



# The latest on the Aussie Rootstock trial

Joshua Fielke – Industry Development Officer

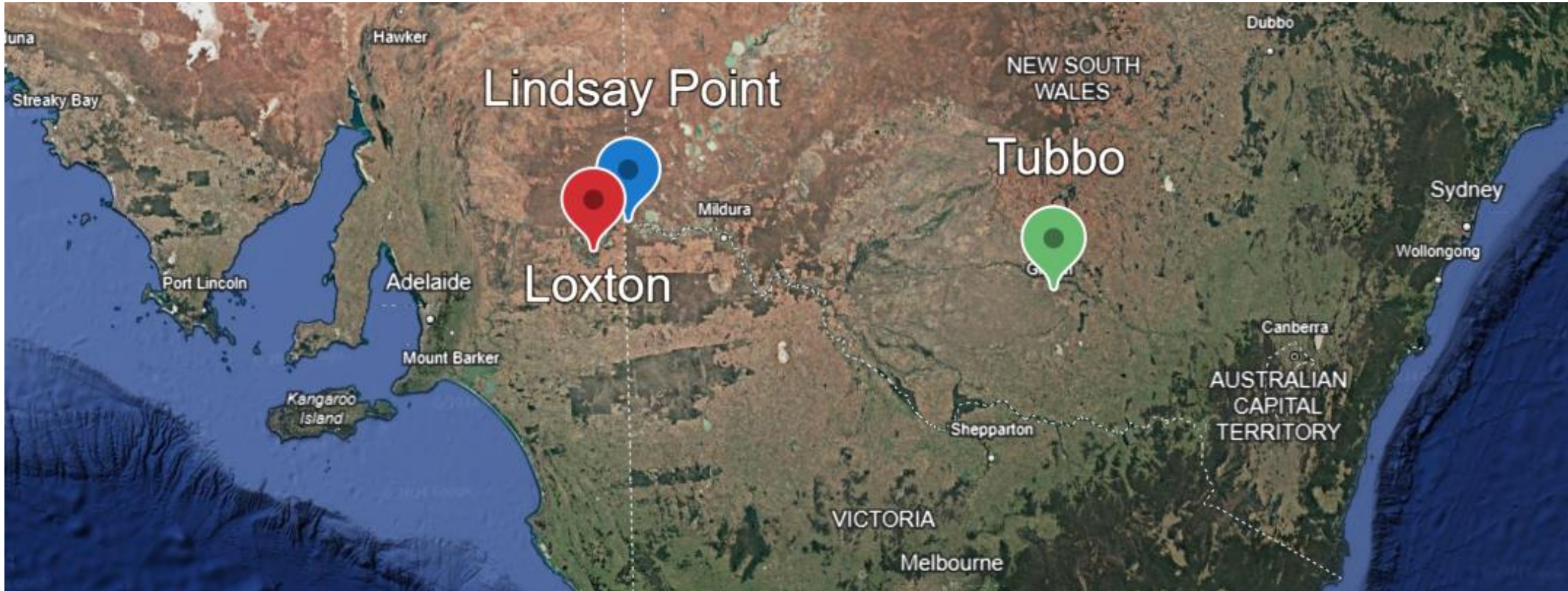


ALMOND BOARD  
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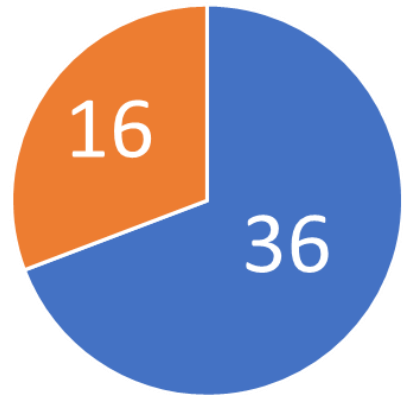
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# Our sites



