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# Managing Hull rot

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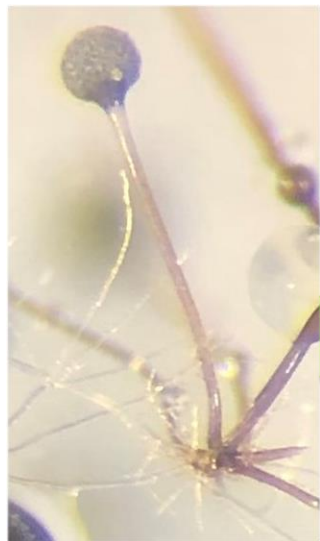
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# Hull rot is a host phenology-based disease

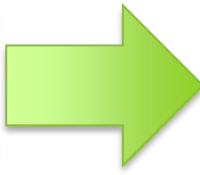
- Pathogen is always present in orchard
- Disease occurs on specific host tissue – just split fruit
- Disease occurs for a limited time – mid January to harvest



Fungus



Susceptible stage



Fungal expression



Toxin  
production



Spur dieback

# AL16005 Completed

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Season 1 / 2

**26** Orchards

**126** Blocks

**1077** Ha of orchard blocks

**9841** Ha of orchards surveyed

**Disease survey**

2018-2020



Shot hole 74% / 45%



Lower limb dieback 63% / 74%



Hull rot (NP)  
69% / 69%



Trunk disease 26% / 27%



Anthracnose  
0.4% / 0.3%



Rust  
2% / 2%



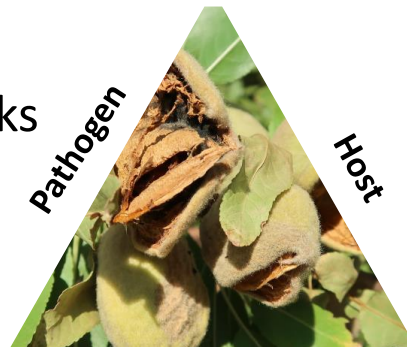
Scab <0.1%



Bacterial spot  
1% / 8%



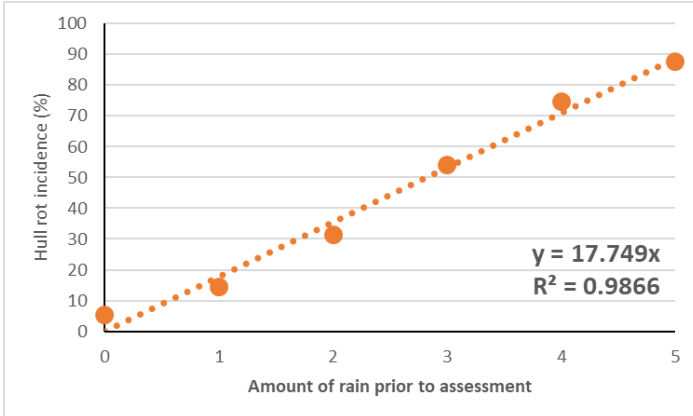
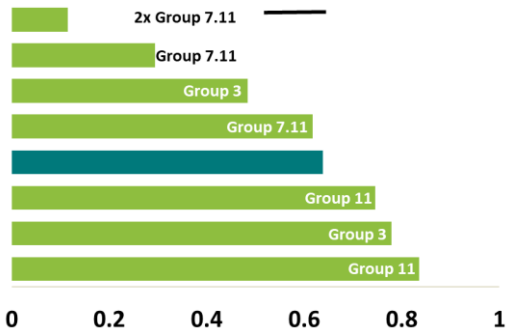
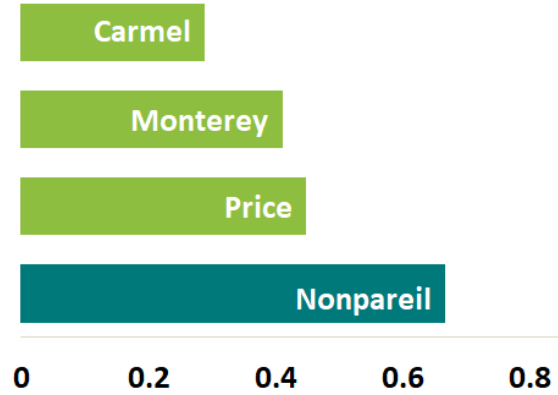
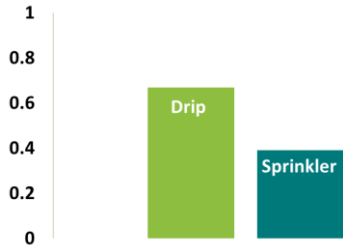
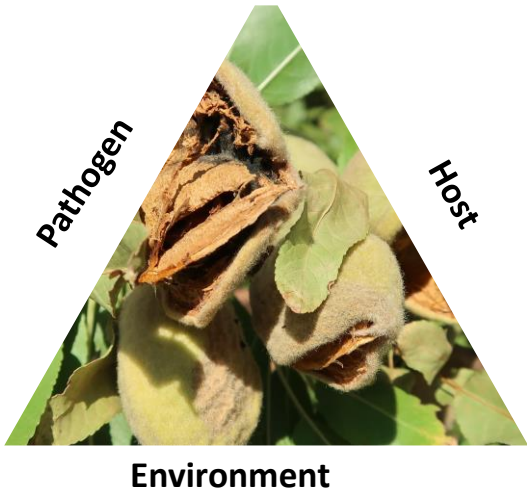
Blossom blight <0.1%



