

Dieback On Macadamia Trees In South Africa:

The causal agent and the most effective fungicides

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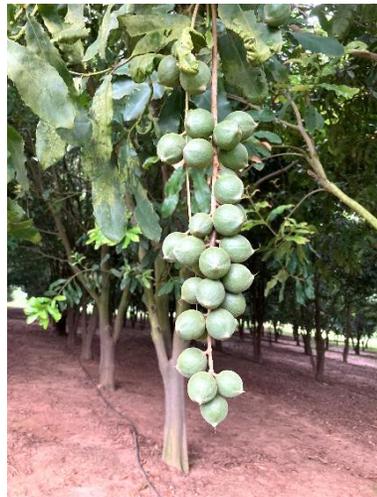
Agricultural Research Council (ARC), Pretoria, South Africa



South African Macadamia



- The world's largest producer of macadamia nuts.
- **72,652 ha**
- The 2023 crop of 77,532 tonnes was 12.6% higher than the 2022.





Objectives

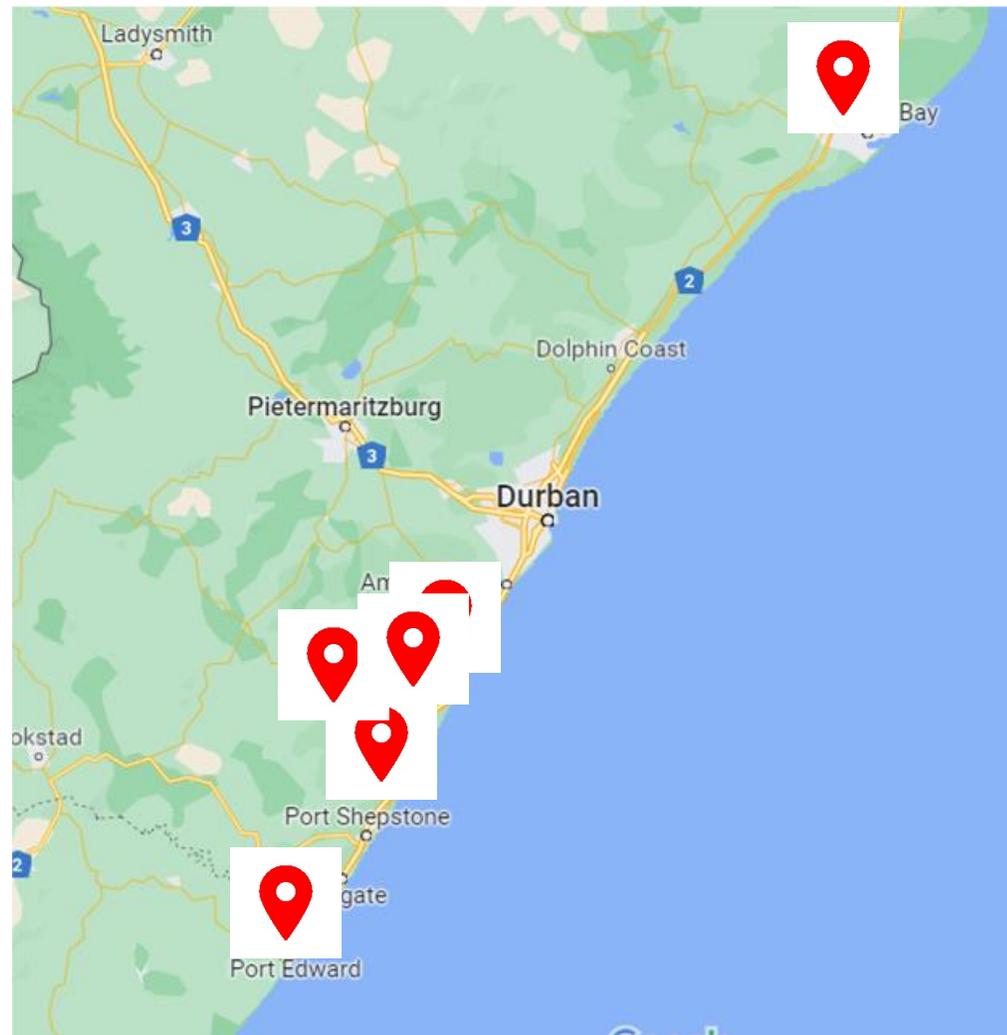
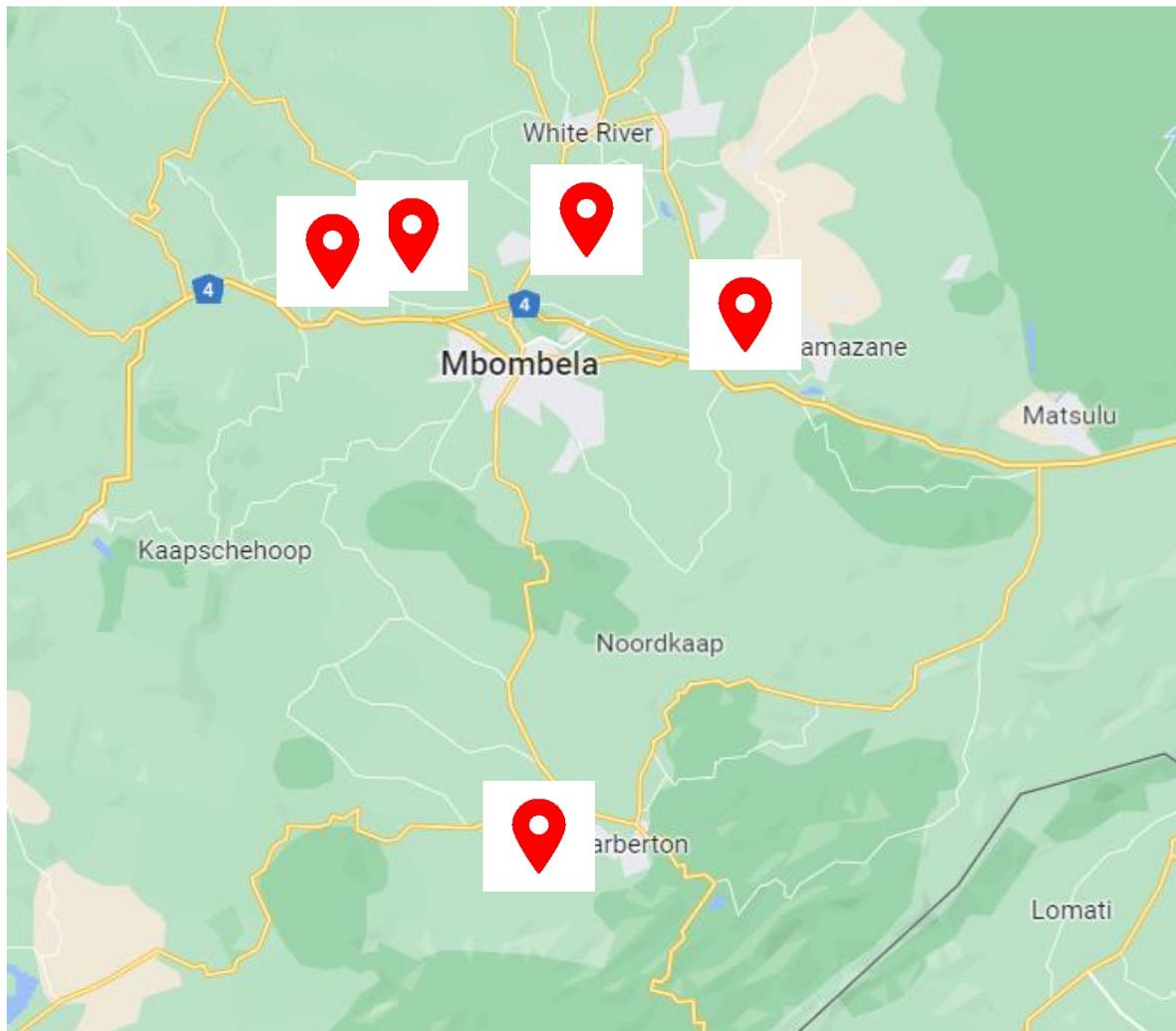
1. Determine the cause of dieback on macadamia trees in affected orchards.
1. Examine the virulence of the most common species & evaluate the tolerant and susceptibility of different varieties against the most virulence species.
1. Evaluate fungicides in preventing fungal causing dieback in macadamia trees.



