



*A broad look at charcoal rot in the Northern Region broadacre crops  
through soil sampling and in-crop surveys*

## What is charcoal rot (and why should I care)?

*Macrophomina phaseolina*



Stalk rot infected (left) vs healthy sorghum (right)

Photo: Kansas State University

## *Charcoal Rot*

- Common after prolonged drought and heat stress during grain fill
- Any form of stress due to agronomic factors also predispose the crop
- First obvious sign usually lodging near maturity
- Ash-grey stalk tissue with microsclerotes
- Survives in soil and on stubble of over 400 crop and weed hosts for up to 4+ years
- Widely occurring, endemic



Charcoal rot symptoms

Photo: USQ CCH Summer Crops Pathology

# Sorghum





# Research

## PREDICTA®B Macrophomina Tests



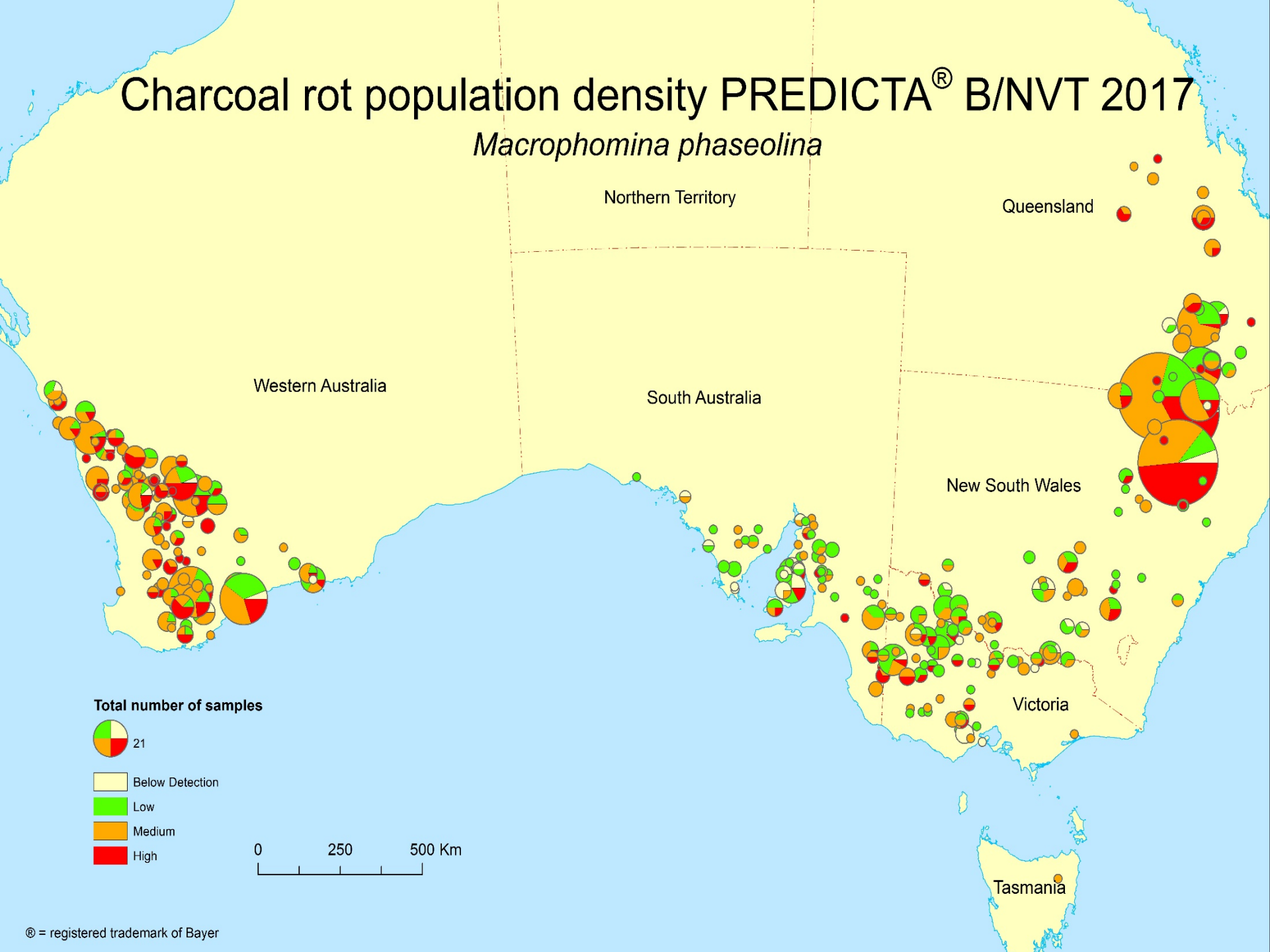
UNIVERSITY OF SOUTHERN QUEENSLAND



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GRAINS RESEARCH & DEVELOPMENT CORPORATION

# Charcoal rot population density PREDICTA<sup>®</sup> B/NVT 2017

*Macrophomina phaseolina*





# *Research*

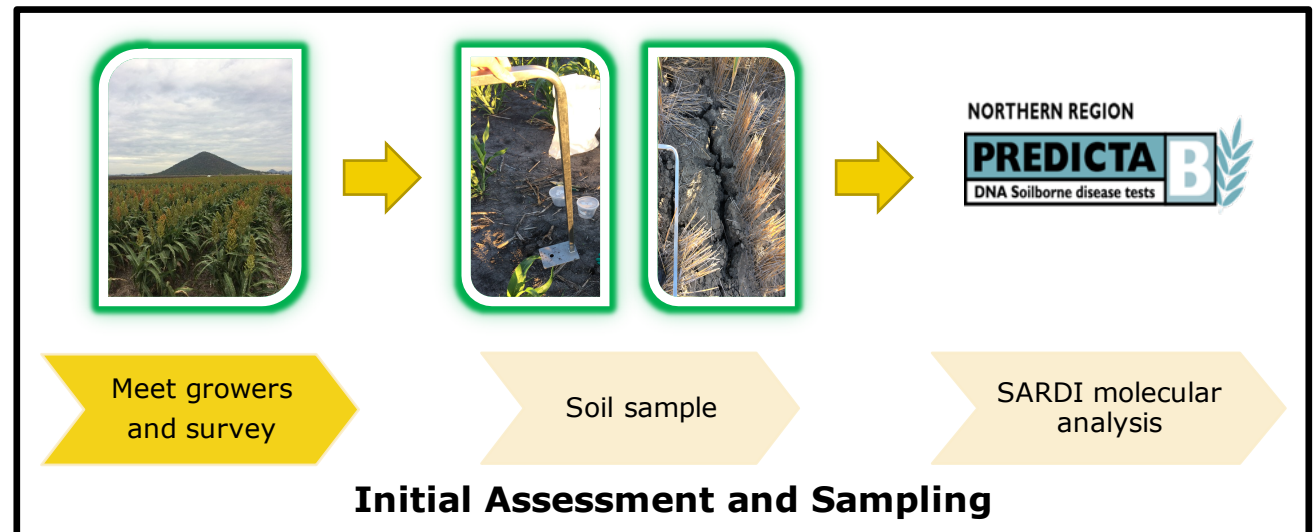
## *Sampling Method Development*

*2016/17 and 2017/18 Summer Seasons*

## *Sampling Strategy Development*

The sampling strategy developed needs to be repeatable and rigorous and take into consideration:

- different stubble management systems;
- location of new crop row;
- where to sample;
- quantity of stubble required in sample,
- in-paddock variability.