Environment

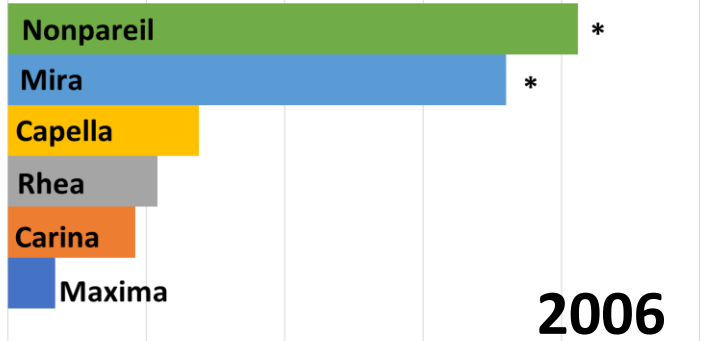


# Hull rot associations from disease survey



Hull rot on Split trees only, all varieties

# Australian cultivars have less Hull rot

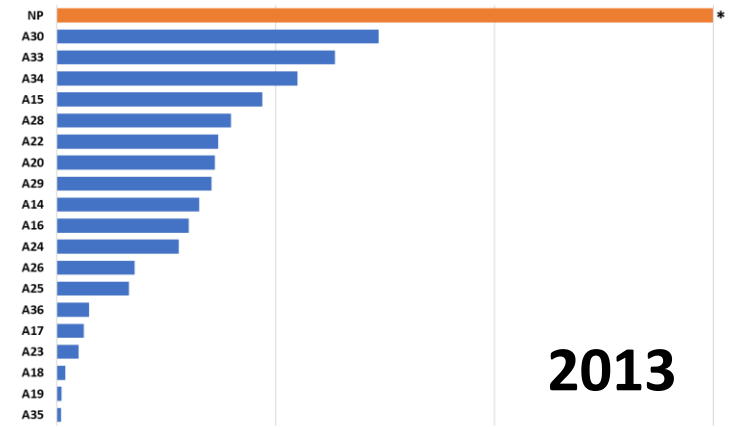


2006

