



Pasture dieback: Outcomes from 7 years of DAF research, development and extension across Queensland

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Australian Government



MEAT & LIVESTOCK AUSTRALIA



Queensland Government



Outline of presentation

1. Background
2. DAF activities
3. Management options





Acknowledgements

- DAF team
 - *'Ologists*
 - Pasture Agronomists, Biometrician
 - GIS/Mapping team
 - Beef Extension
 - Technical and farm staff
- Co-funding from Federal Govt and MLA
- Collaboration with other organisations



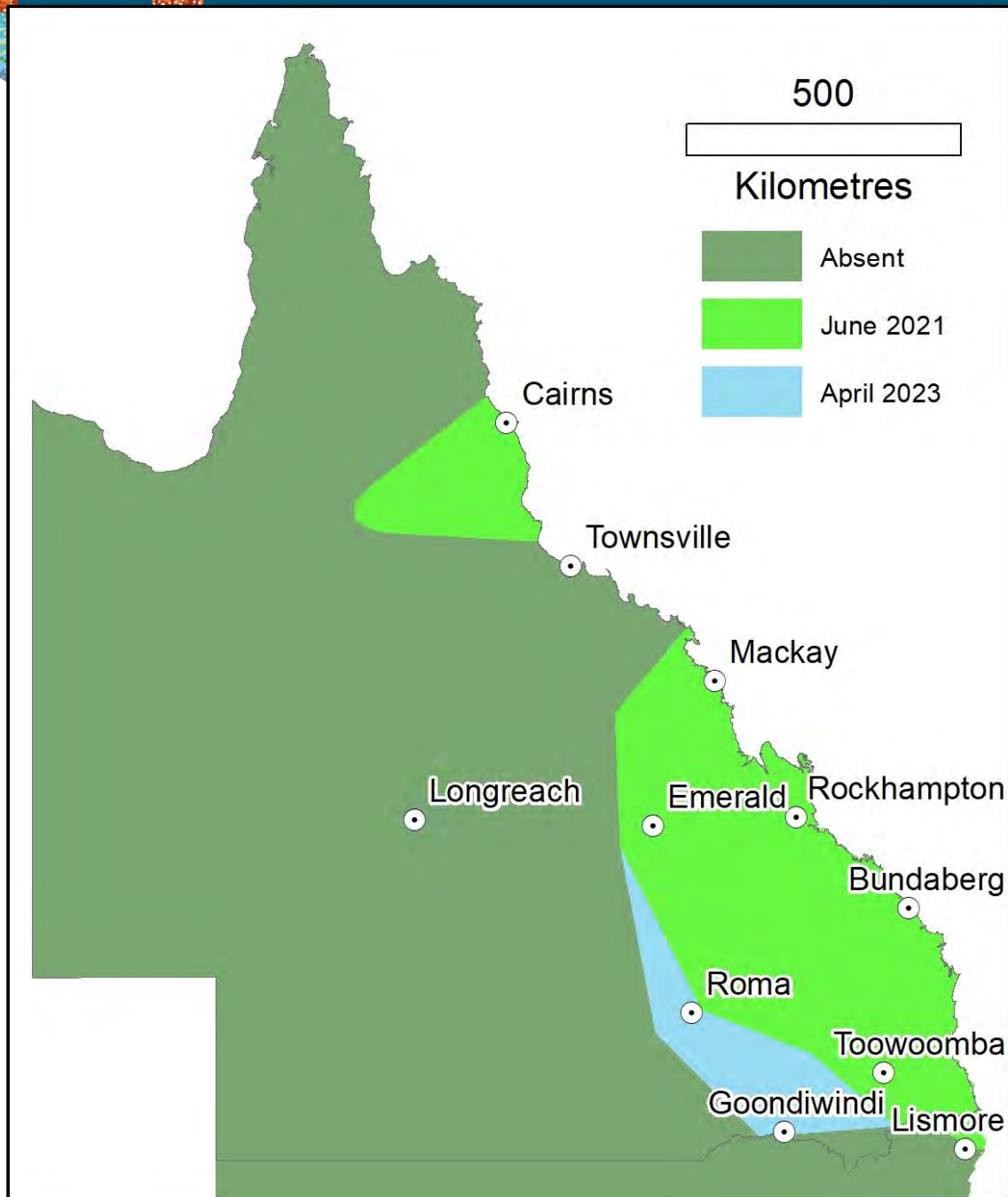




Death of tropical
grasses, typically in
patches

Sown grass sp.
Very few natives
Legumes unaffected





- Large commercial properties >10,000 ha through to smaller lifestyle blocks
- Up to 6,000 ha reported on one property



4 stages of symptoms





Rhodes grass, Boonah SEQ



March 2018



June 2019



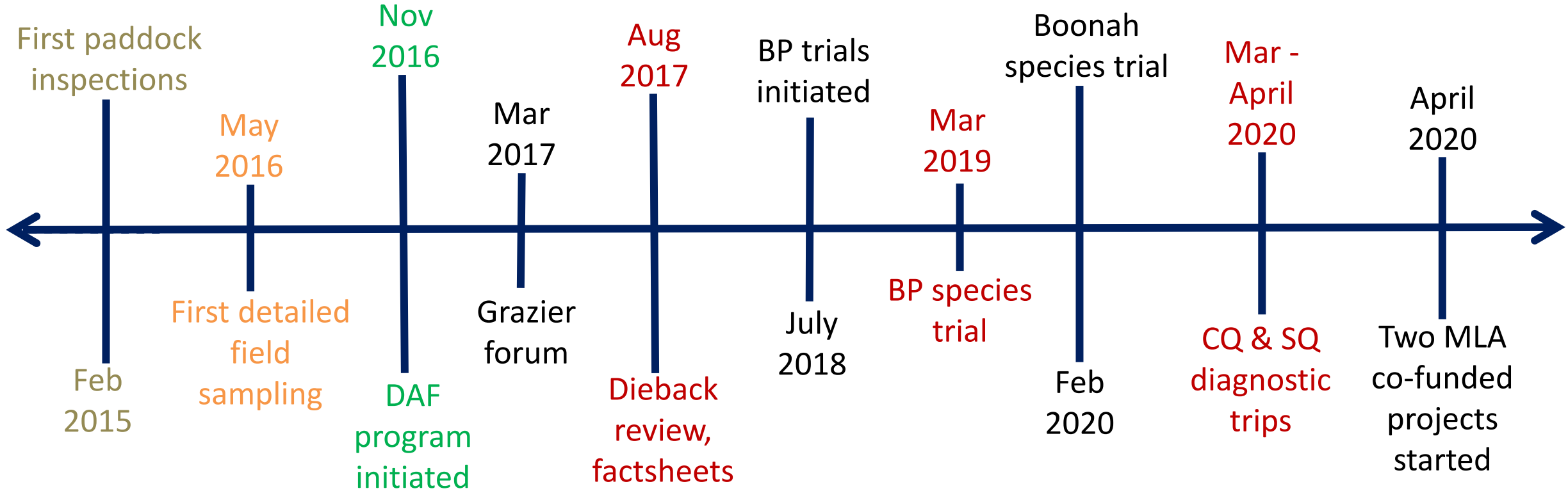
Grazing management impacts



A photograph of a field of tall, dense grasses. The grasses are a mix of green and brown, suggesting some are mature or dry. The text 'DAF Activities' is overlaid in the center in a bold, white, sans-serif font.