Determine The Cause Of Dieback



Collecting Samples



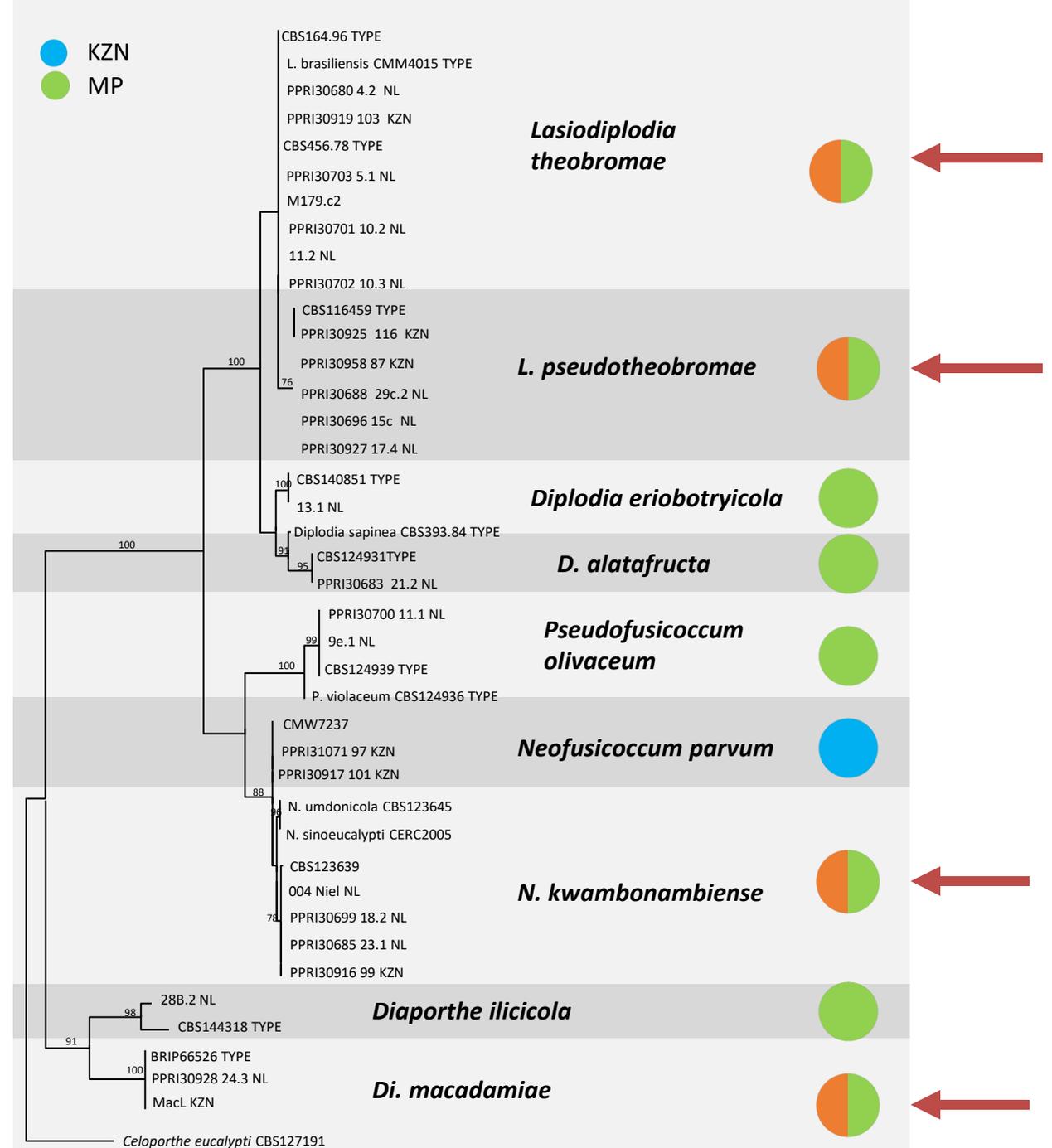




Nine species were identified:

- Seven *Botryosphaeriaceae* species
- Two *Diaporthaceae* species

Maximum Likelihood (ML) tree of the combined data set of ITS and *TEF1-α* loci sequences.