# Lindsay Point, planted 2013

## Lindsay Point, VIC



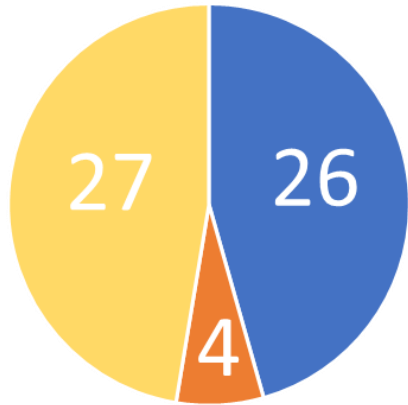
■ Loamy Sand ■ Sand



Count of data points under each soil type, 2024

# Loxton, planted 2019 & 2020

## Loxton, SA



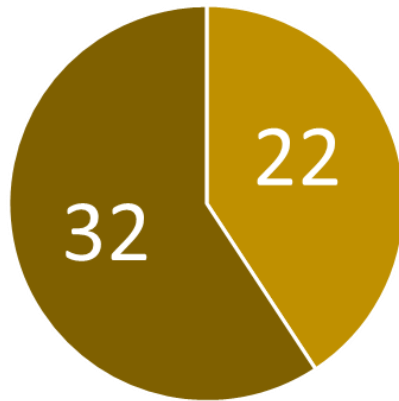
■ Loamy sand ■ Sand ■ Sandy loam



Count of data points under each soil type, 2024

# Tubbo, planted 2021

## Tubbo, NSW



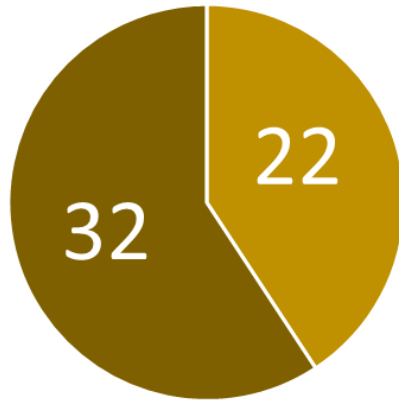
■ Clay ■ Clay loam



Count of data points under each soil type, 2024

# Tubbo, planted 2021

## Tubbo, NSW



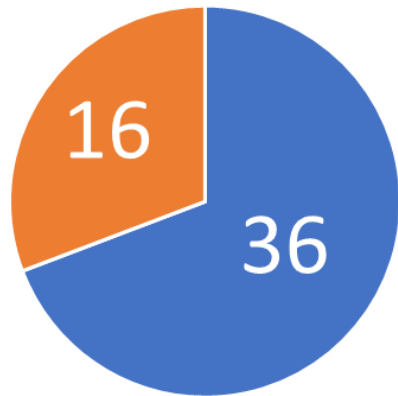
■ Clay ■ Clay loam



Count of data points under each soil type, 2024

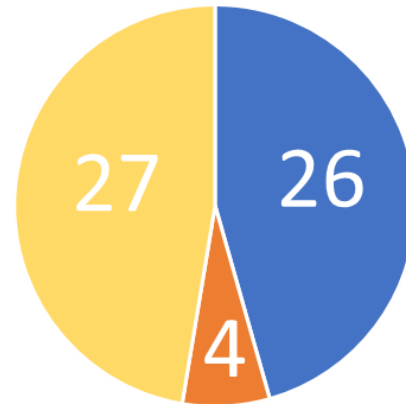
# Soil types

Lindsay Point, VIC



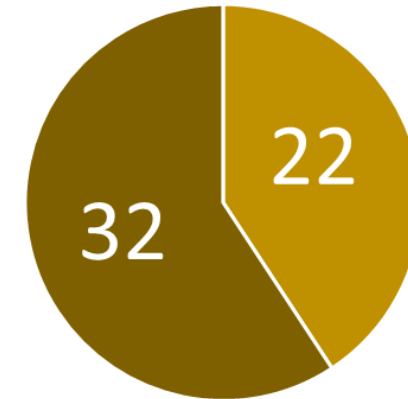
■ Loamy Sand ■ Sand

Loxton, SA



■ Loamy sand ■ Sand ■ Sandy loam

Tubbo, NSW



■ Clay ■ Clay loam

Count of data points under each soil type, 2024



# Rootstock Parentage

## Peach

### Lindsay Point, VIC

- Nemaguard

### Loxton, SA

- Nemaguard

### Tubbo, NSW

- Nemaguard

# Rootstock Parentage

## Peach / Almond Hybrids

### Lindsay Point, VIC

- Cornerstone  
(Planted a year late)
- Garnem
- Felinem
- Monegro
- Hansen 536
- Brights Hybrid
- GF749
- GF677
- GF557
- Adafuel

### Loxton, SA

- Cornerstone
- Garnem
- Atlas (Apricot / Plum inc.)
- Viking (Apricot / Plum inc.)

### Tubbo, NSW

- Cornerstone
- Garnem
- Atlas (Apricot / Plum inc.)
- Viking (Apricot / Plum inc.)
- Rootpac R
- Tetra



# Rootstock Parentage

## Plum / Almond Hybrids

### Lindsay Point, VIC

- Krymsk 86

### Loxton, SA

### Tubbo, NSW

- Krymsk 86
- Rootpac 20

# Trial design

- All trials are 50% Nonpareil.
- Rootstock treatments / blocks are set up in groups of 20 trees split evenly across 4 rows.
- The middle Nonpareil row is the data row with the internal 3 trees being the data trees.
- This is replicated for statistical analysis.

ROOTSTOCK TRIAL LEGEND			Row	1	2	3	4	5	6	7	8	9
NP	= Nonpareil (non-p)	Tree 1	1	C	NP	P	NP	C	NP	P	NP	NP
C	= Carmel (pollinatc)	2	NP	C	o	P	NP	C	o	P	NP	NP
P	= Peerless (pollinator)	3	NP	C	o	P	NP	C	o	P	NP	NP
o	= monitored trees	4	NP	C	o	P	NP	C	o	P	NP	NP
		5	NP	C	NP	P	NP	C	NP	P	NP	NP
ROOTSTOCKS			6	2	C	NP	P	NP	C	NP	P	NP
1	Nemaguard	7	NP	C	o	P	NP	C	o	P	NP	NP
2	GF557	8	NP	C	o	P	NP	C	o	P	NP	NP
3	GF677	9	NP	C	o	P	NP	C	o	P	NP	NP
4	GF749	10	NP	C	NP	P	NP	C	NP	P	NP	NP
5	Adafuel	11	3	C	NP	P	NP	C	NP	P	NP	NP
6	Garnem	12	NP	C	o	P	NP	C	ND	P	NP	NP
7	Felinem	13	NP	C	o	P	NP	C	ND	P	NP	NP
8	Monegro	14	NP	C	o	P	NP	C	ND	P	NP	NP
9	Brights Hybrid	15	NP	C	NP	P	NP	C	NP	P	NP	NP
10	Hansen 536	16	4	C	NP	P	NP	C	NP	P	NP	NP
11	Cornerstone	17	NP	C	o	P	NP	C	o	P	NP	NP
12	Nickels	18	NP	C	ND	P	NP	C	o	P	NP	NP
13	Krymsk 86	19	NP	C	o	P	NP	C	o	P	NP	NP
14	Cadaman (Was Pen)	20	NP	C	NP	P	NP	C	NP	P	NP	NP
15	Atlas (was Tetra)	21	5	C	NP	P	NP	C	NP	P	NP	NP
16	Spare (Nemaguard)	22	NP	C	o	P	NP	C	o	P	NP	NP
		23	NP	C	o	P	NP	C	o	P	NP	NP
7.30	m	Spacing	24	NP	C	o	P	NP	C	o	P	NP
4.00	m	Spacing	25	NP	C	NP	P	NP	C	NP	P	NP
			26	6	C	NP	P	NP	C	NP	P	NP
0.06		Hectares	27	NP	C	o	P	NP	C	o	P	NP
3.74		Hectares	28	NP	C	o	P	NP	C	o	P	NP
			29	NP	C	o	P	NP	C	o	P	NP
			30	NP	C	NP	P	NP	C	NP	P	NP
			31	7	C	NP	P	NP	C	NP	P	NP
			32	NP	C	o	P	NP	C	o	P	NP
			33	NP	C	o	P	NP	C	o	P	NP
			34	NP	C	o	P	NP	C	o	P	NP
			35	NP	C	NP	P	NP	C	NP	P	NP
			36	8	C	NP	P	NP	C	NP	P	NP
R1	R2		37	NP	C	o	P	NP	C	o	P	NP
			38	NP	C	o	P	NP	C	o	P	NP
R3	R4		39	NP	C	o	P	NP	C	o	P	NP
			40	NP	C	NP	P	NP	C	NP	P	NP