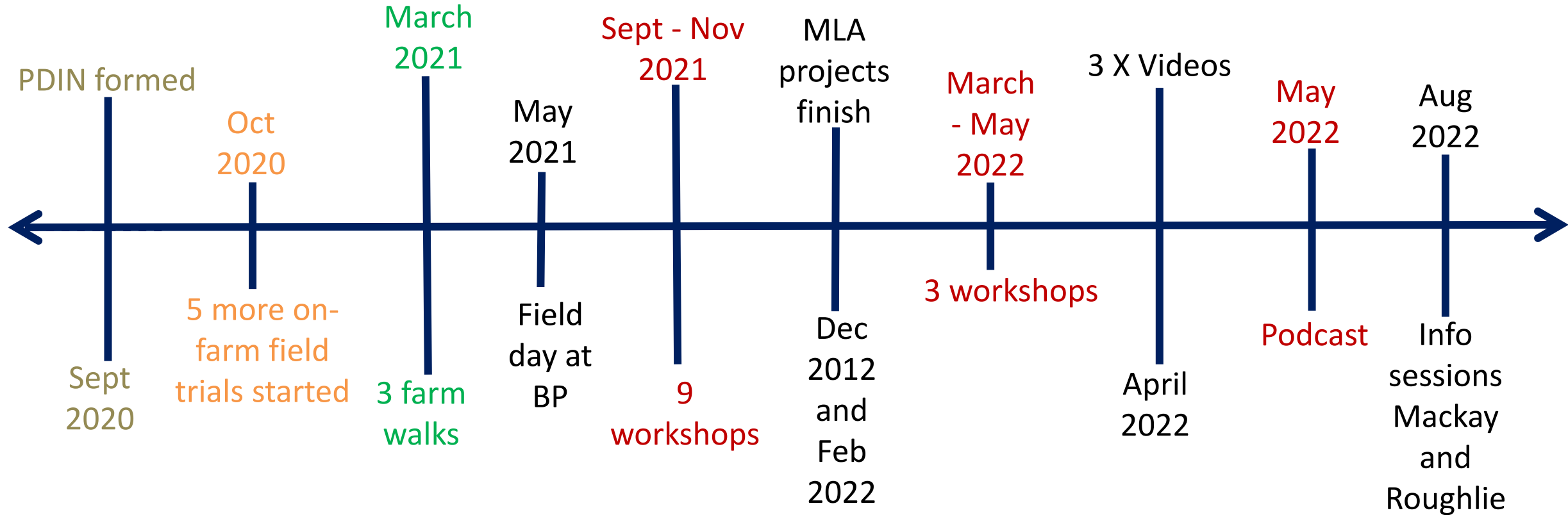
DAF Activities

Timeline: DAF dieback RD&E



Qld Govt funded activities from 2015 - 2020

Timeline: DAF dieback RD&E

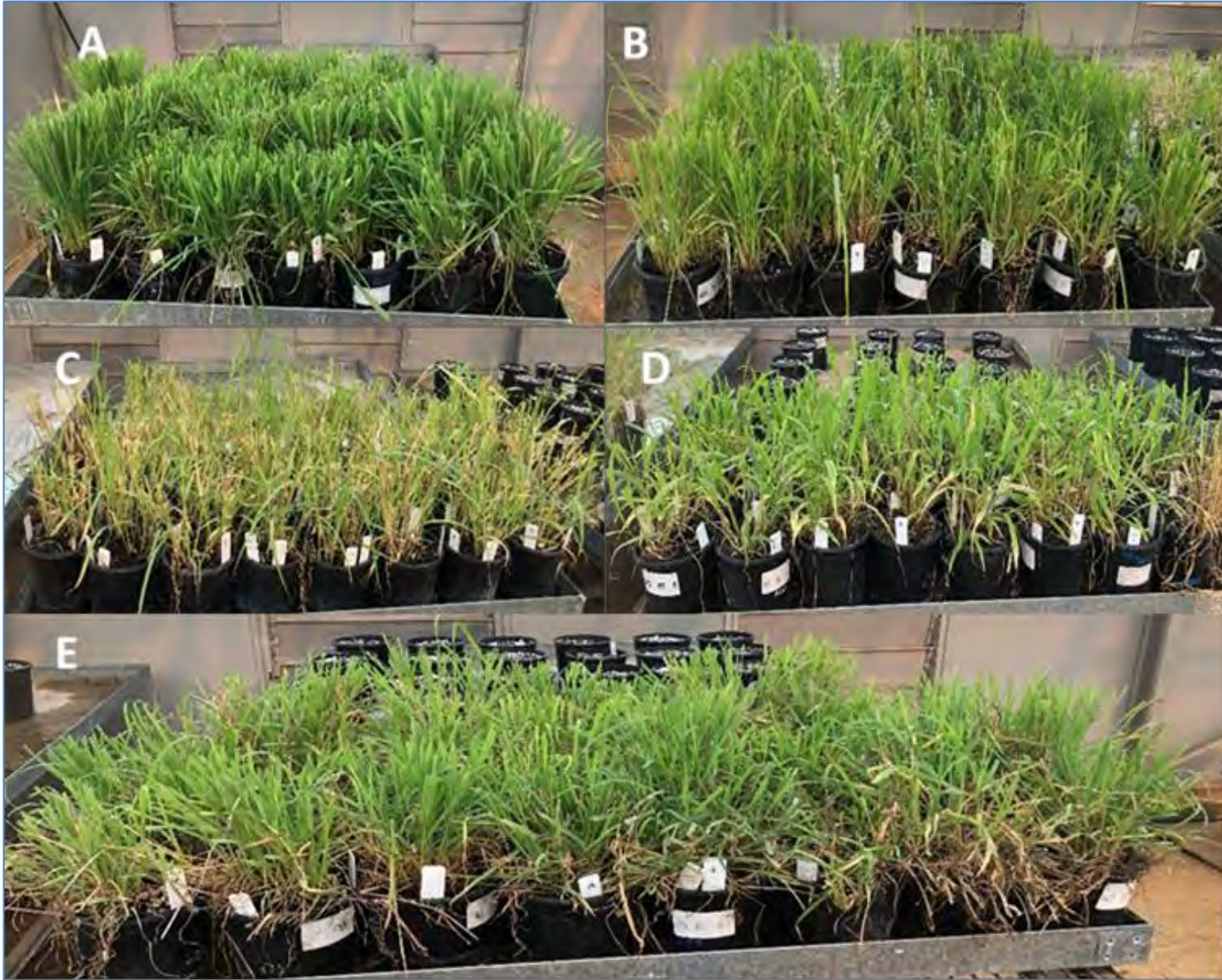