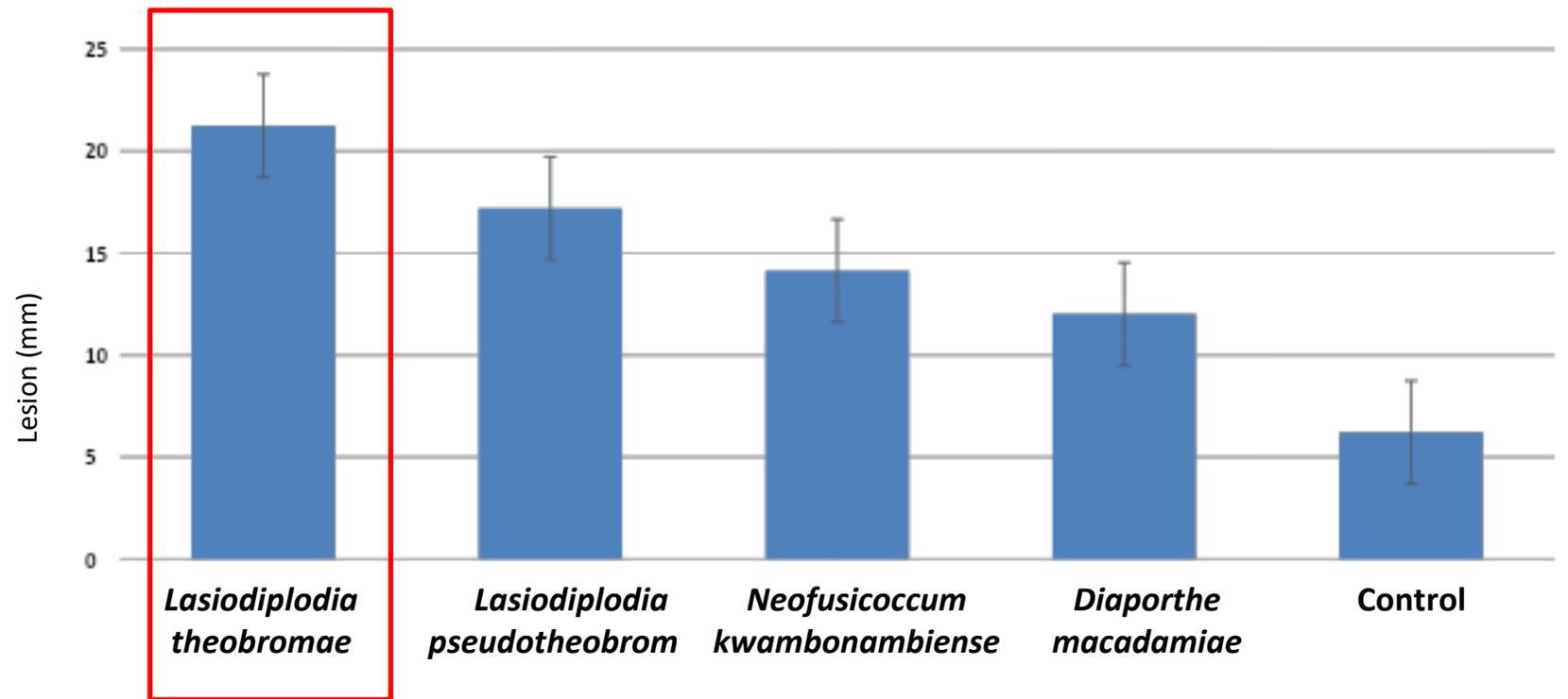


Evaluating the Virulence of Common Fungal Species & Tolerance of Macadamia Varieties