# Harvest



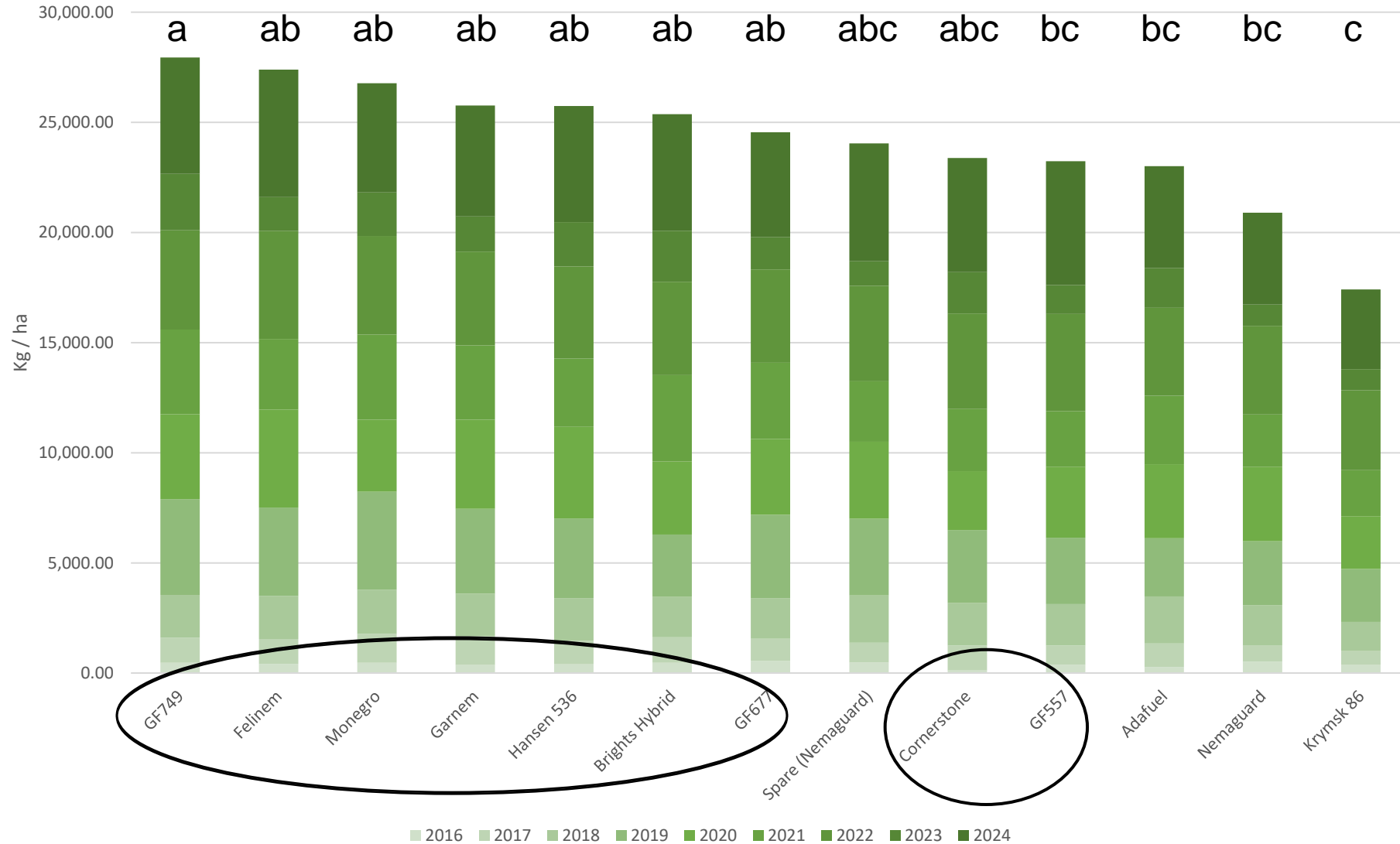


# **Let's focus on Lindsay Point**

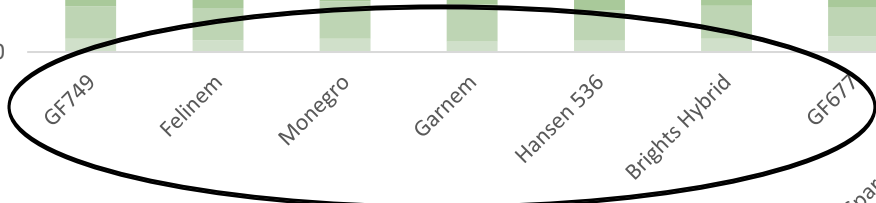
**Tells the best story due to age**



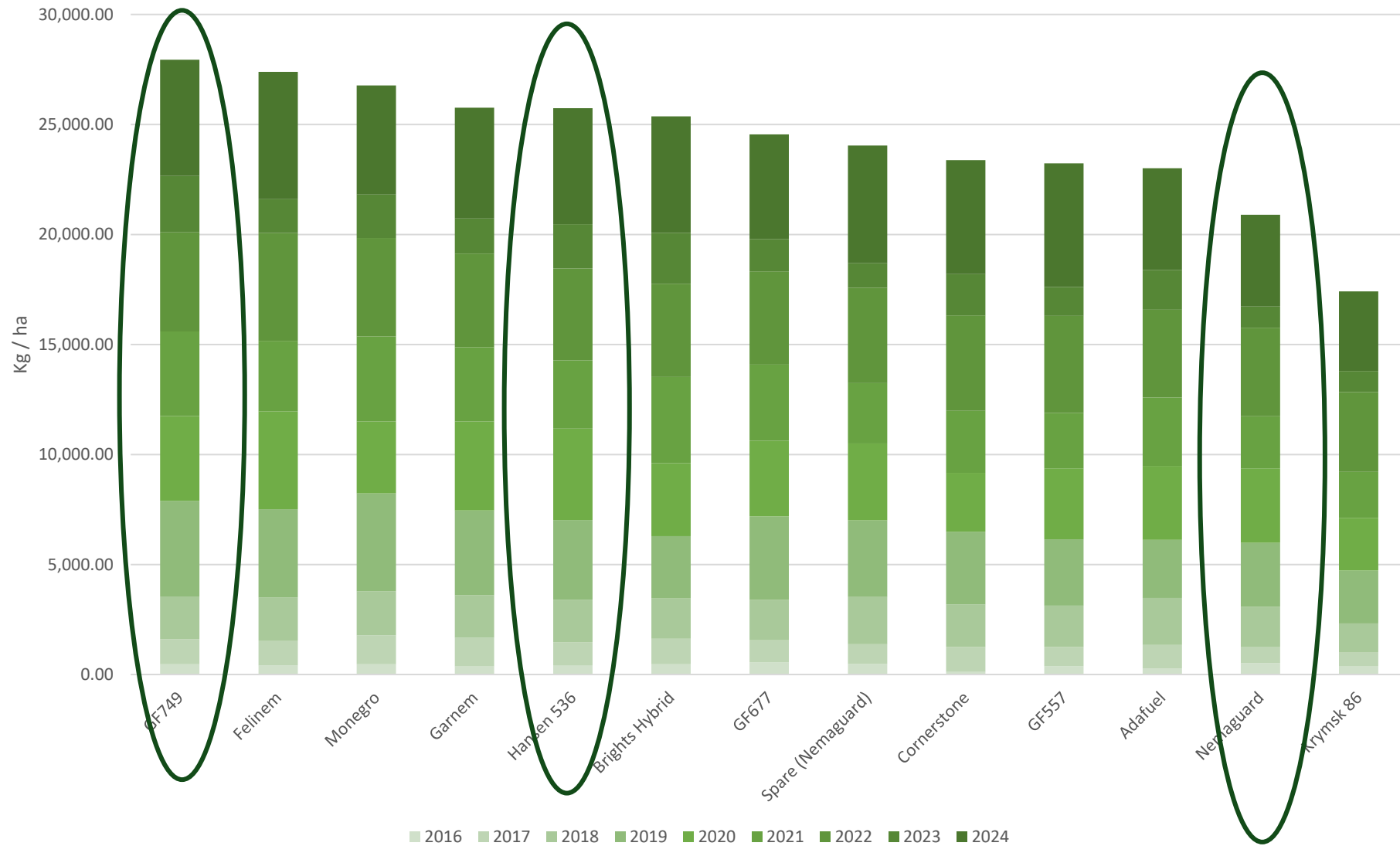