Qld Govt and MLA funded activities 2020 – 2023+

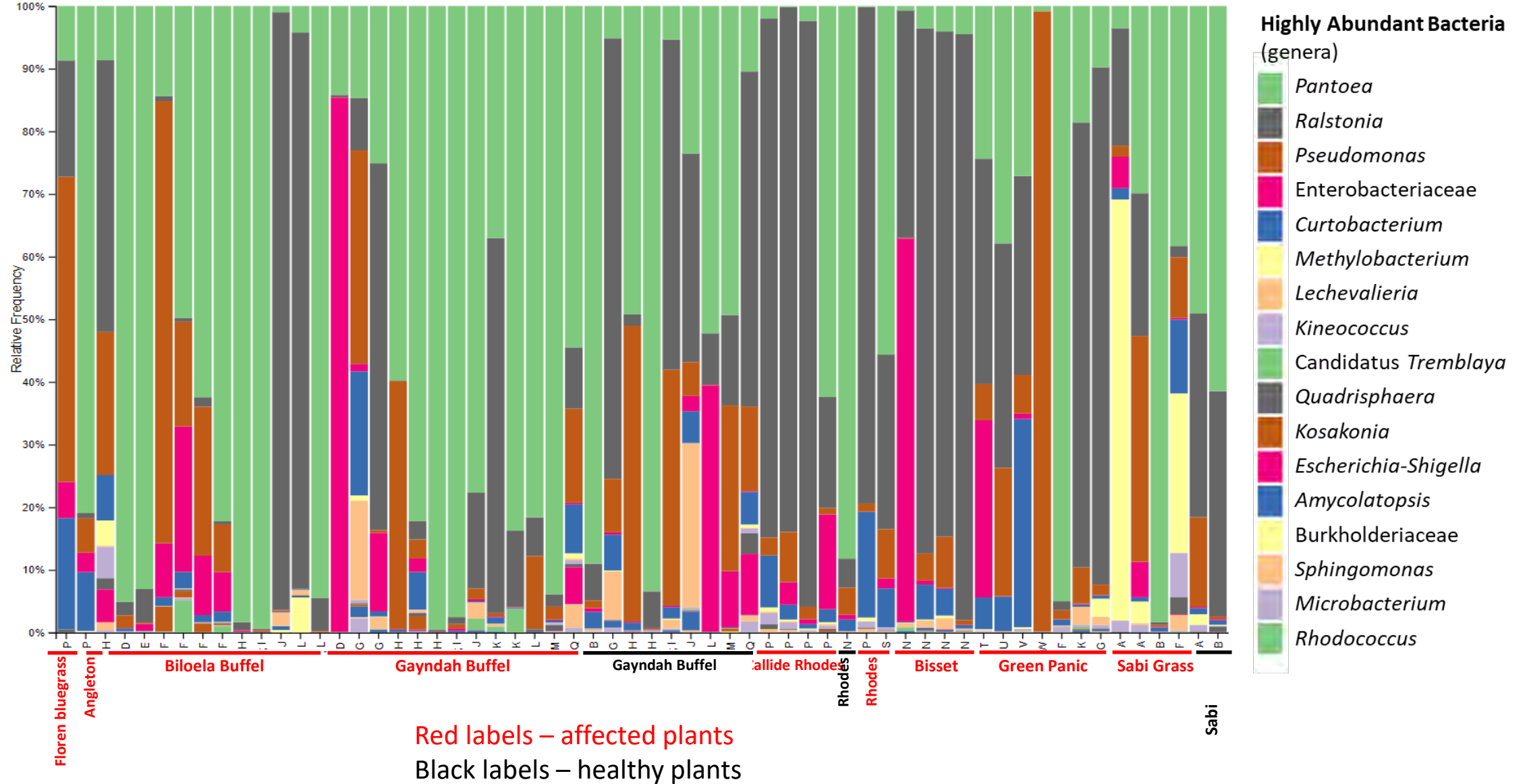
Diagnostic research: Surveys



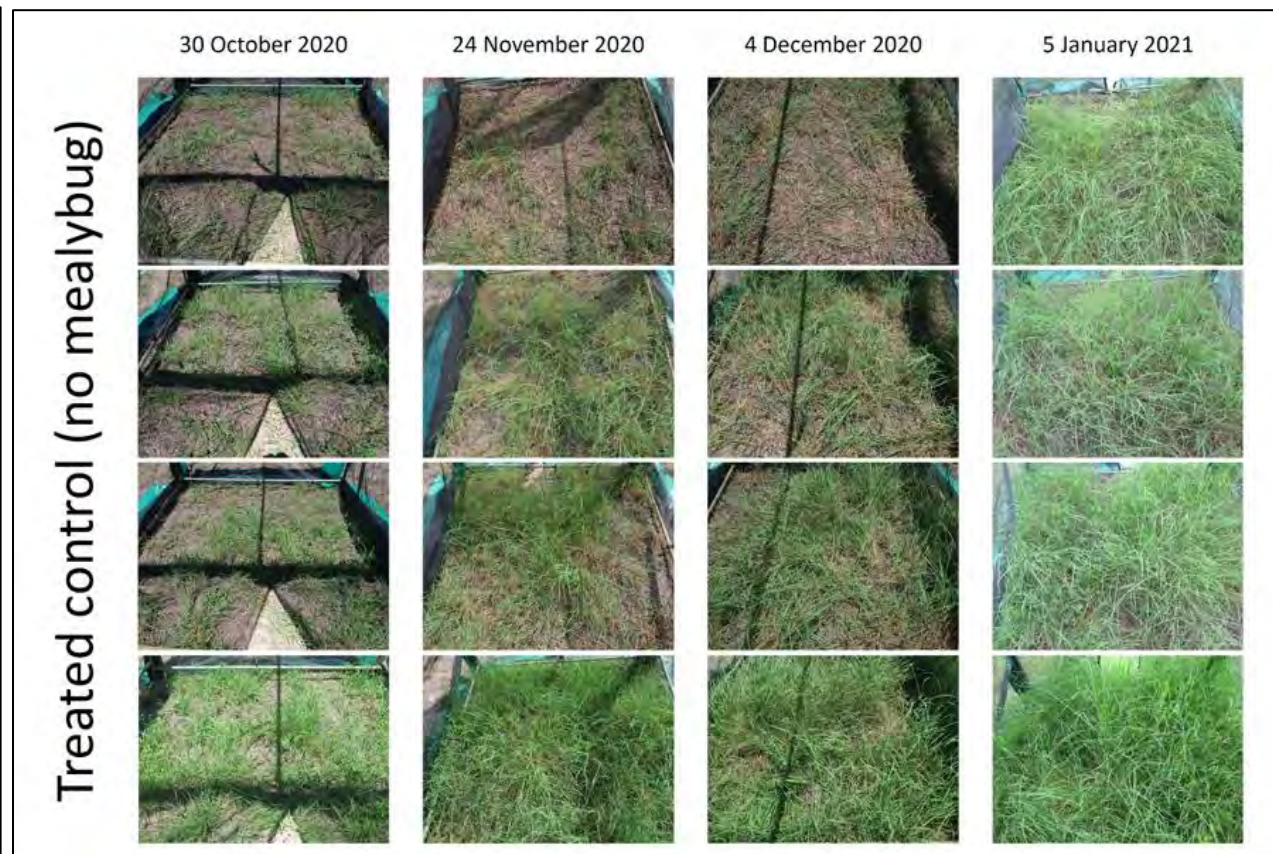
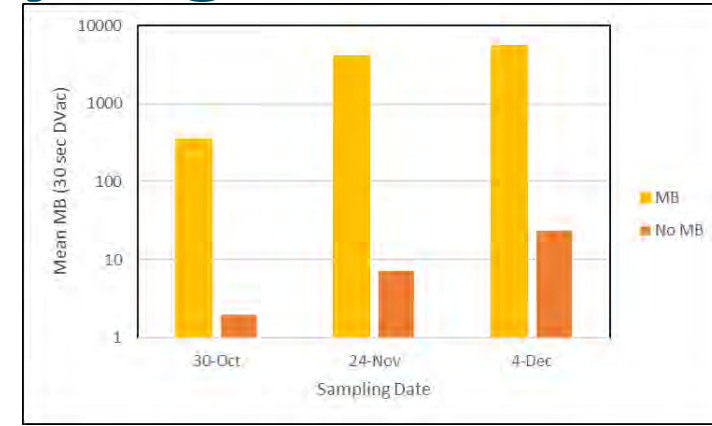
Diagnostic research: Fungi and viruses



