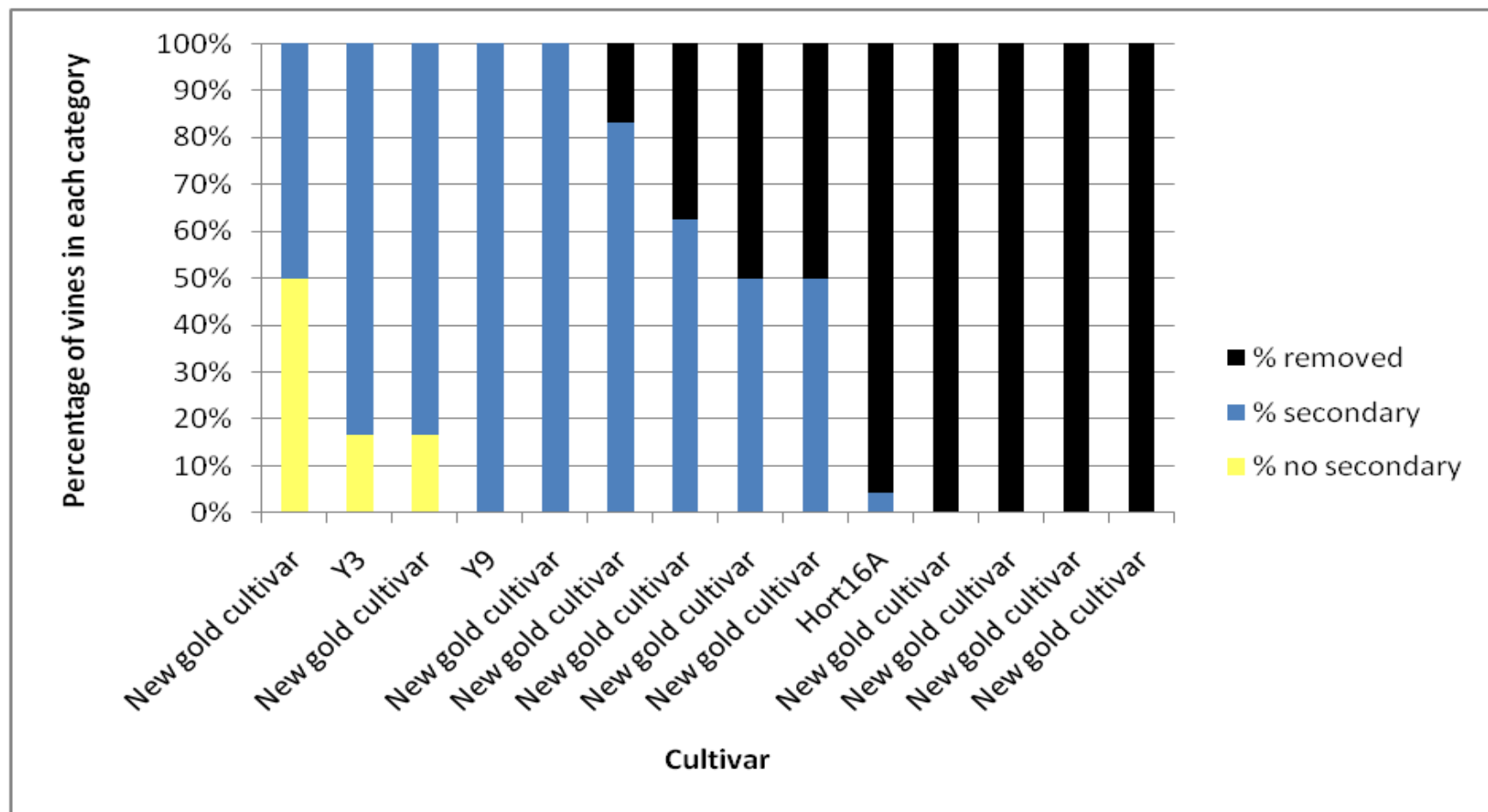
Green field data – TPRO clonal block



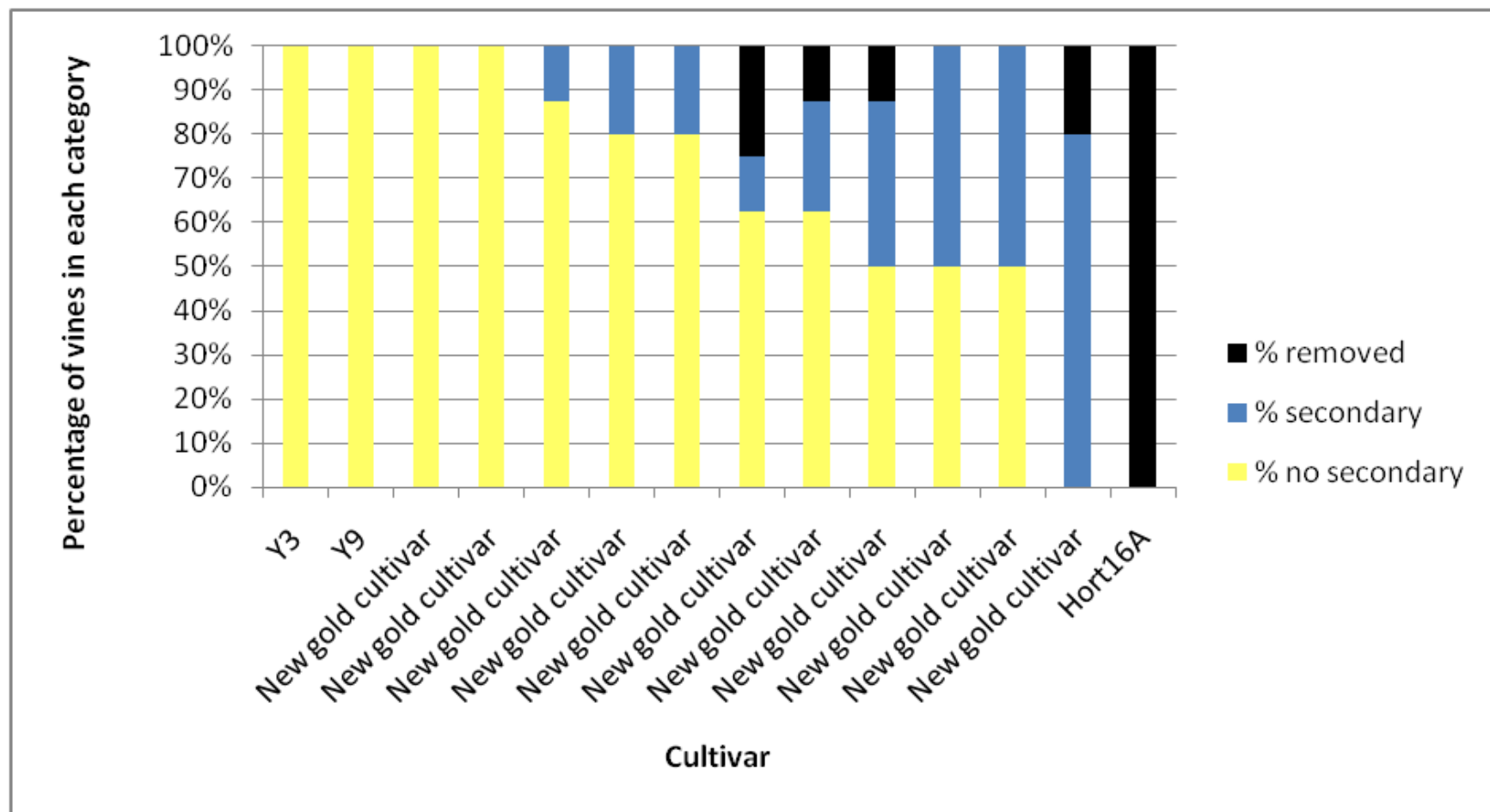
Green field data – Te Puke clonal block



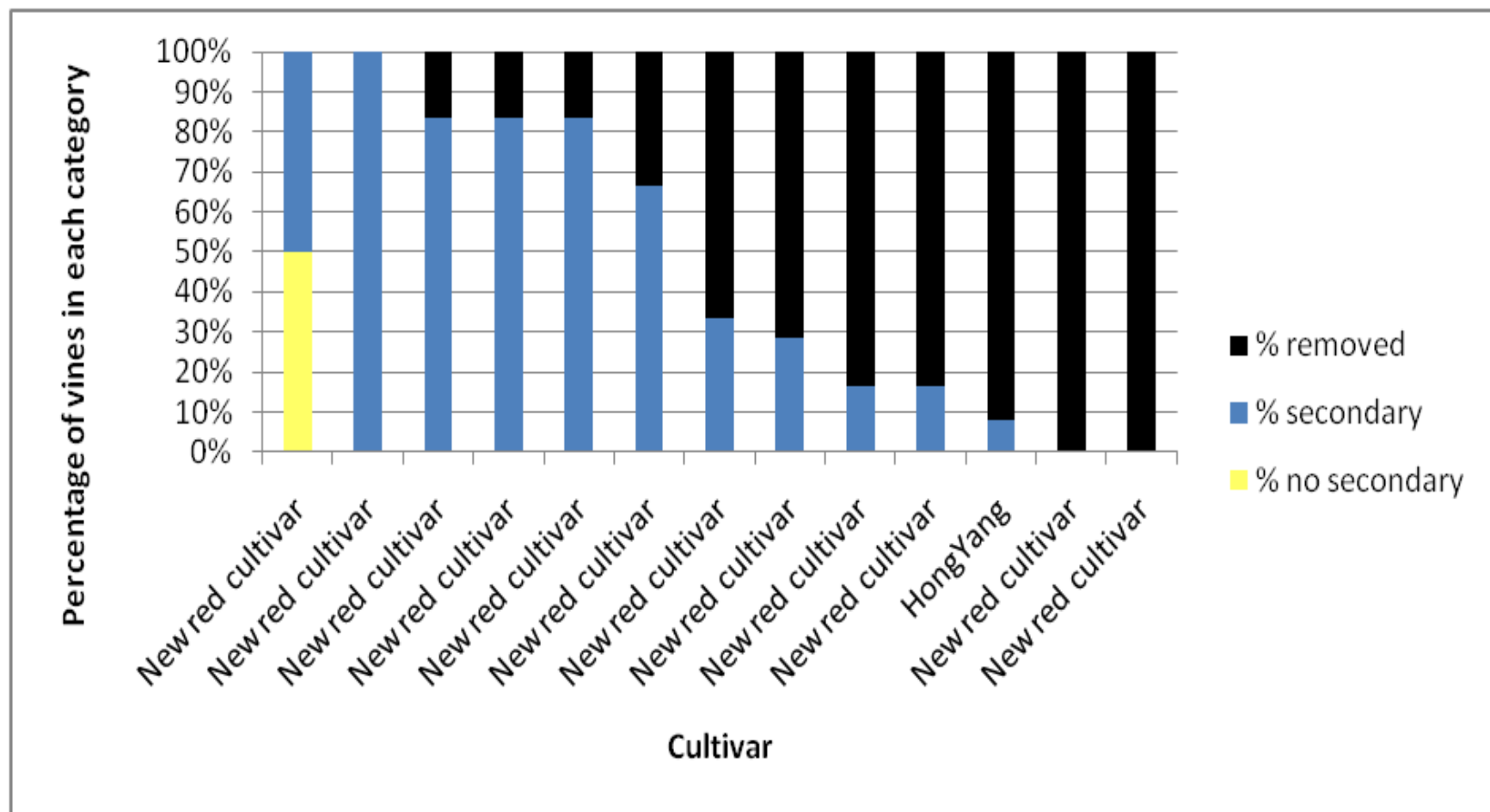
Gold field data – TPRO clonal block



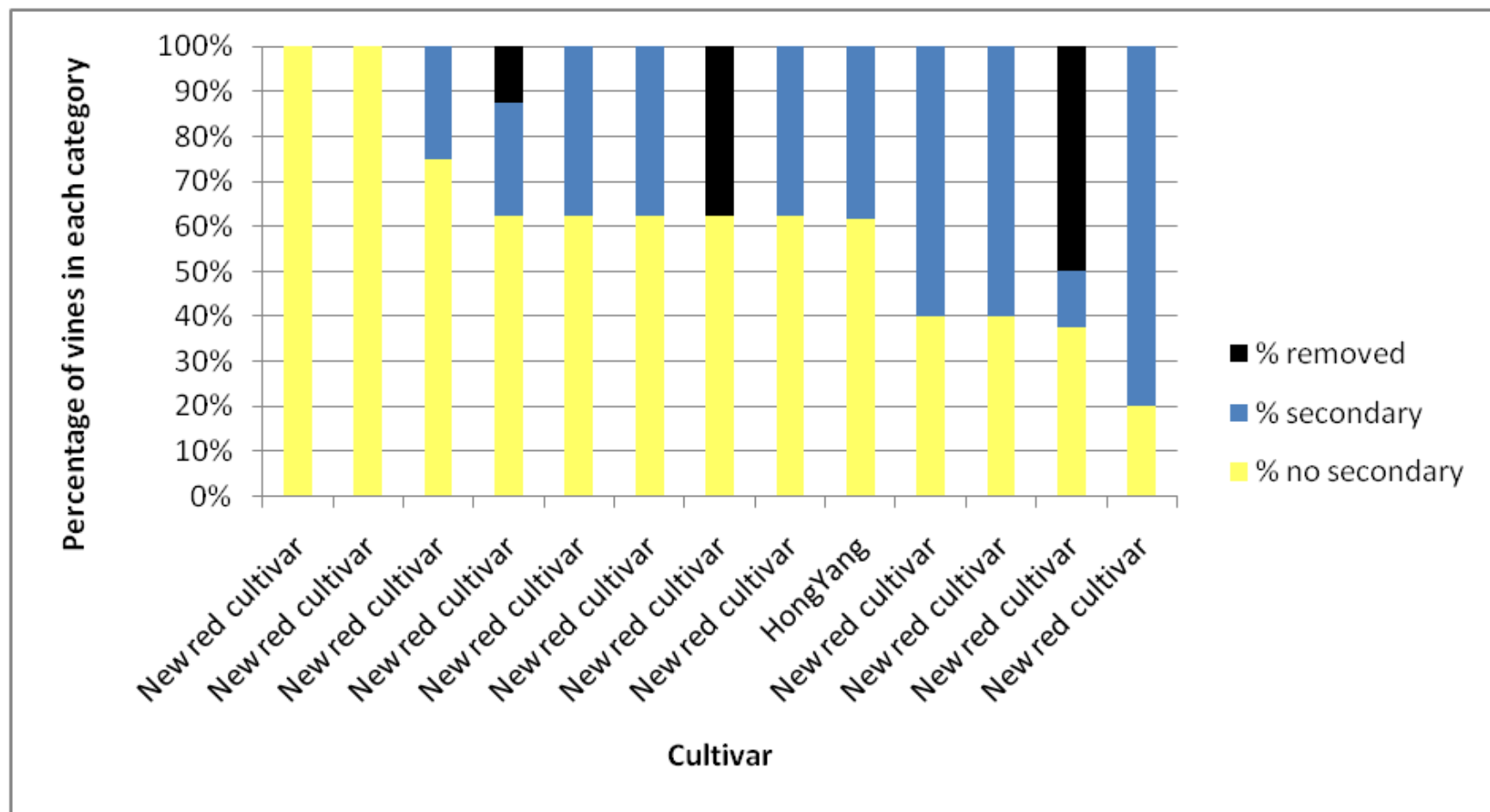