# Cumulative yield



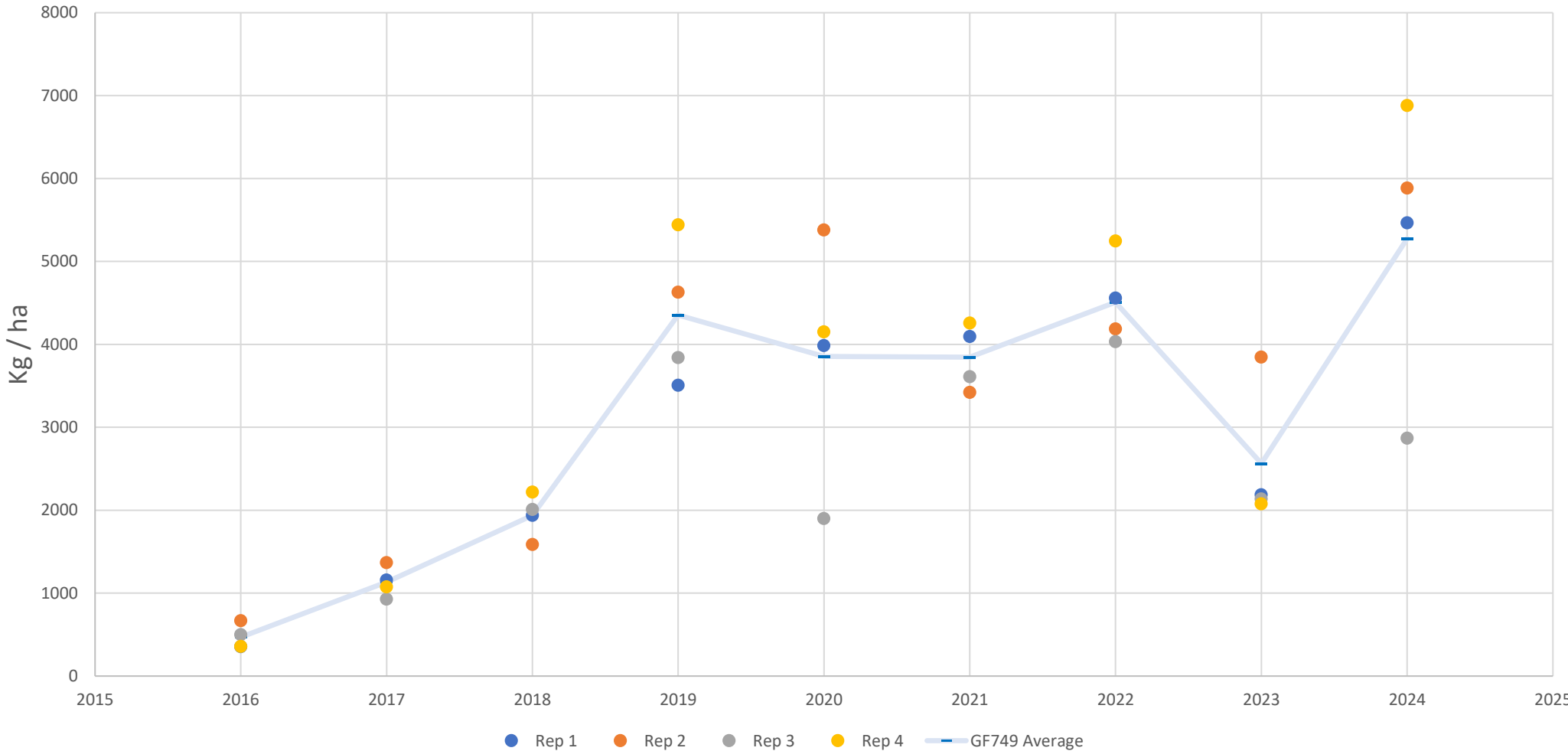
Peach / Almond Hybrids provide a greater yield.



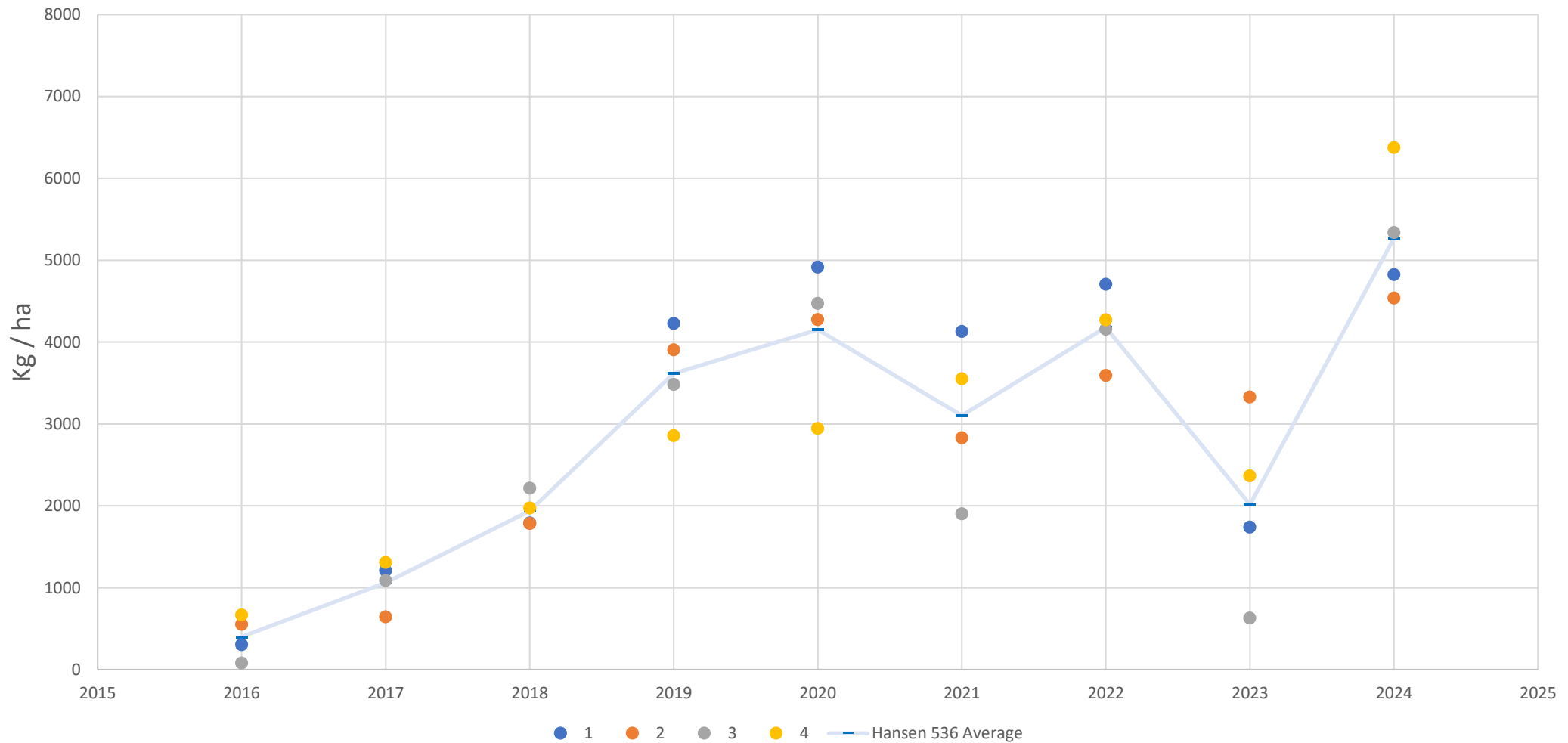
# What makes the difference?