Diagnostic research: Micro-biome

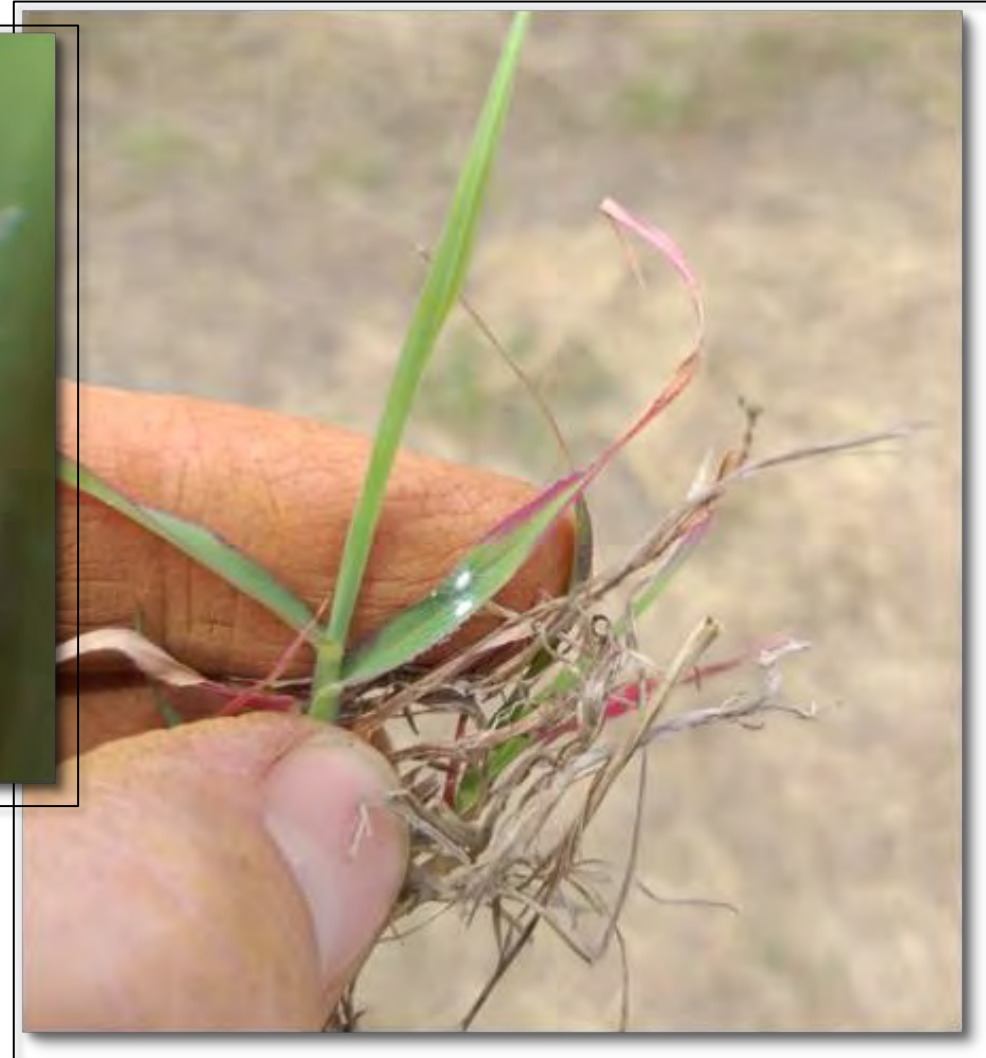


Diagnostic research: Pasture mealybug



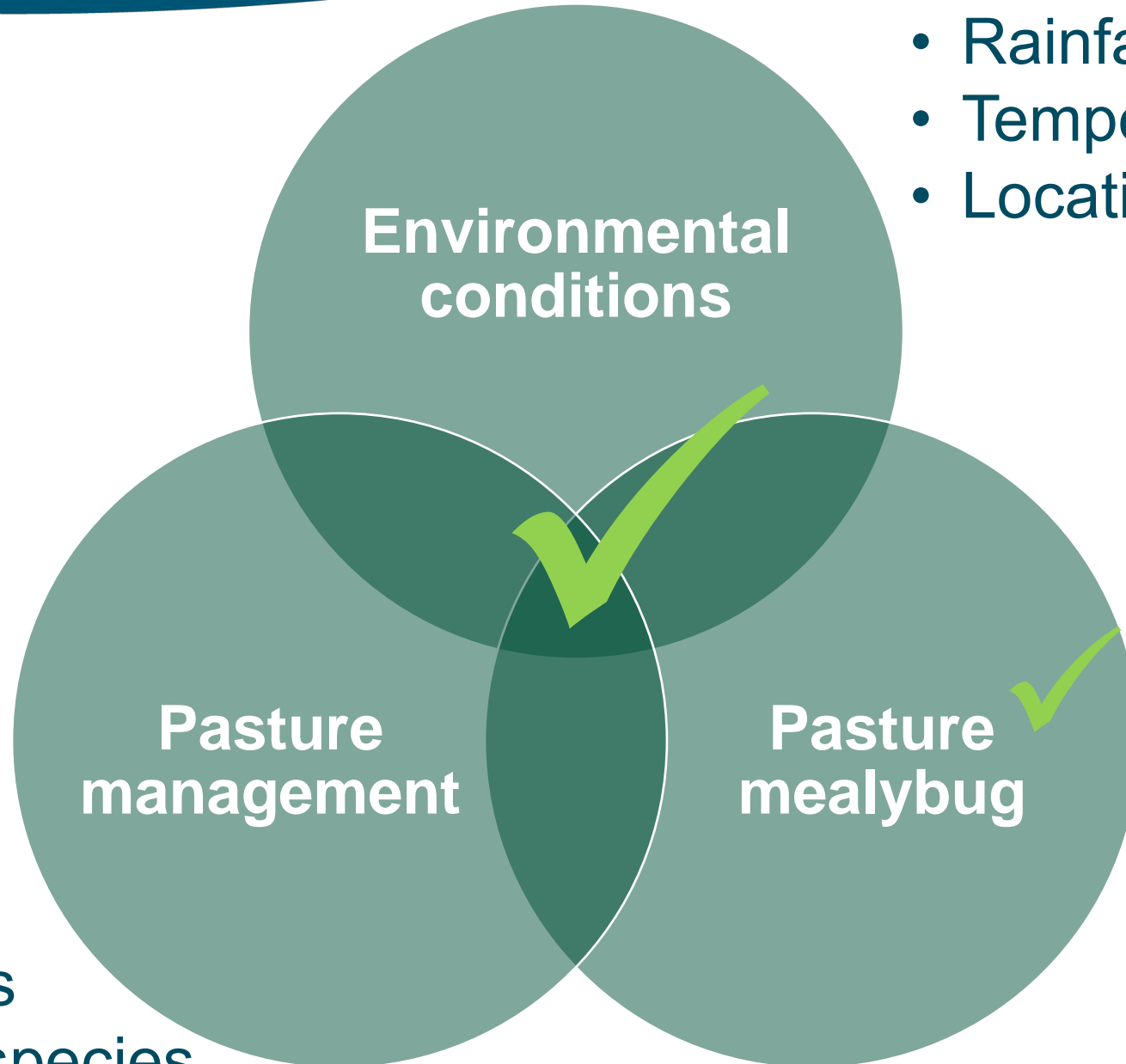


Pasture mealy bug - *Heliococcus summervillei*





Will I get pasture dieback?



- Rainfall
- Temperature
- Location

+ virus + secondary infections?