Virulence



Tolerant & susceptibility of different varieties



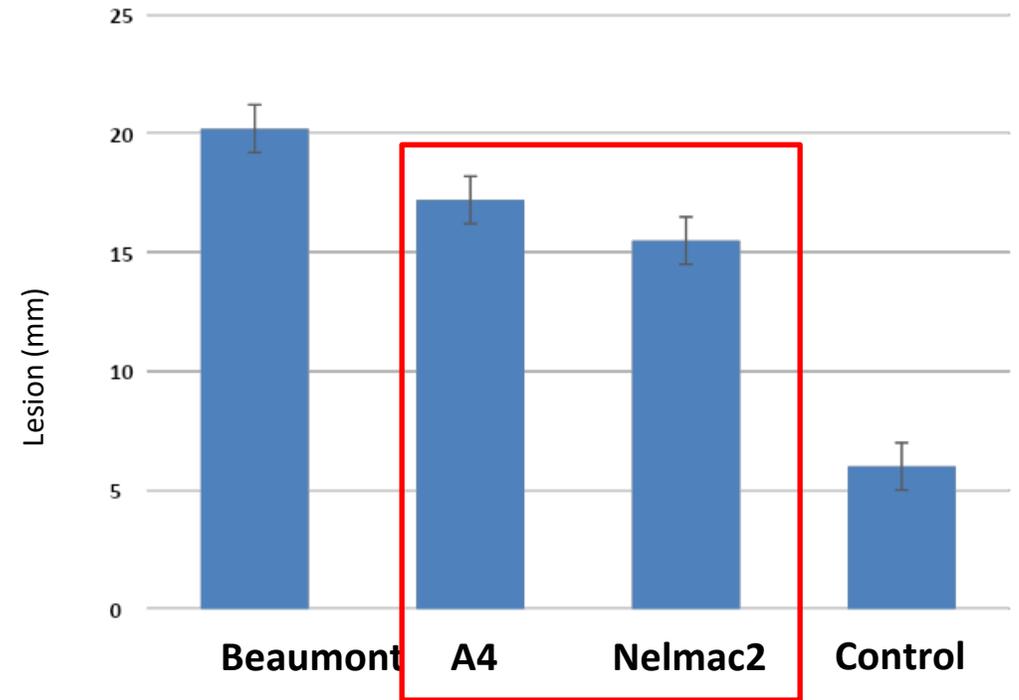
Beaumont



Nelmac2



Control



Evaluating Fungicides



In vitro

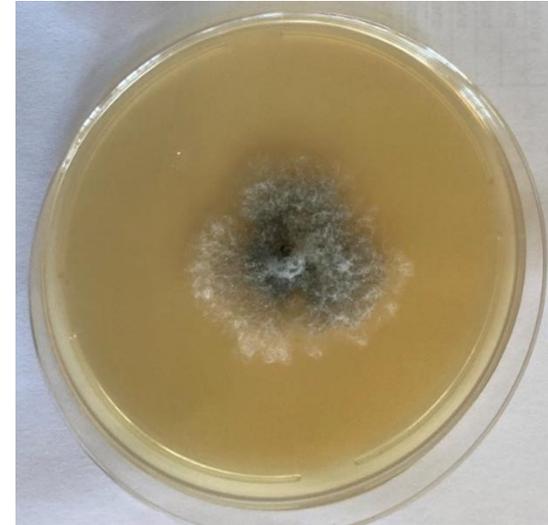
	Fungicides	Active ingredients	Mode of action	C1*	C2	C3	C4	Fungicide/Water**
1	Amistar Top	Azoxystrobin + Difenoconazole	G. sterol biosynthesis in membranes	250u	500	750	1000	0.5-1 ml/1 L
2	Artea	Propiconazole + Cyproconazole	G. sterol biosynthesis in membranes	1ml	2.5ml	5ml	7.5ml	1 ml/1L
3	Bravo 720	Chlorothalonil	M. Chemicals with multi-site activity	1ml	2.5ml	5ml	7.5ml	100 ml/100L
4	Miravis Duo	Adepidyn™ + Difenoconazole	C. respiration + G. sterol biosynthesis in membranes	1ml	2.5ml	5ml	7.5ml	100 ml/100L
5	Miravis Neo	Adepidyn™ + Azoxystrobin + Propiconazole	C. respiration + G. sterol biosynthesis in membranes	2.5ml	5ml	7.5ml	10ml	1000ml/200L
6	Ridomil Gold Flo	Mefenoxam + Chlorothalonil	A. nucleic acids metabolism + M. chemicals with	2.5ml	5ml	7.5ml	10ml	2000ml/500L