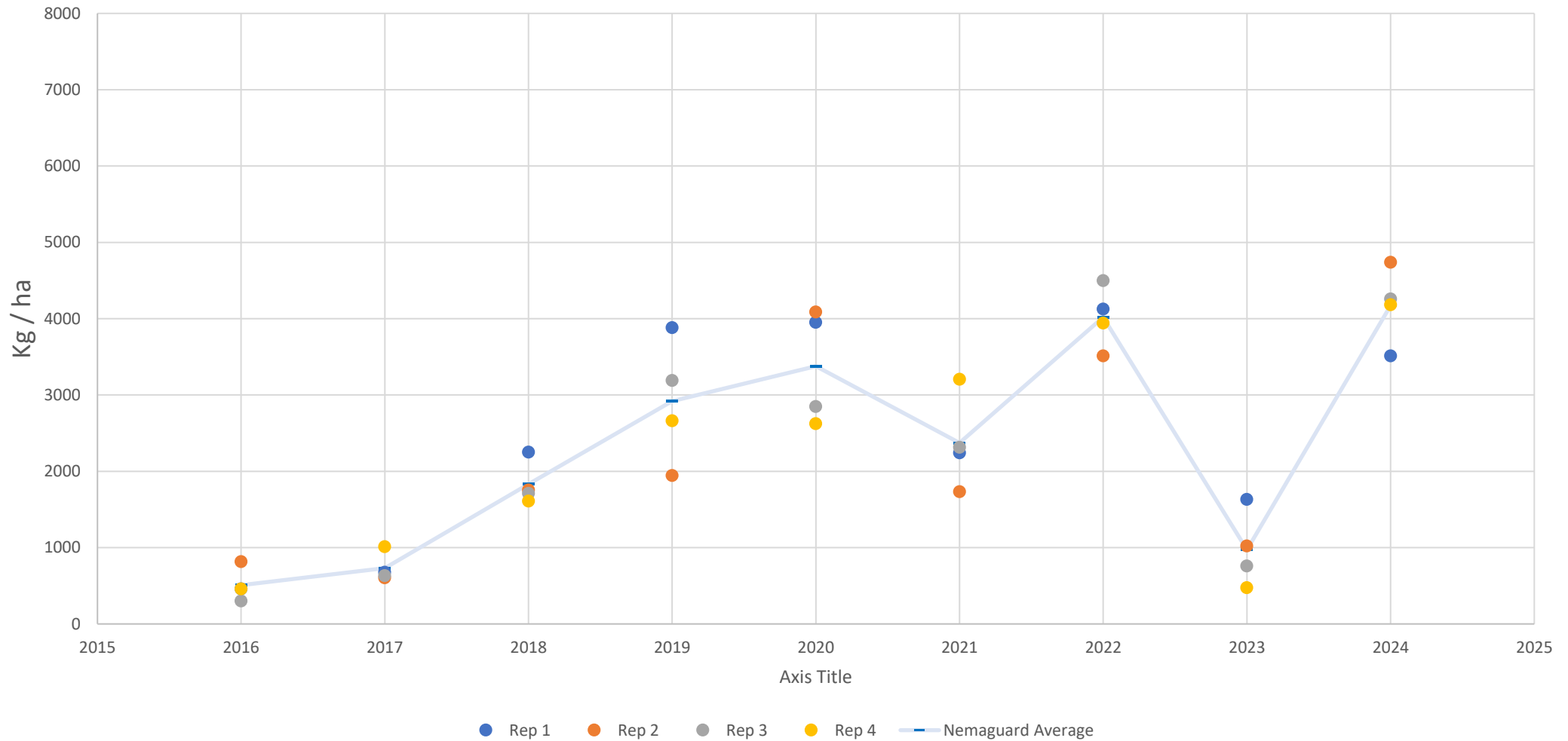
# GF749 annual yield data



# Hansen 536 annual yield data

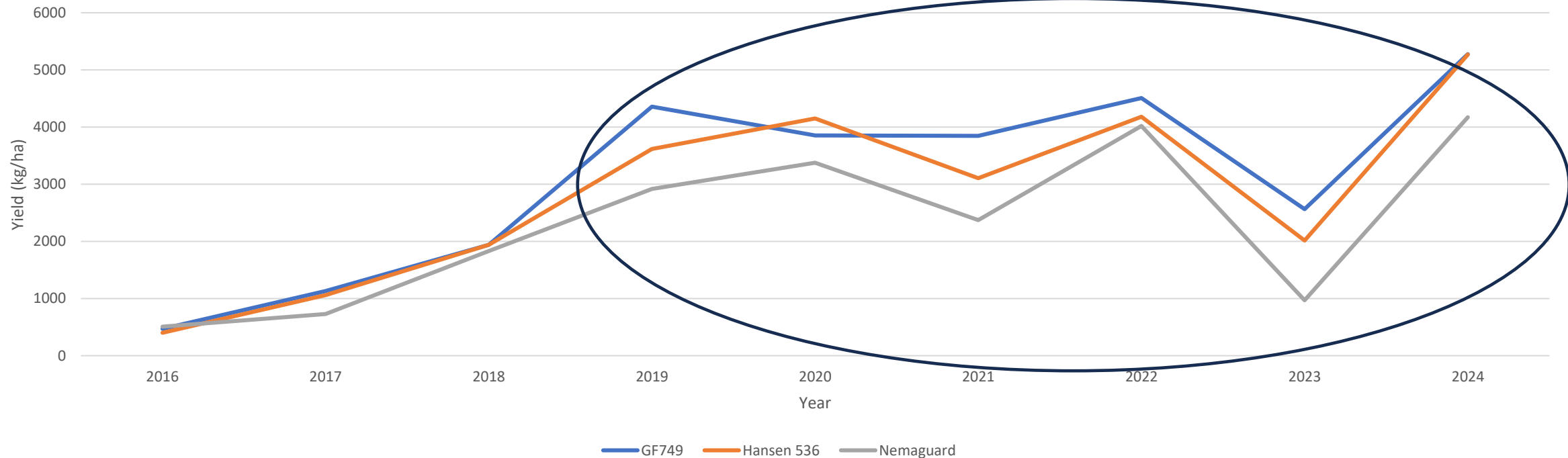


# Nemaguard annual yield data



# Consistency within mature production is the difference

Comparison of average annual yield - GF749, Hansen 536 and Nemaguard



# Looking at it closer

	Average Crop by year (Kg / ha)	Average Variability (Kg / ha)	Weighted Average Variability % (Av crop / Av Variability*100)	Uniformity of Replicates (Average Biannual Bearing Index)
<b>GF749</b>	3,105	1,626	52.39	0.26
<b>Felinem</b>	3,044	1,584	52.03	0.33
<b>Monegro</b>	2,975	1,548	52.03	0.29
<b>Garnem</b>	<b>2,863</b>	<b>1,315</b>	<b>45.94</b>	0.32