- High biomass
- Susceptible species



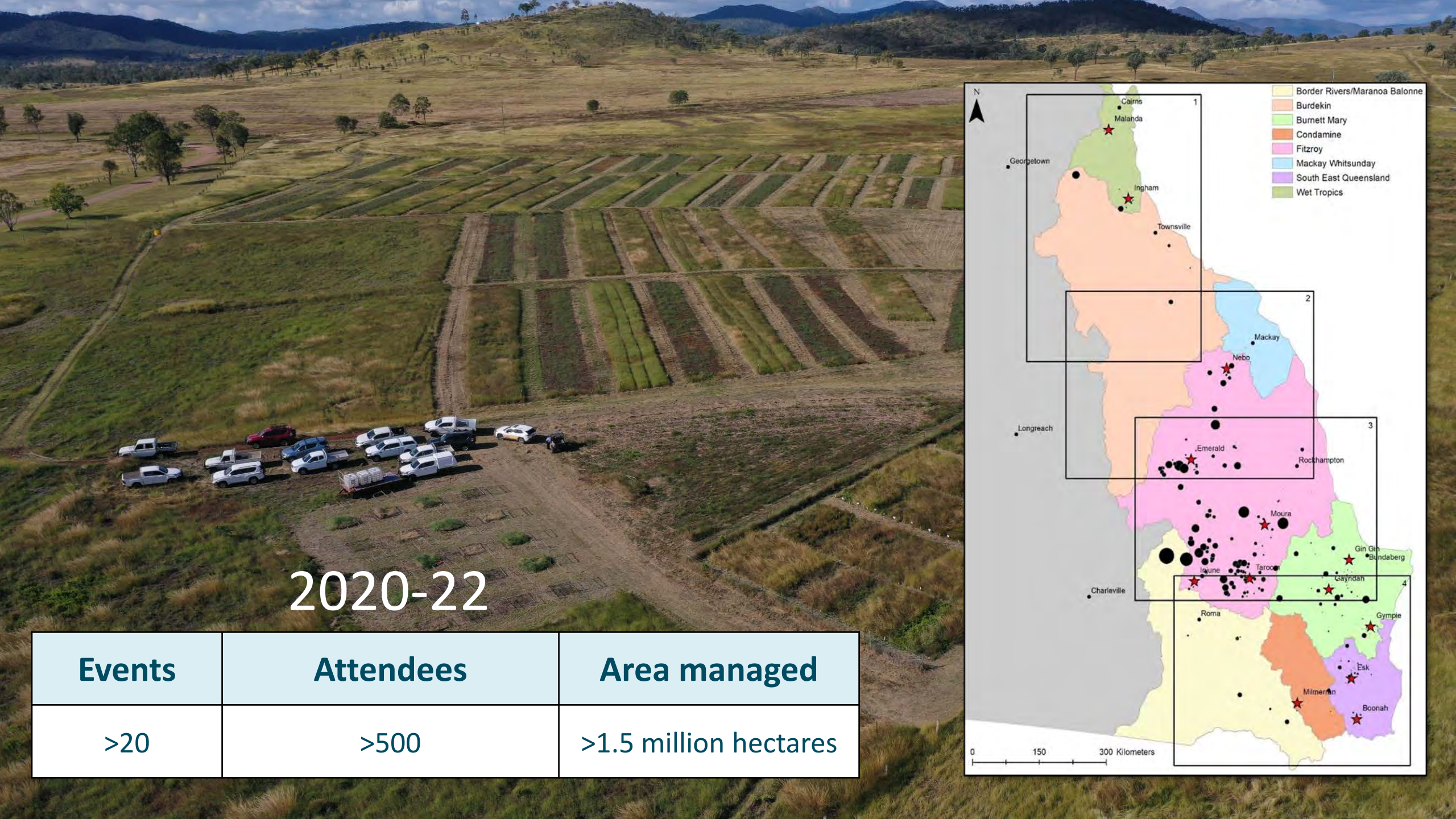
10 field research sites





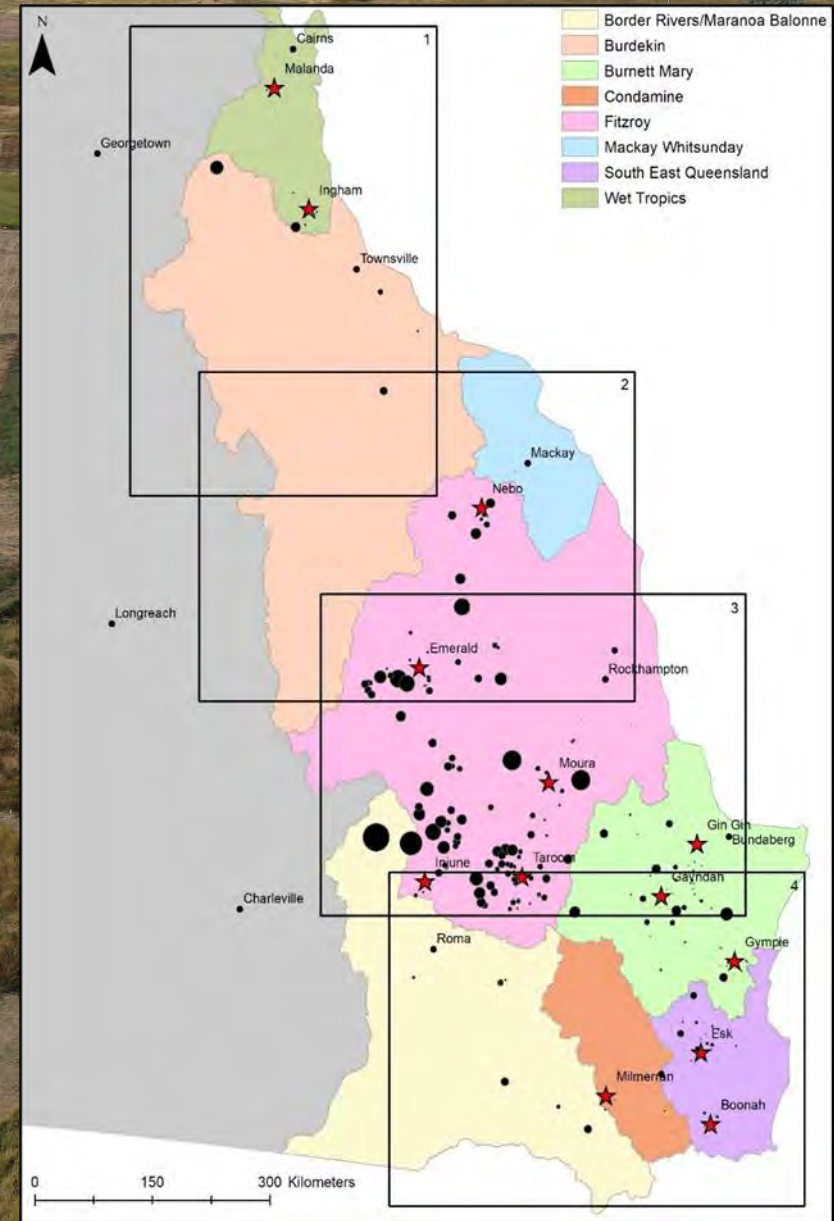
Research trials experience

- We have not specifically investigated IC but the presence of has been reported
- We have 2 long term trials in progress:
 - Moura - Casareto study 1.9% vs 0.6% (10000)
 - Wandoo - Scott study 1.8% vs 0.6% (10000)
- Both show that 19000 is a significant threshold. We impact of equipment and procedures on the large differences in prevalence. Limited no. of sites.