7	Score	Difenoconazole	G. sterol biosynthesis in membranes	500u	1000u	1500u	2000u	50ml/100L
8	Switch	Cyprodinil + Fludioxonil.	E. signal transduction + D. amino acids	2.5g	5g	10g	12.5g	1000g/200L
9	Tilt	Propiconazole	G. sterol biosynthesis in membranes	500u	1000u	1500u	2000u	50ml/100L
10	Bixafen	Bixafen	SDHI Group 7	2.5ml	5ml	7.5ml	10ml	1000ml/100L
11	Folicur	Tebuconazole	Systemic fungicide	800u	1200u	1600u	2000u	80ml/100L
12	Fox xpre	Bixafen + Prothioconazole	SDHI Group 7 & DMI Group 3	2.5ml	5ml	7.5ml	10ml	1000ml/100L
13	Luna Experience	Fluopyram + Tebuconazole	Systemic fungicide	100u	200u	300u	400u	35 mL/100 L
14	Luna Sensation	Fluopyram + Trifloxystrobin	Systemic fungicide	100u	200u	300u	400u	30 mL/100 L

14 Fungicides x 4 concentration x 10 isolates x 3 replication + 140 control = 1820

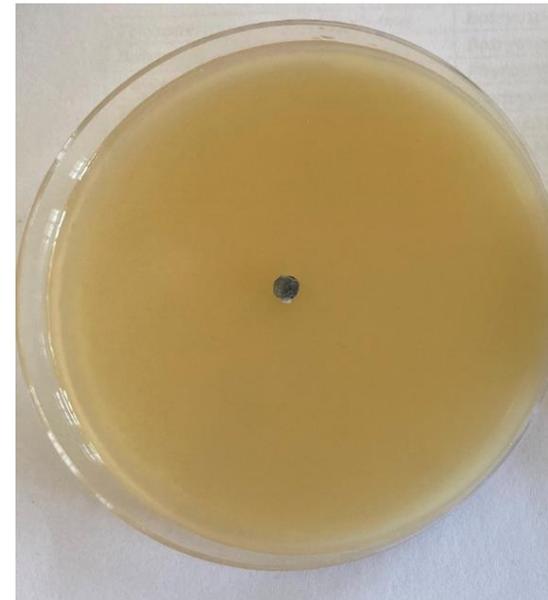
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Fungicide