<b>Hansen 536</b>	2,860	1,434	50.13	0.29
<b>Brights Hybrid</b>	2,819	2,112	74.92	0.31
<b>GF677</b>	2,727	1,447	53.04	0.32
<b>Spare (Nemaguard)</b>	2,671	1,730	64.77	0.36
<b>Cornerstone*</b>	2,598	1,819	70.03	0.39
<b>GF557</b>	2,582	1,346	52.14	0.37
<b>Adafuel</b>	2,556	1,728	67.58	0.32
<b>Nemaguard</b>	<b>2,322</b>	<b>1,090</b>	<b>46.94</b>	0.34
<b>Krymsk 86</b>	1,935	1,122	58.00	0.33

# Biannual Bearing Index

$$BBI = \sum_{i=2}^n \left[ \frac{|y_i - y_{i-1}| / (y_i + y_{i-1})}{(n-1)} \right]$$

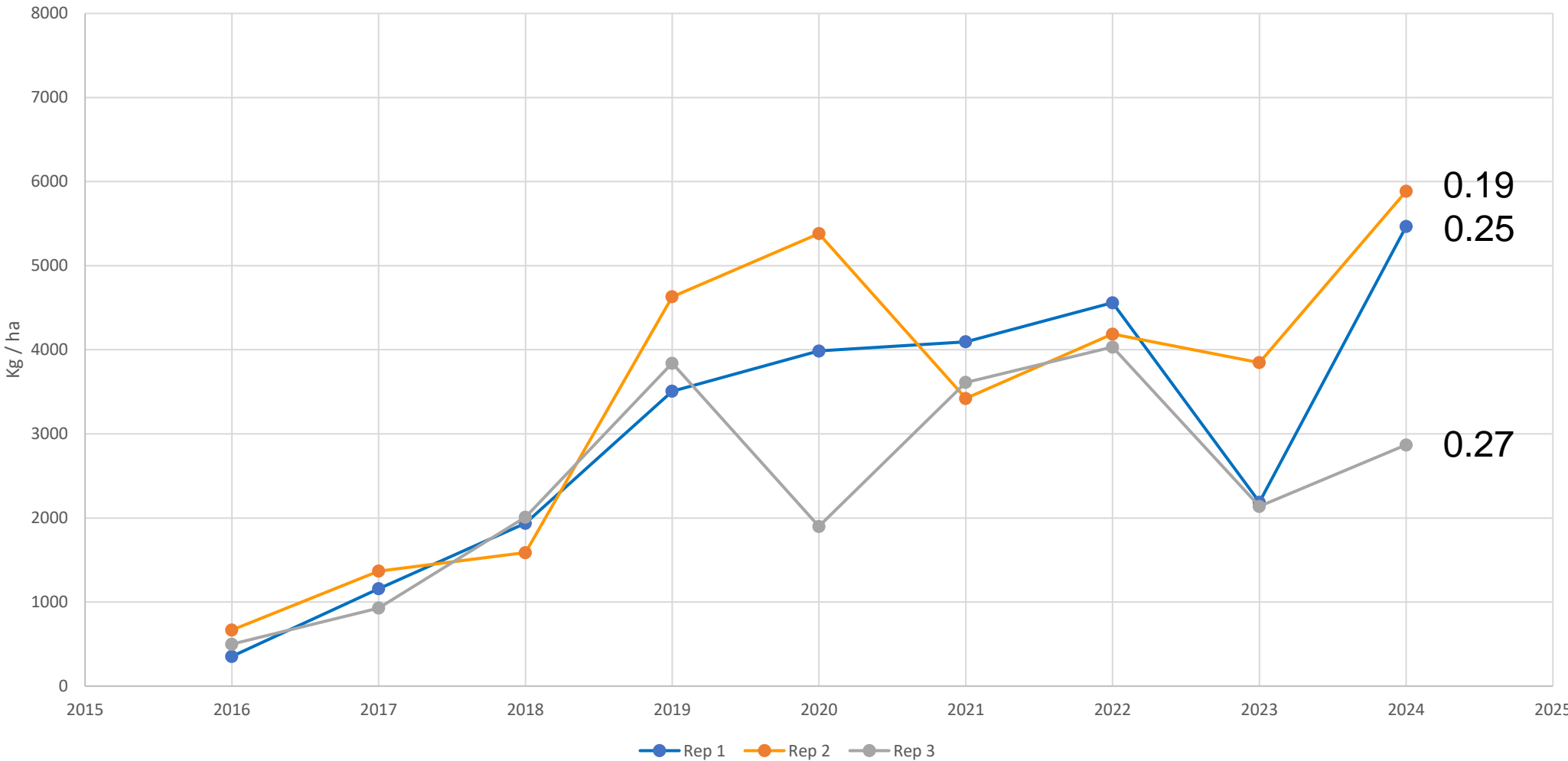
It uses the fluctuations of all yield differences over the time data has been collected to provide a number lower than 1.