2020-22

Events	Attendees	Area managed
>20	>500	>1.5 million hectares



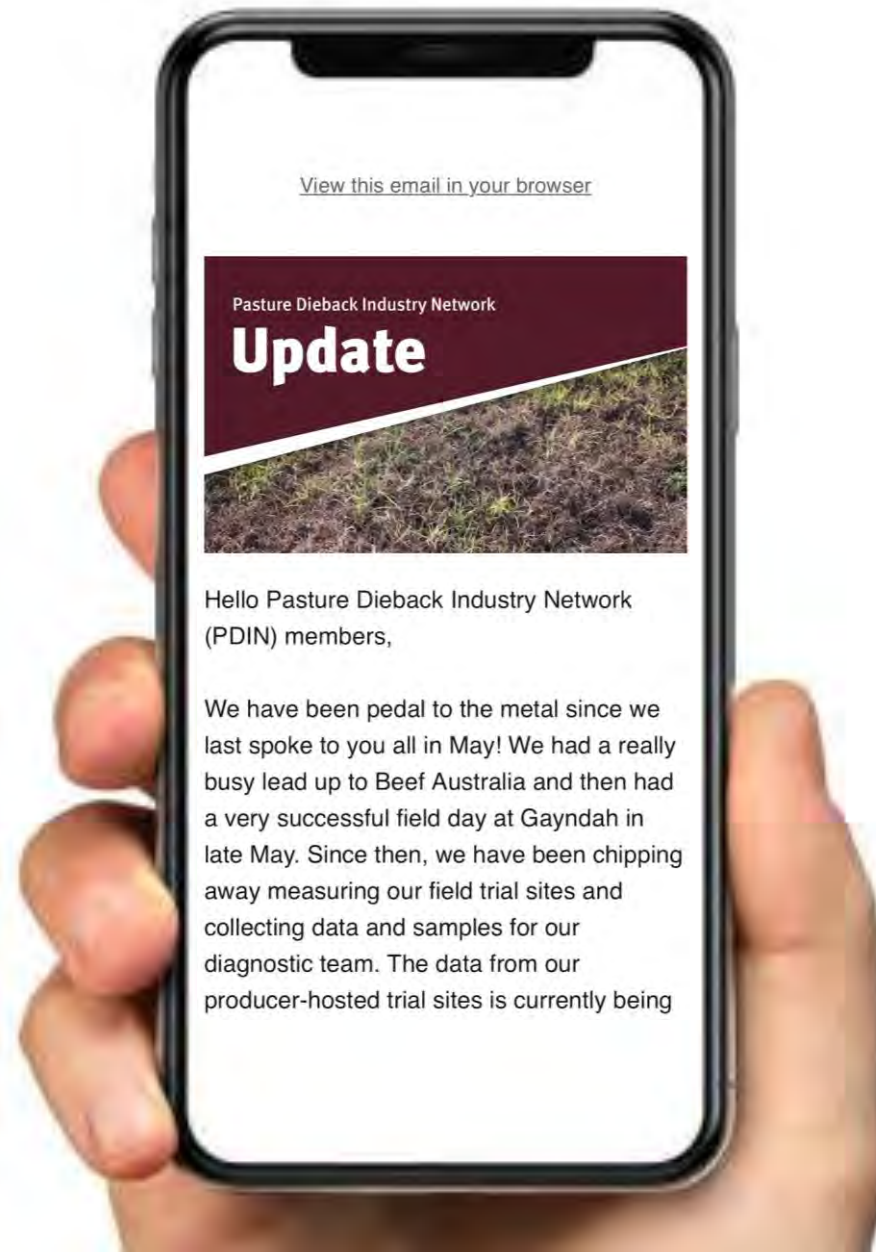


Pasture Dieback Industry Network

Formed in August 2020

8 newsletters

Over 300 subscribers





What can be done about pasture dieback?

PREVENTION?

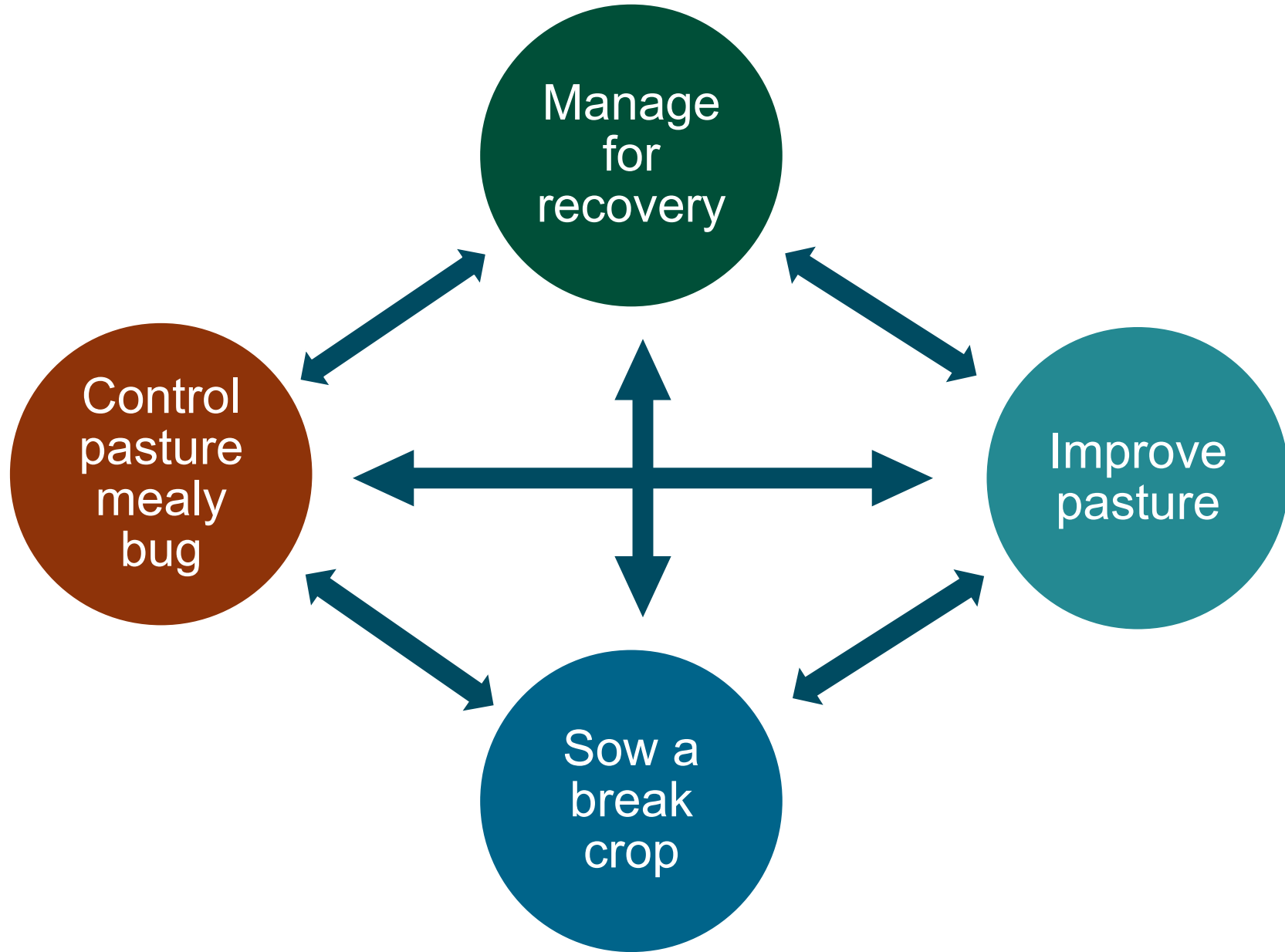
No reliable and practical prevention strategies (currently)

ERADICATION?

No cost-effective eradication strategies (currently)

MANAGE WITH?

Yes, the only solution at this stage





Management strategies	Practice	Small patch		Widespread	
		Arable	Forest	Arable	Forest
Manage for recovery	Adjust stocking rate (forage budget)	✓	✓	✓	✓
	Monitor and treat weeds in bare patches	✓	?	✓	?
Improve pasture					
Sow a break crop					
Control pasture mealybug					



Manage for recovery



June 2019



Jan 2021



Management strategies	Practice	Small patch		Widespread	
		Arable	Forest	Arable	Forest
Manage for recovery	Adjust stocking rate (forage budget)	✓	✓	✓	✓
	Monitor and treat weeds in bare patches	✓	?	✓	?
Improve pasture	Sow legumes and tolerant grasses	✓	✓	✓	✓
	Apply fertiliser	?	?	✓	?
	Cultivate	?	X	✓	X
Sow a break crop					
Control pasture mealybug					



Grass susceptibility to dieback

Highly susceptible

Tolerant

Paspalum sp.
Pangola
Kikuyu
Sabi grass
Creeping bluegrass cv. Bisset
Buffel grass cv. Gayndah, American
Bambatsi panic
Digit grasses (Premier, Strickland)

Indian couch
Signal grass
Setaria (PPG)
Angleton grass/Floren
Green Panic
Rhodes grass

Setaria
Panic cv. Gatton
Buffel grass cv. Biloela
Guinea grass
Mekong
Tully

LEGUMES (annual or perennial) are RESISTANT

How do I... select grass varieties tolerant to pasture dieback?