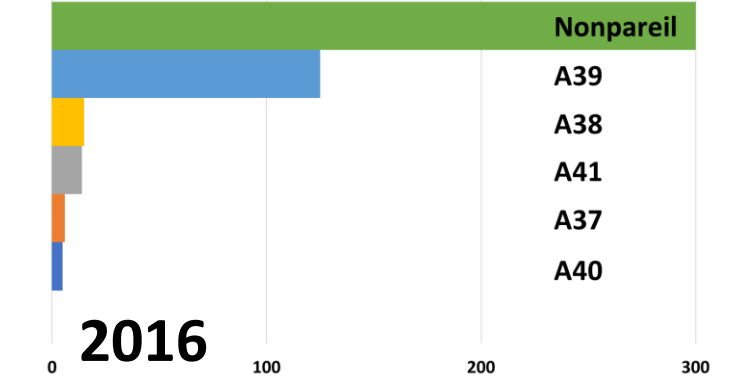


GF677

2010

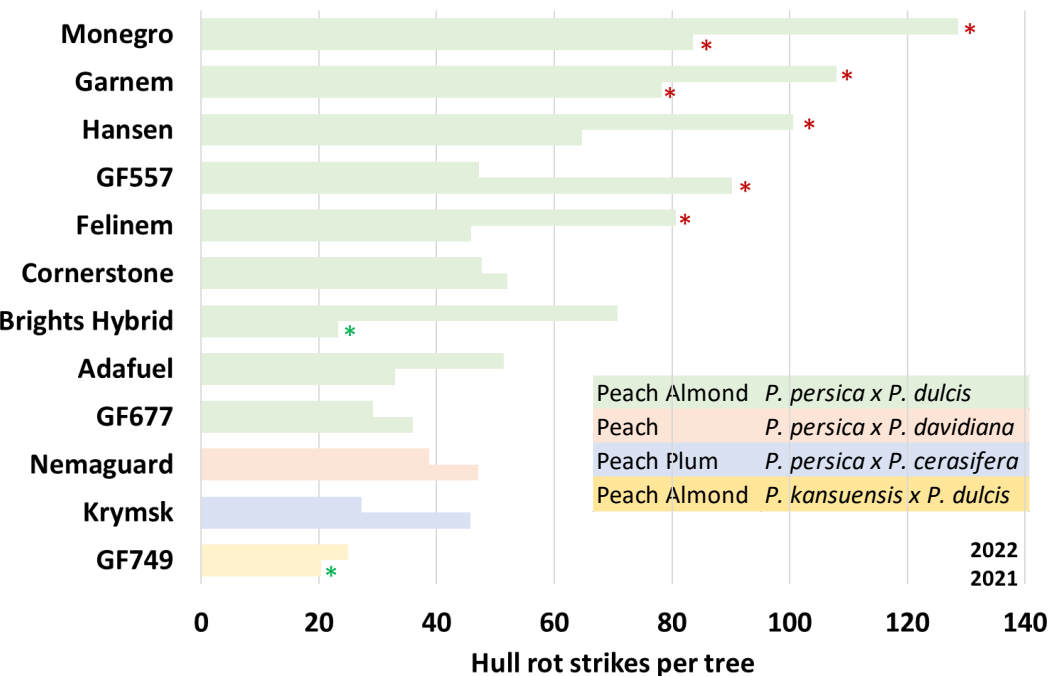


2013

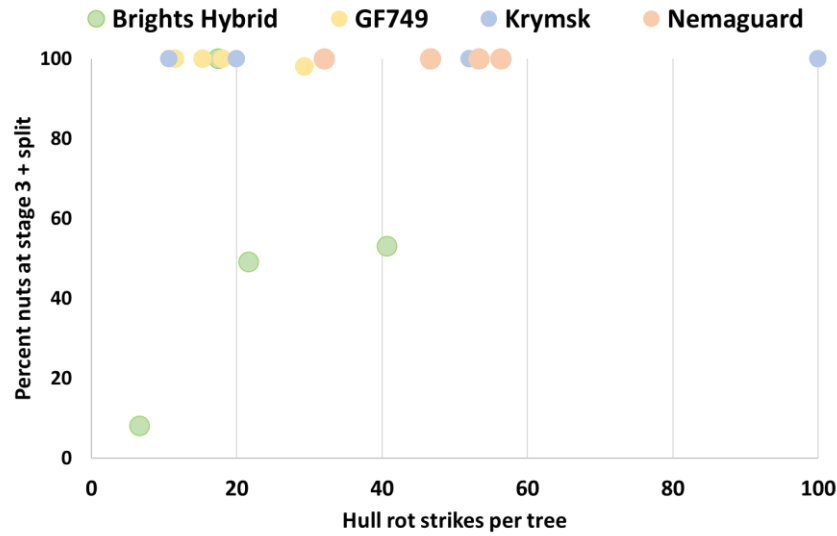


2016

# Peach almond rootstocks have more Hull rot



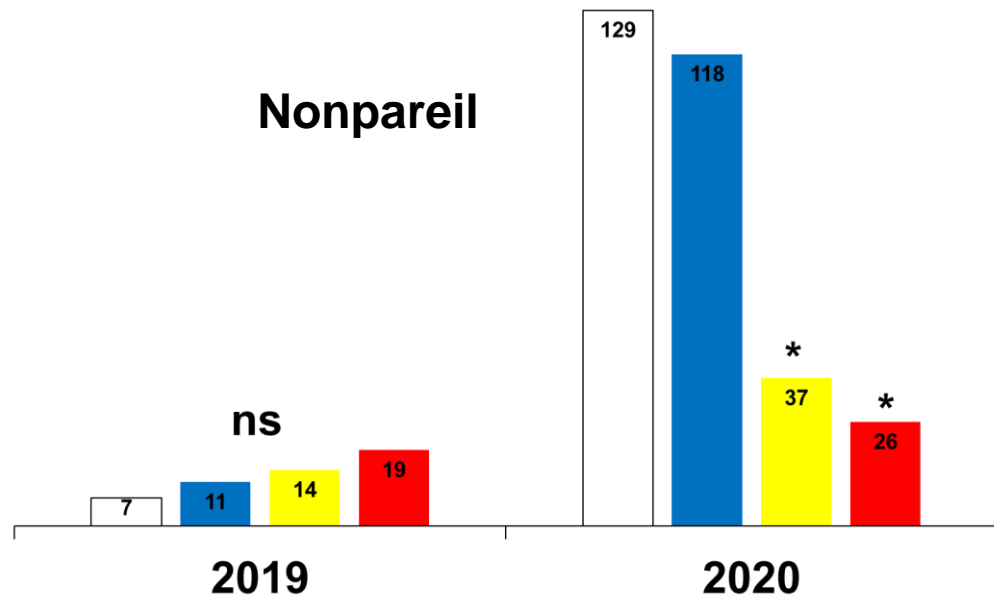
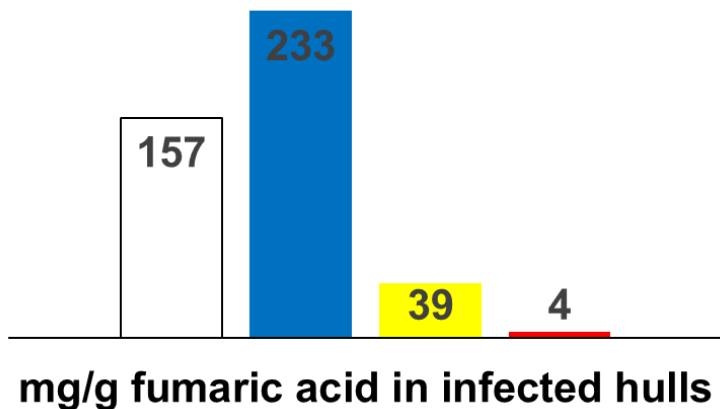
\*worse than Nemaguard  
\*better than Nemaguard



- **Brights hybrid** fruit escaped infection as fruit was not split when 8.6 mm of rain fell on Australia day
- **GF749** was fully split so another mechanism for hull rot resistance must be involved.