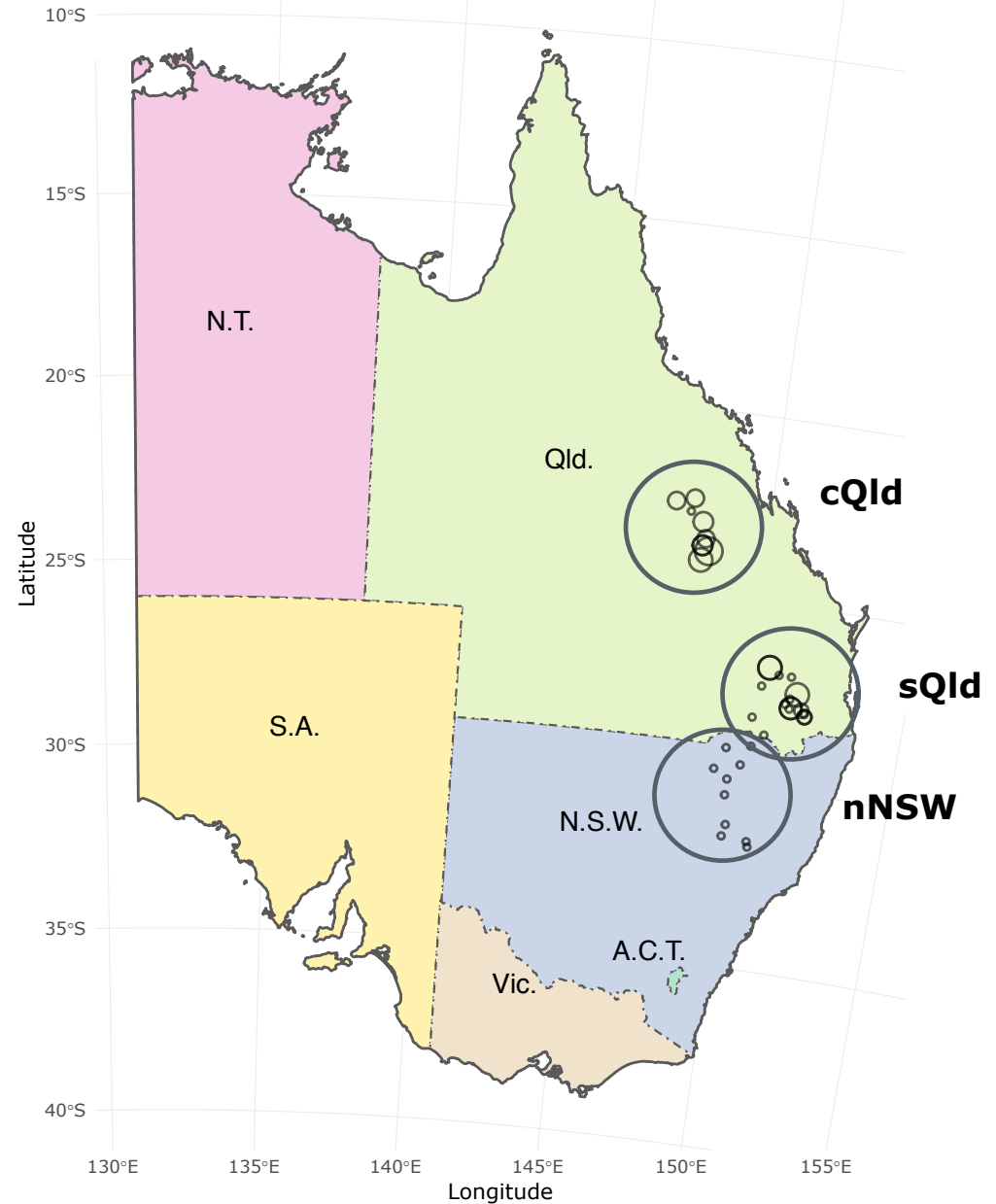




# Research

2017/18 Summer Season  
Sampling Locations (n = 73)