The issue: Pasture dieback negatively impacts livestock health and production potential to support their business objectives. A grazing concern for the industry is the impact caused by pasture dieback. The detrimental impacts are significant for pasture production, affecting a variety of pasture species.

The impact: Mitigating pasture dieback reduces the overall productivity and quality of grazing land, it can lead to significant economic losses.

The opportunity: By identifying tolerant pasture species and implementing best management practices to reduce the risk of pasture dieback in the management of grazing systems, their results are obtained when indicators of tolerance and tolerant grasses are used.

The fact sheet provides research-based knowledge to help producers make informed decisions regarding the selection, tolerance and susceptibility of grass pastures to pasture dieback caused by pasture dieback (PDD) (pasture dieback) (Figure 1, Figure 2).

The information in this fact sheet summarizes current knowledge from various field trials on the impact of pasture dieback on grazing systems. This information is available for producers of different grazing systems, although the impact of pasture dieback is a range of grazing conditions. Opportunities for pasture dieback research in commercial pasture systems have also been incorporated as additional data is collected, further updates will be provided.

Field trials and observations in commercial pasture systems have shown that pasture dieback is a significant issue for producers, including both a loss of grass species and regrowth (Figure 1).

Table 1 provides the relative tolerance levels of each grass species against the pasture dieback, ranging from tolerant to highly susceptible.

Figure 1: Pasture dieback caused by pasture dieback on tropical grasses. Note the small size of the regrowth, and growth and yellowing of dieback symptoms. Photo: Gordon (unpublished, 2017).

Figure 2: Pasture dieback caused by pasture dieback on tropical grasses with purple and yellow regrowth of dieback symptoms. Photo: DAF.



Management strategies	Practice	Small patch		Widespread	
		Arable	Forest	Arable	Forest
Manage for recovery	Adjust stocking rate (forage budget)	✓	✓	✓	✓
	Monitor and treat weeds in bare patches	✓	?	✓	?
Improve pasture	Sow legumes and tolerant grasses	✓	✓	✓	✓
	Apply fertiliser	?	?	✓	?
	Cultivate	?	✗	✓	✗
Sow a break crop	Annual forage (graze or hay/silage)	✗	✗	✓	✗
	Grain	✗	✗	✓	✗
Control pasture mealybug					



November 2018



May 2019



December 2021

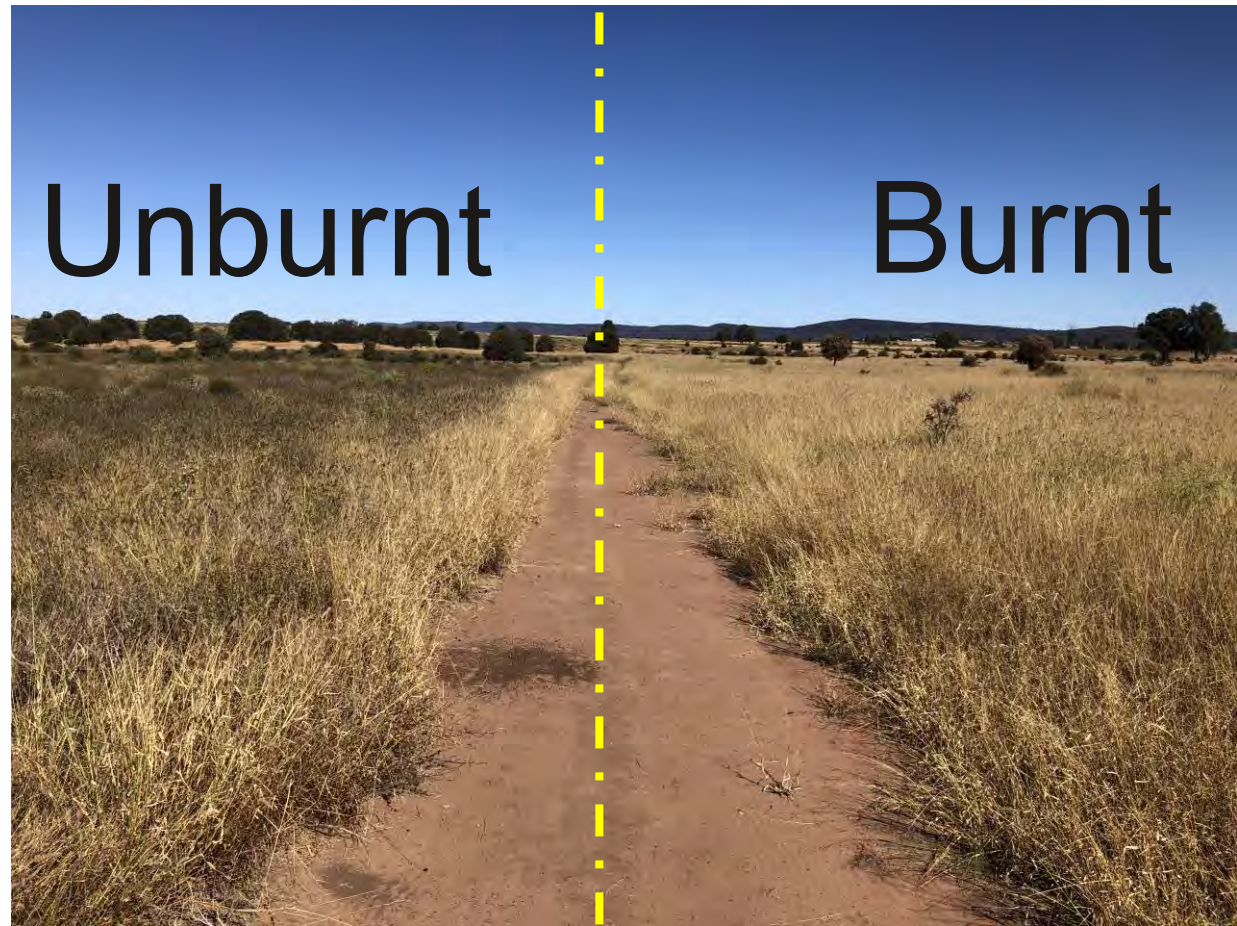
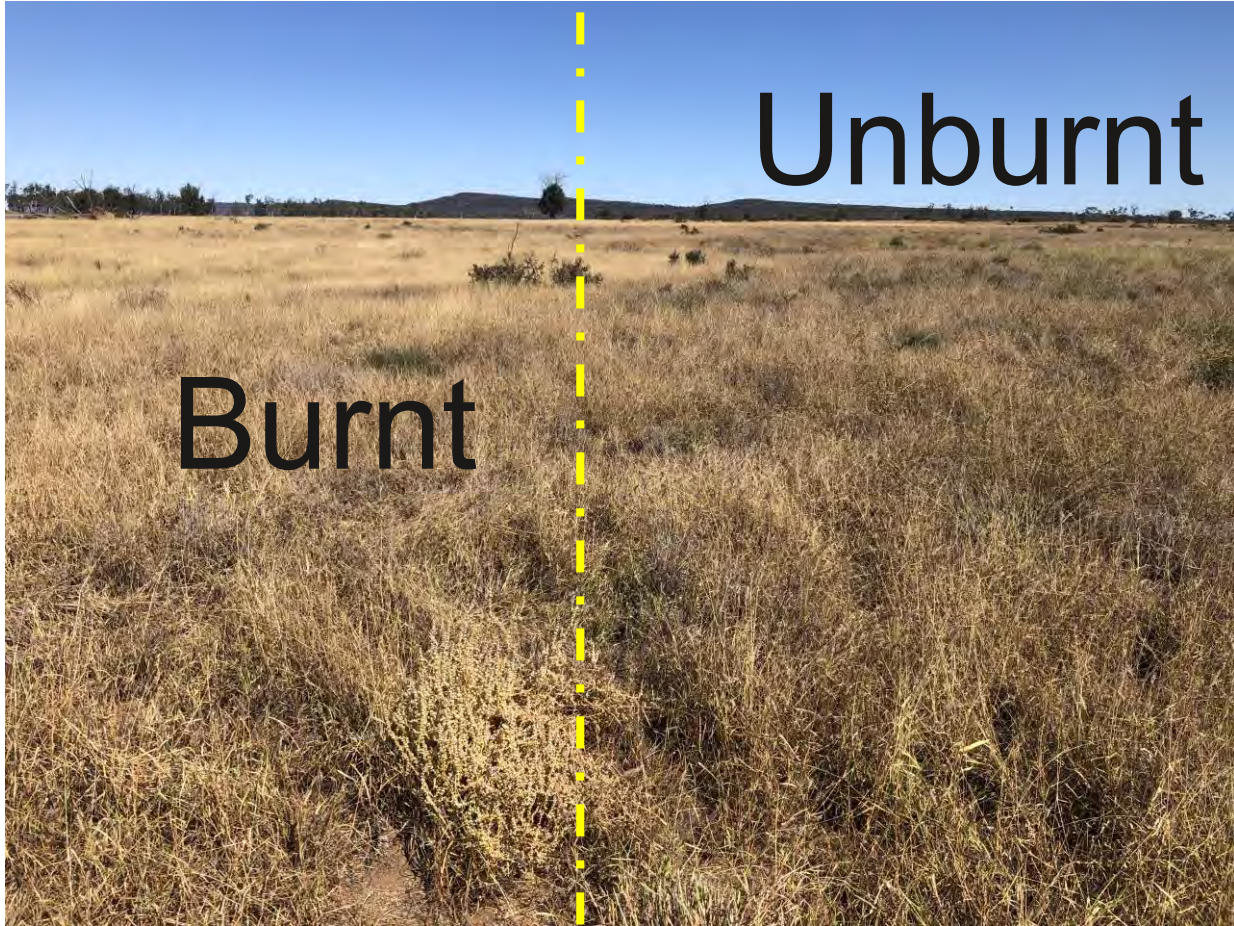