**The closer the value is to 1, the more biannual bearing and the more fluctuations of yield**

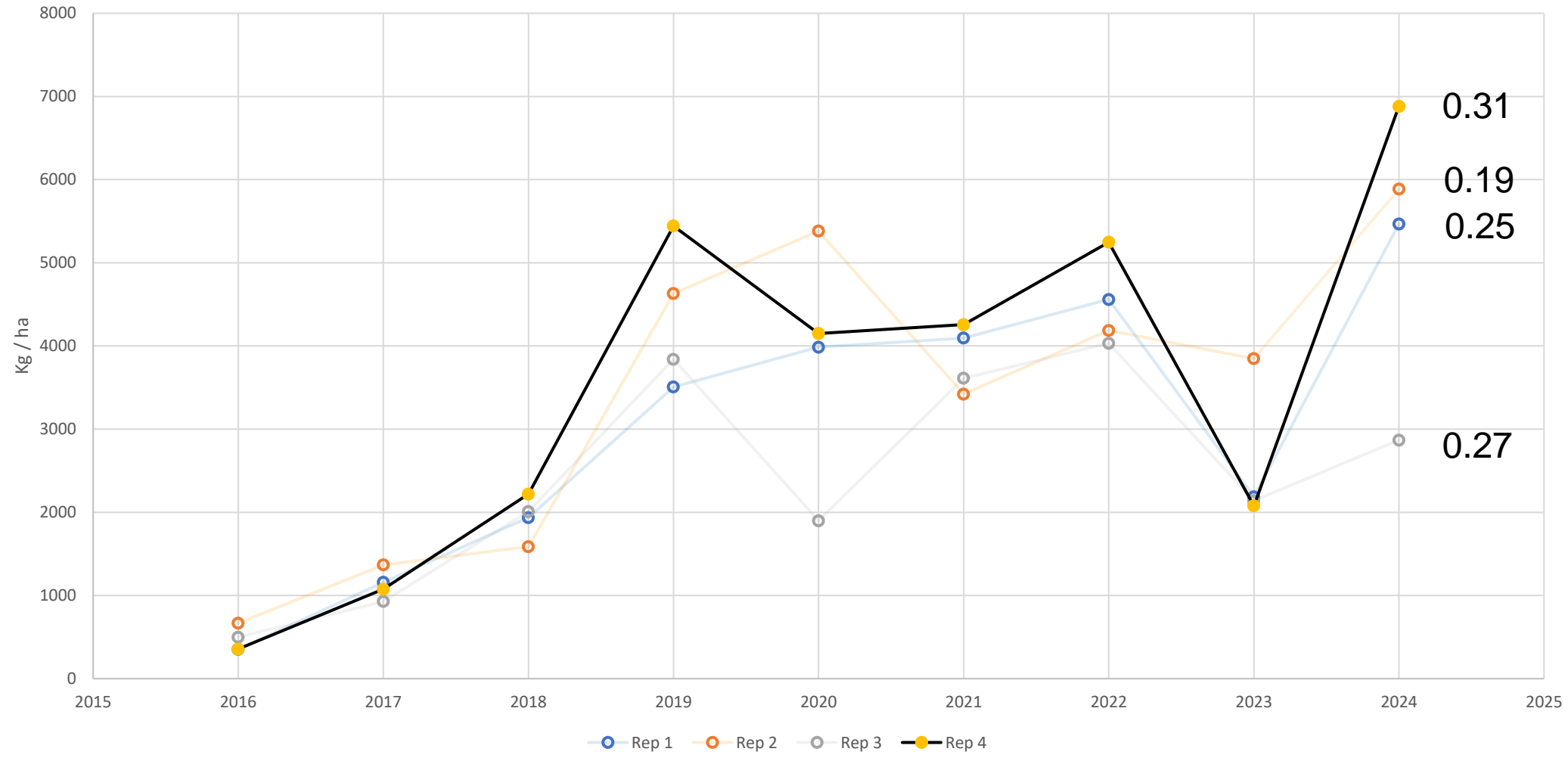
# Is it between replicates or rootstock?

	Average Crop by year (Kg / ha)	Average Variability (Kg / ha)	Weighted Average Variability % (Av crop / Av Variability*100)	Uniformity of Replicates (Average Biannual Bearing Index)
<b>GF749</b>	3,105	1,626	52.39	0.26
<b>Felinem</b>	3,044	1,584	52.03	0.33
<b>Monegro</b>	2,975	1,548	52.03	0.29
<b>Garnem</b>	2,863	1,315	45.94	0.32
<b>Hansen 536</b>	2,860	1,434	50.13	0.29
<b>Brights Hybrid</b>	2,819	2,112	74.92	0.31
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# GF749 annual yield data