# Restricted irrigation reduced hull rot strikes due to reduced toxin production

kg N/ha	ML water/ha	
	10.5	15
179	- W - N	+ W - N
320	- W + N	+ W + N

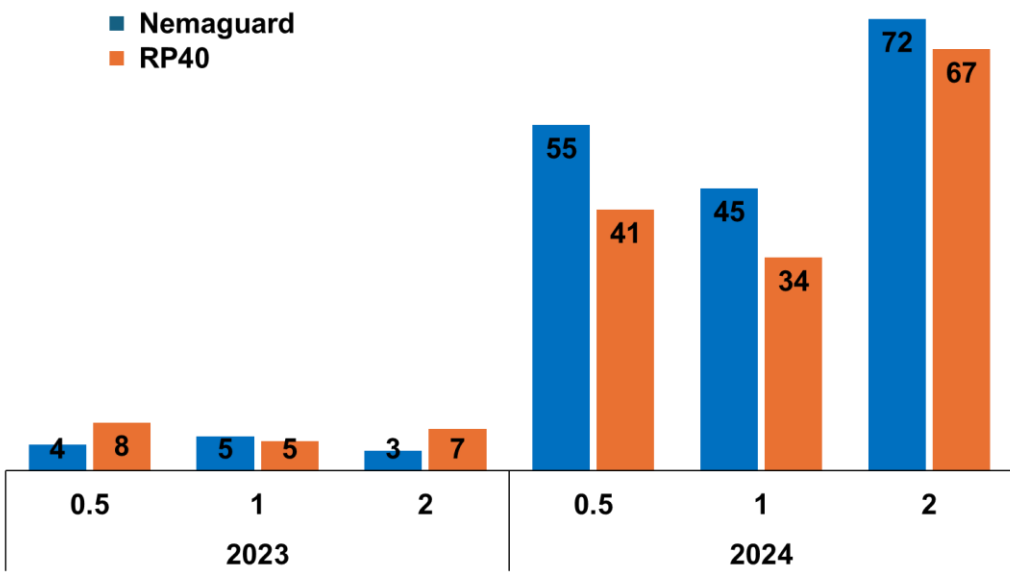


- Restricted irrigation reduced hull rot strikes
- Restricted irrigation reduced fungal toxin in infected nuts
- No clear relationship between hull rot and nitrogen