March 2023



Management strategies	Practice	Small patch		Widespread	
		Arable	Forest	Arable	Forest
Manage for recovery	Adjust stocking rate (forage budget)	✓	✓	✓	✓
	Monitor and treat weeds in bare patches	✓	?	✓	?
Improve pasture	Sow legumes and tolerant grasses	✓	✓	✓	✓
	Apply fertiliser	?	?	✓	?
	Cultivate	?	✗	✓	✗
Sow a break crop	Annual forage (graze or hay/silage)	✗	✗	✓	✗
	Grain	✗	✗	✓	✗
Control pasture mealybug	Spray pesticide	?	✗	✗	✗
	Burn	?	?	?	?







Management strategies	Practice	Small patch		Widespread	
		Arable	Forest	Arable	Forest
Manage for recovery	Adjust stocking rate (forage budget)	✓	✓	✓	✓
	Monitor and treat weeds in bare patches	✓	?	✓	?
Improve pasture	Sow legumes and tolerant grasses	✓	✓	✓	✓
	Apply fertiliser	?	?	✓	?
	Cultivate	?	✗	✓	✗
Sow a break crop	Annual forage (graze or hay/silage)	✗	✗	✓	✗
	Grain	✗	✗	✓	✗
Control pasture mealybug	Spray pesticide	?	✗	✗	✗
	Burn	?	?	?	?



**How has the feeling on dieback changed
in 8 years?**

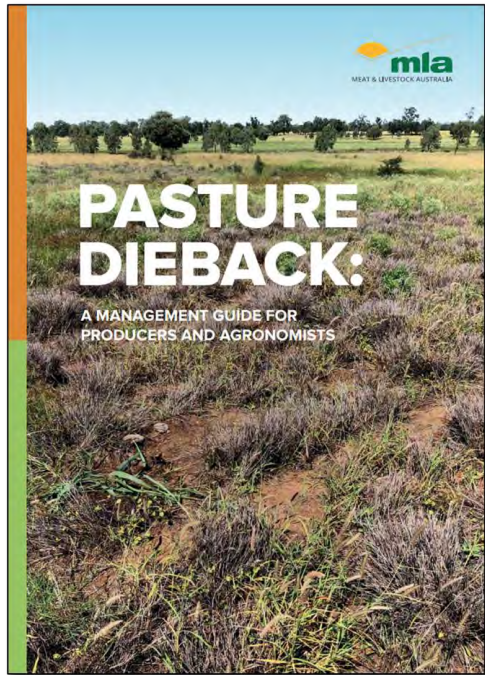
What are graziers doing now?











How do I... select grass varieties tolerant to pasture dieback?

The issue: Producers face ongoing challenges to maintain healthy and productive pastures to support their livestock operations. A growing concern for the industry is damage caused by pasture dieback from the detrimental impacts are significant for pasture production, affecting a variety of pasture species.

The impact: Molybdenum-induced pasture dieback reduces the overall productivity and quality of grazing land. It can lead to significant economic losses.

The opportunity: By selecting molybdenum-tolerant pasture species and implementing best management practices, producers can minimise the impact of pasture dieback on their grazing operations. Best results are obtained when measures of legumes and tolerant grasses are planted.

This fact sheet provides research-based knowledge to help producers make informed decisions regarding the relative tolerance and susceptibility of grass pastures to pasture dieback caused by pasture molybdenum deficiency (summarised in Figure 1, Figure 2). The information in this fact sheet supplements current conclusions from various field trials (for example in Figure 3) and demonstrates current trials. The ongoing trials are evaluating different pasture species along with pasture dieback in a range of commercial pasture situations incorporated. An additional data system will be produced.

Field trials and observations in situations have shown that pastures with a high proportion of tolerant grass species are more at risk of pasture dieback than those with a mix of grass species and legumes. Table 1 provides the relative tolerance of grass species against the pasture from tolerant to highly susceptible.



Management of pasture dieback

What is pasture dieback and where does it occur in Queensland?

Pasture dieback causes death of otherwise healthy tropical and sub-tropical grass pastures. It affects most high-yielding sown species and some native species, while legumes and other broadleaf plants are unaffected.

Pasture dieback occurs across eastern Queensland and north-eastern New South Wales – generally in areas with more than 600 mm annual rainfall. Pasture death begins in patches but can quickly spread to large areas – or whole paddocks – within one summer season when it is warm and wet.

Water and temperature stress, nutrient deficiency and herbicide damage can present similar symptoms to pasture dieback.

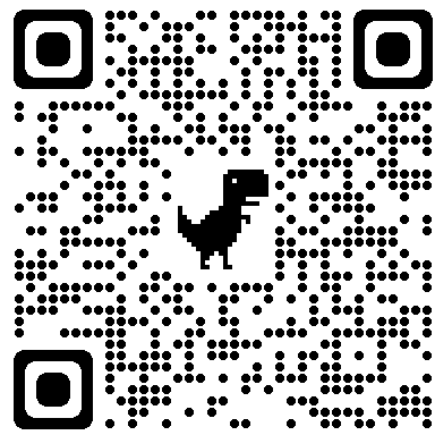
Other known pathogens such as fungal infections can also be misdiagnosed as pasture dieback. It is important to exclude these to definitively diagnose this condition. The four stages of pasture dieback symptoms are:

1. Yellowing and/or reddening of individual leaves, starting from the older leaves.
2. Stunted, unhealthy growth of plants in patches – or in severe cases, across whole paddocks – with obvious yellowing and/or reddening of multiple leaves or the whole plant.
3. Death of pasture, in patches or widespread throughout the paddock.
4. Broadleaf plants (legumes or weeds) growing unaffected in areas of dead pasture. Dead pasture plants are grey and can be easily uprooted.



Map of Queensland and northern New South Wales showing areas most affected by pasture dieback (dark green), affected in June 2021 (bright green) and also affected in April 2023 (blue).

Butter grass leaves showing discoloration.





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