No fungicide



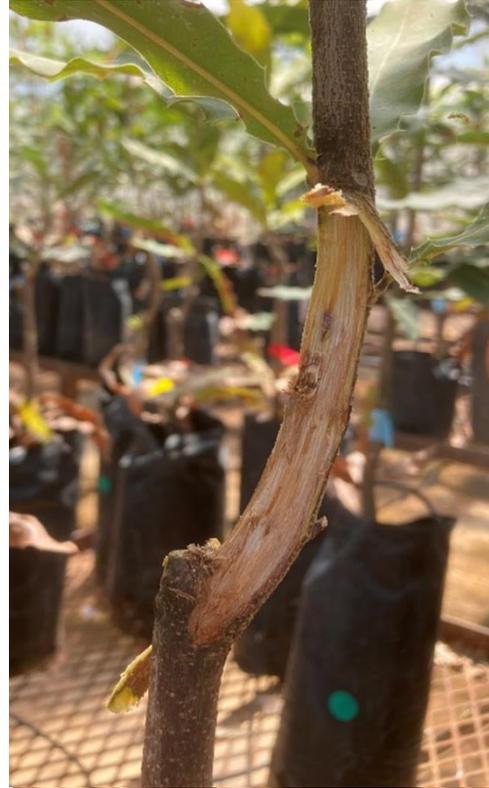
Greenhouse



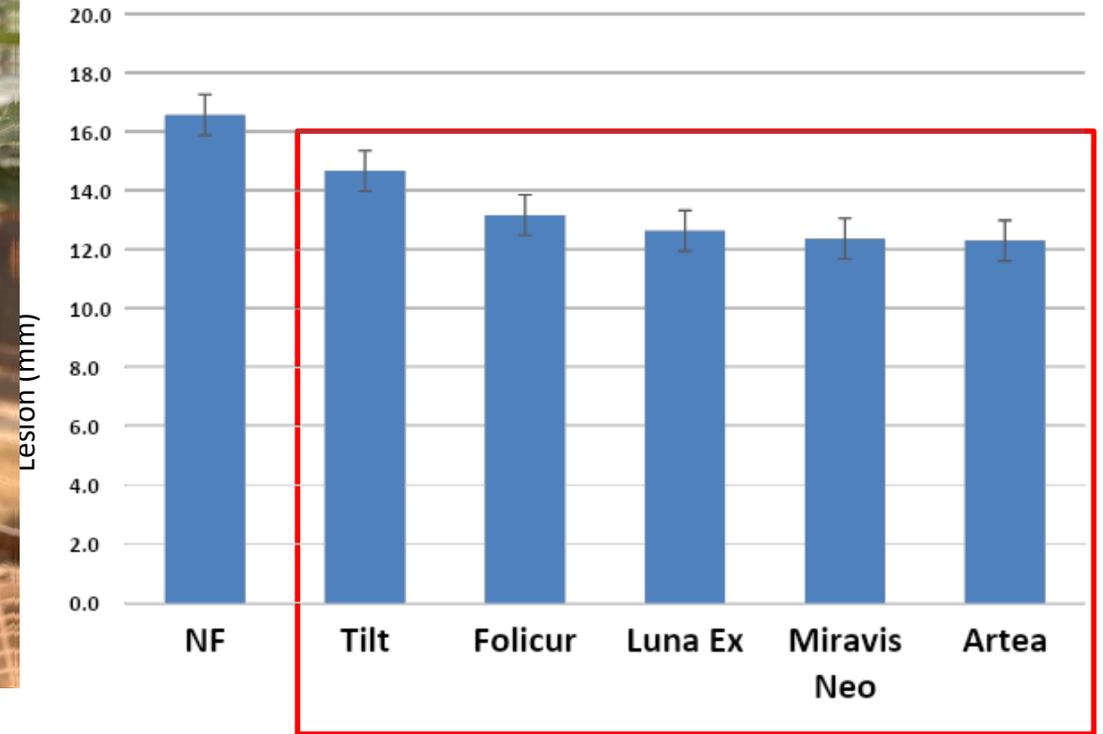
Tilt



Artea



No fungicide



Field (inoculation)