# Sustained reduced nitrogen does not reduce Hull rot

Rootstock	kg N/ha/season		
	0.5	1	2
Nemaguard	126	308	729
RP40	112	280	672

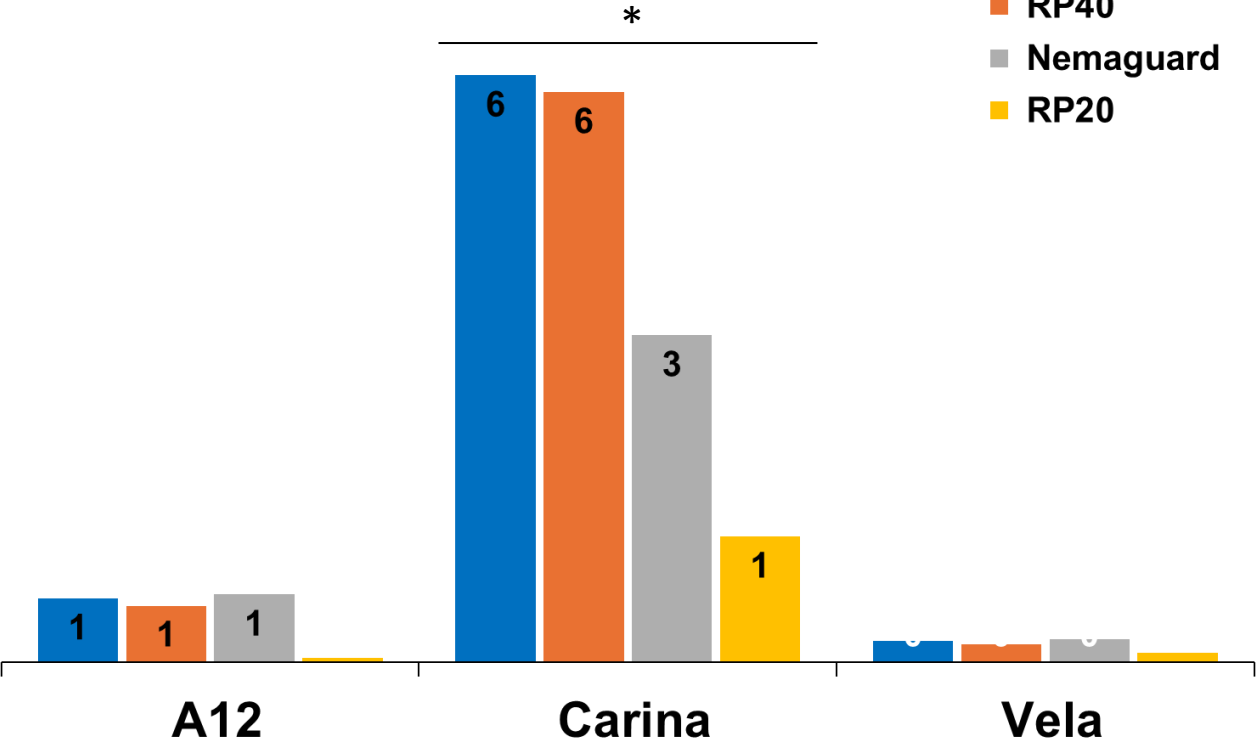
## Nonpareil



- More hull rot strikes in 2024 than 2023 due to conducive weather conditions
- 2x nitrogen resulted in higher hull rot

# Canopy density - rootstock x scion effect

- Garnem
- RP40
- Nemaguard
- RP20



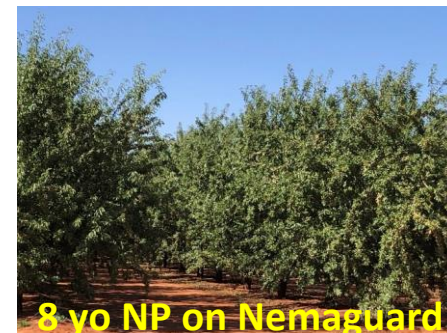
- A12 ✓
- Carina ✓
- Vela
- Nemaguard
- Garnem ✓
- RP40 ✓
- RP20
- 4 m = 500 trees/ha
- 2 m = 1000 trees/ha
- 1 m = 2000 trees/ha

# Managing Hull rot

Product name	Active ingredient	Hull rot	
		2021	2022
Custodia	200 g/L tebuconazole + 120 g/L azoxystrobin	32	45
Luna Sensation	250 g/L fluopyram + 250 g/L trifloxystrobin	30	44
Dipotassium phosphate	Dipotassium phosphate (food grade)	39*	nt
Luna Sensation + dipotassium phosphate diKaP	250 g/L fluopyram + 250 g/L trifloxystrobin + dipotassium phosphate (P <sub>2</sub> O <sub>5</sub> ) 31%, (K <sub>2</sub> O) 50%	33 nt	nt 35
<b>p value</b>		<b>0.05</b>	<b>ns</b>
<b>Isd</b>		<b>5.4</b>	