Gold field data – Te Puke clonal block



Red field data – TPRO clonal block



Red field data – Te Puke clonal block

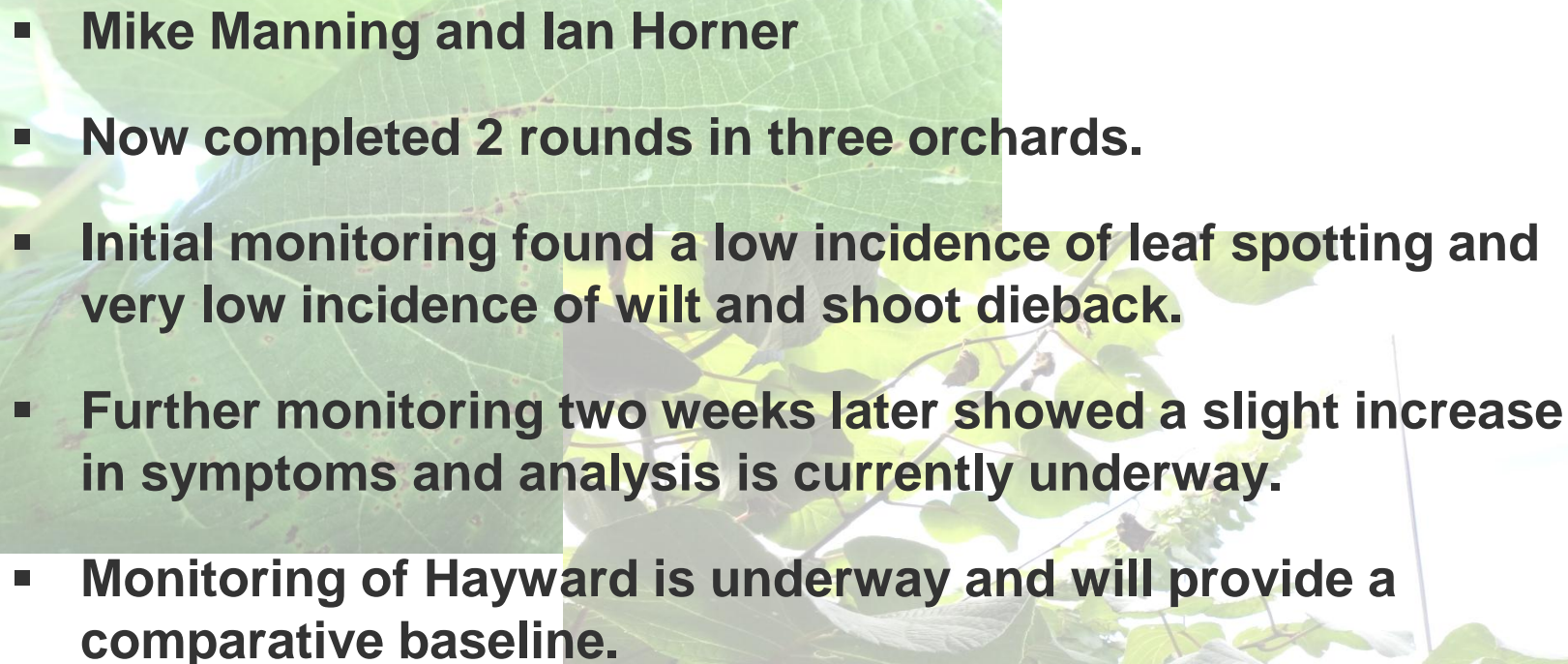


Field data – TPRO blocks 1E and 23

- **Block 1E – Grafted with new cultivars in Aug 2011.**
- **Block 23 – Grafted with new cultivars Aug 2010.**
- **Psa progression on Hort16A, Bruce and Sparkler, little to no development on Gold 3, Gold 9 and Green 14.**



Disease progression trials

- 
- **Mike Manning and Ian Horner**
 - **Now completed 2 rounds in three orchards.**
 - **Initial monitoring found a low incidence of leaf spotting and very low incidence of wilt and shoot dieback.**
 - **Further monitoring two weeks later showed a slight increase in symptoms and analysis is currently underway.**
 - **Monitoring of Hayward is underway and will provide a comparative baseline.**

Successful growing in the presence of Psa will require good orchard management in combination with good cultivars.





Acknowledgements:

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Luis Gea

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