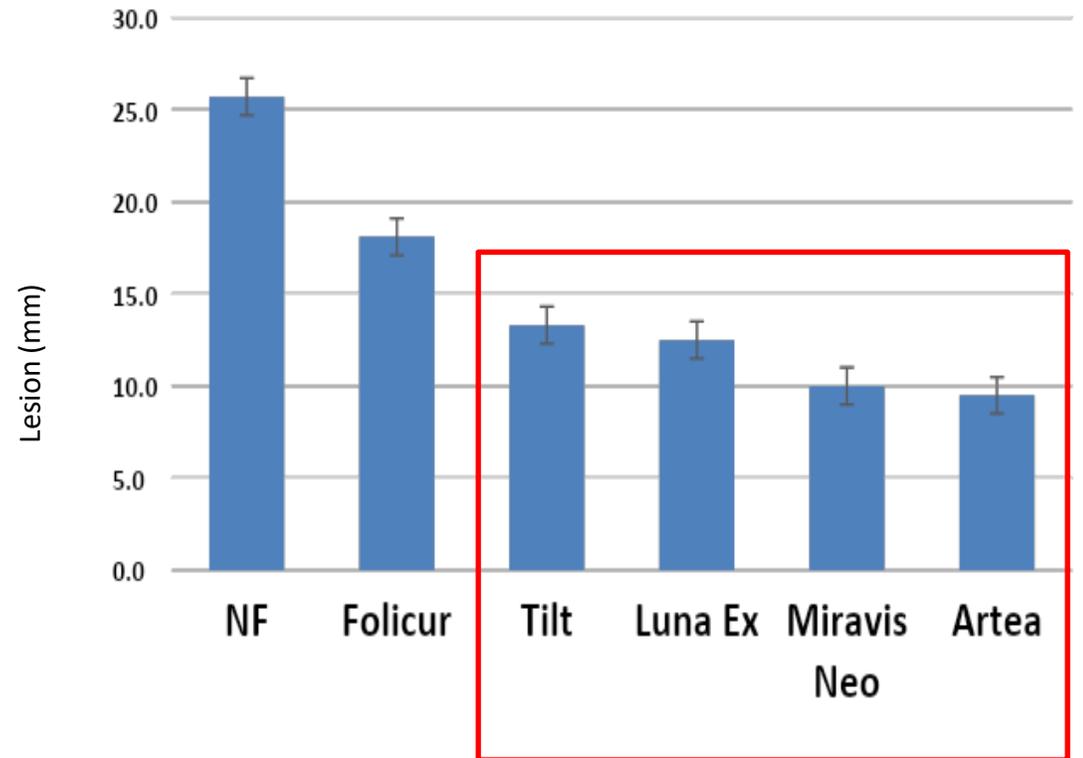
No fungicide



Tilt



Artea





Conclusions

- **Nine species (*Botryosphaeriaceae* & *Diaporthaceae*) as the cause of dieback.**
- **One species (*Lasiodiplodia thoebromae*) was the most virulent.**
- **In artificial inoculation:**
 - ✓ **Nelmac2 and A4 produced significantly shorter lesions compared to Beaumont.**
 - ✓ **Four fungicides (Artea, Miravis Neo, Luna Experience & Tilt) were significantly effective in lesion development.**



Conclusions

✦ Impact:

- ✓ **Crop Protection:** leading to increased crop yields and reduced economic losses due to disease.
- ✓ **Sustainability:** Effective fungicide use could contribute to the long-term sustainability of macadamia farming by mitigating the impact of disease outbreaks on crop health and productivity.

✦ Policy recommendations

- ✓ **Regulatory Support:** Streamlined regulatory processes for the approval and registration of fungicides.
- ✓ **Environmental Considerations:** Policies promoting the use of environmentally friendly and sustainable fungicides to minimize negative impacts on ecosystems and human health.



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Thank you!