17 yo NP on Nemaguard



8 yo NP on Nemaguard



# Hierarchy of disease management

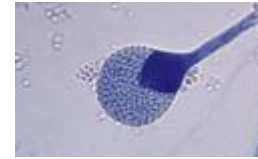
## Weather

- Uncontrollable
- Increasingly getting storms in almond growing regions



## Pathogen inoculum

- Partially controllable
- Fungicides

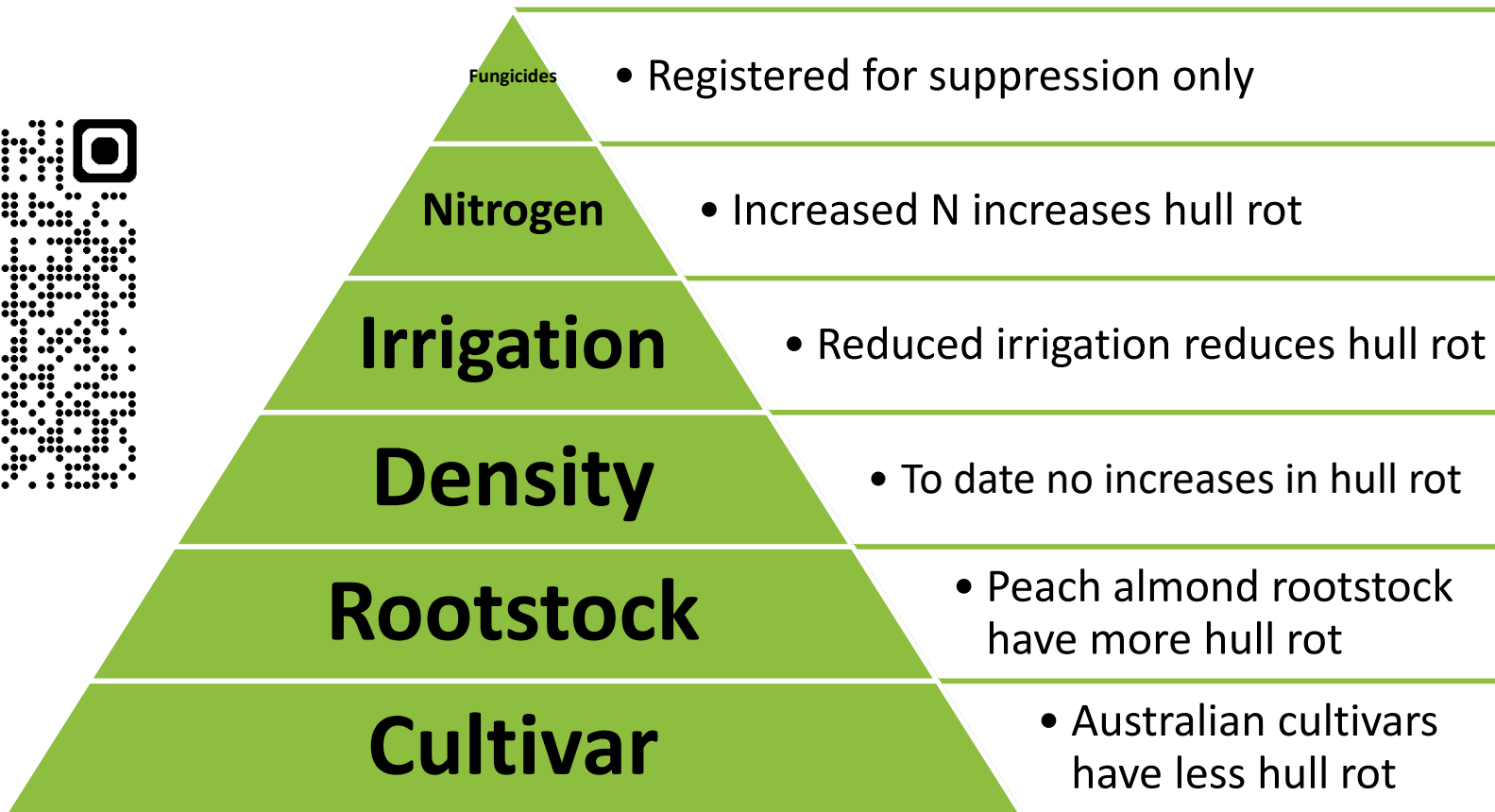
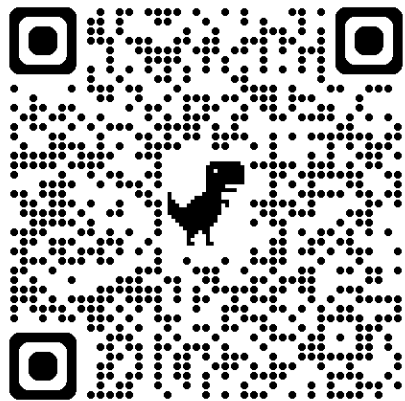


## Plant health

- Controllable
- Water and nutrient stress



# Summary



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**Hort  
Innovation**  
Strategic levy investment

**ALMOND  
FUND**



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