# GF749 annual yield data



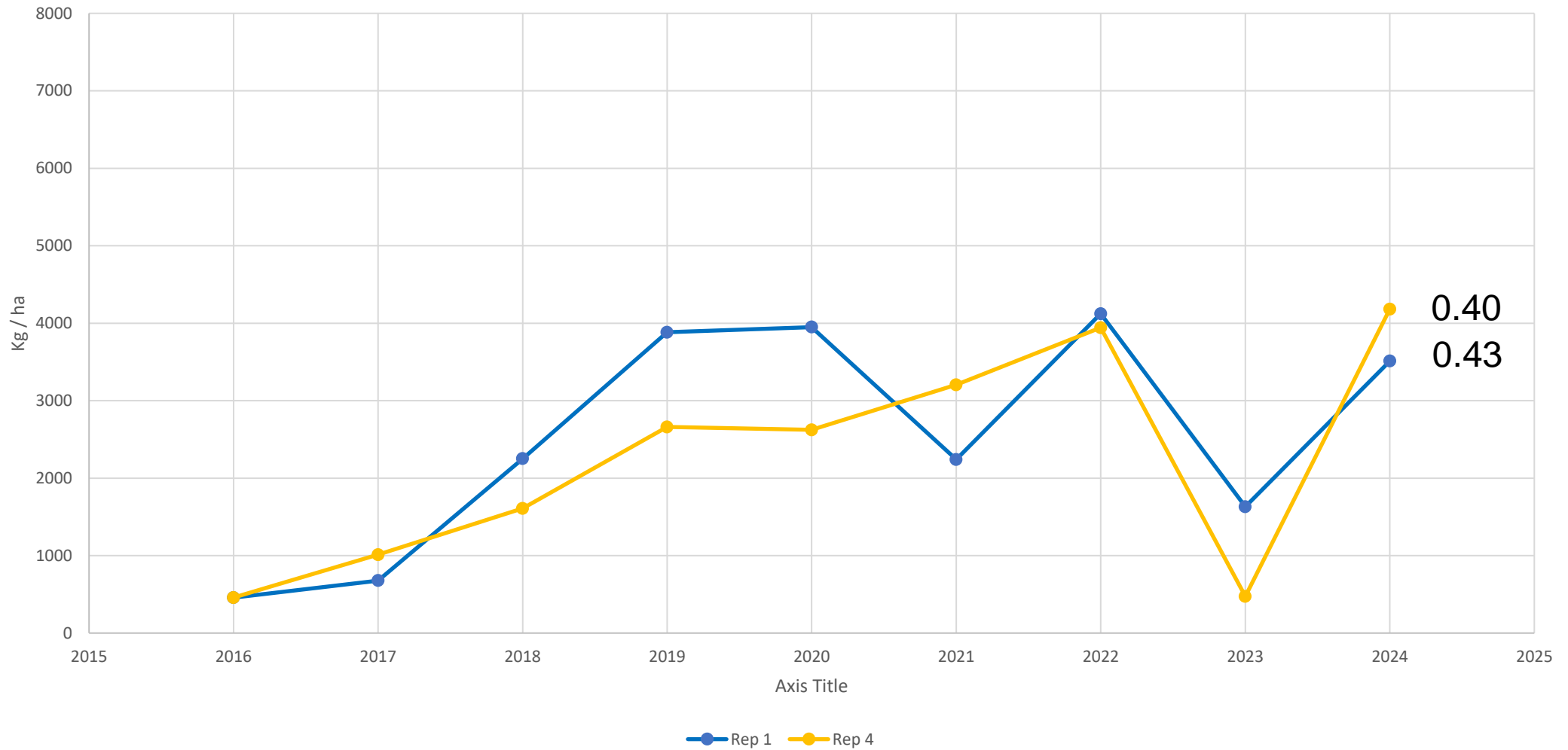
0.31

0.19

0.25

0.27

# Nemaguard annual yield data



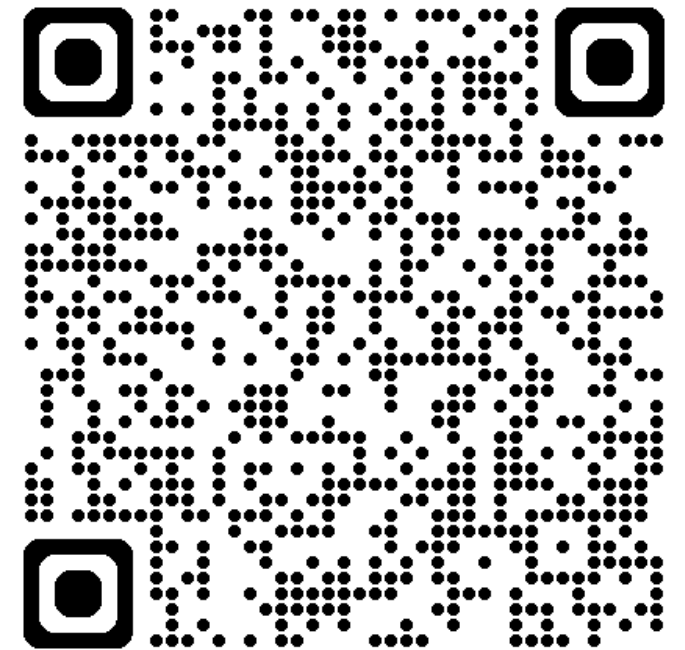


# **How can we use rootstocks to eliminate the variability?**

**An average variation of 1.5T/ha is a lot!**

# Understand your site, it's challenges and select accordingly

Rootstock	Parentage	Pathogen Resistance								Soil Adaption		Effects on the Variety		
		Root knot Nematode <small>Variation in resistance / susceptibility of species and isolates when tested in Australia<sup>1</sup></small>			Lesion Nematode	Ring Nematode/ Bacterial Canker	Crown Gall	Armillaria	Phytophthora	Salt exclusion <sup>1</sup>	Chlorosis	Compatibility	Vigour	Propagation by Cuttings
		<i>M.javanica</i>	<i>M.arenaria</i>	<i>M.incognita</i>										
Hansen 536	Peach x Almond	Resistant <sup>1</sup>	Resistant <sup>1</sup>	Resistant <sup>1</sup>	More Tolerant than Nemaguard	Susceptible	Susceptible	Susceptible	Susceptible	Resistant <sup>1</sup> / Excluder	Tolerant	Good	High	Poor
Nickels	Peach x Almond	Susceptible <sup>1</sup>	Tolerant <sup>1</sup>	Susceptible <sup>1</sup>	More Tolerant than Nemaguard	Susceptible	Susceptible	Susceptible	Susceptible	Moderate <sup>1</sup>	Tolerant	Good	High	Poor
Krymsk (Kuban) 86	Peach x Plum	Susceptible <sup>1</sup>	Tolerant <sup>1</sup>	Tolerant <sup>1</sup>	Medium	Susceptible	Medium	High	Tolerant	Sensitive <sup>1</sup>	Medium	Good	Medium	Good
Atlas	Peach x Almond x Apricot x Plum	Susceptible <sup>1</sup>	Resistant <sup>1</sup>	Resistant <sup>1</sup>	Medium	Susceptible	Medium	Susceptible	Medium	Sensitive <sup>1</sup>	Tolerant	Good	High	Poor
Viking	Peach x Almond x Apricot x Plum	Susceptible <sup>1</sup>	Resistant <sup>1</sup>	Resistant <sup>1</sup>	Medium	High	Medium	Susceptible	Medium	Moderate <sup>1</sup>	Tolerant	Good	High	Good
Rootpac 20		High <sup>1</sup>								Moderately tolerant <sup>1</sup>				
Rootpac 40		High <sup>1</sup>								Moderately tolerant <sup>1</sup>				
Rootpac R										Sensitive <sup>1</sup>				



<sup>1</sup>Walker, A.R., Smith, M.H., McDavid, D., Goonetilleke, S., Hassan, M., 2017. Resilience traits for almond rootstocks. Final report for IRSPR2-004. CSIRO Agriculture and Food, Urbrae, pp 61.

<sup>2</sup>Pinochet, J., Calvet, C., Hernández-Dorrego, A., Bonet, A., Felipe, A., and Moreno, M. 1999. Resistance of Peach and Plum Rootstocks from Spain, France, and Italy to Root-knot Nematode *Meloidogyne javanica*. HORTSCIENCE 34(7):1259–1262.

<sup>3</sup>Felipe, A.J., 2009. Felinem<sup>®</sup>, 'Garneim', and 'Monegro' Almond - Peach Hybrid Rootstocks. HORTSCIENCE 44(1):196–197.

# Thank-you



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