Three regions



Paddocks ○ 2.5 ○ 5.0 ○ 7.5

Data: Natureearthdata and DAQ00186



# *Research*

## *Sampling Development Results*



# Research

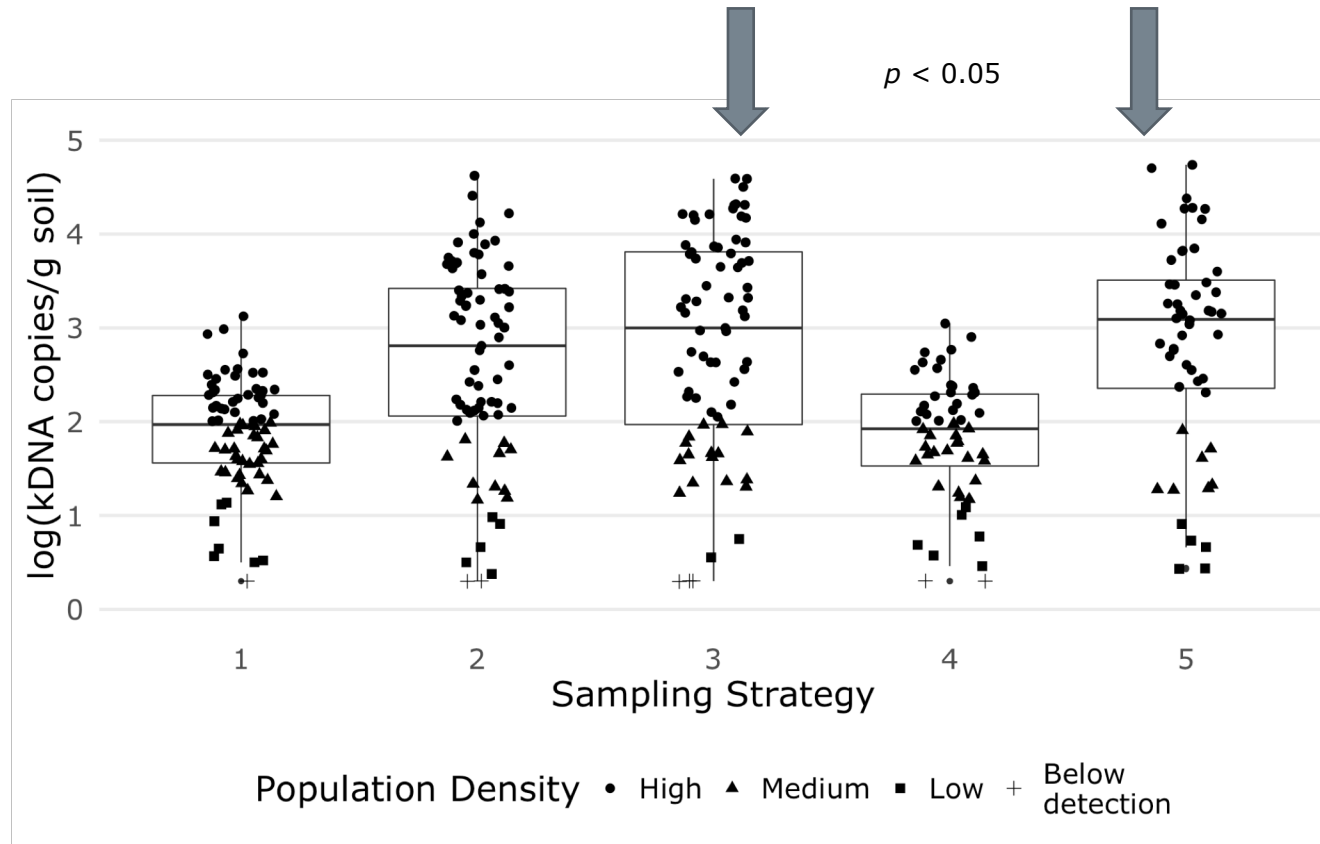
## *Population density categories*

POPULATION DENSITY	LOG KILO-COPIES DNA/G SAMPLE	YIELD LOSS
Below detection	<0.3	Unknown
Low	0.3 to <1.161	Unknown
Medium	1.161 to 2	Unknown
High	>2	Unknown

## PREDICTA®B Sampling Strategy Results

### Sampling strategies

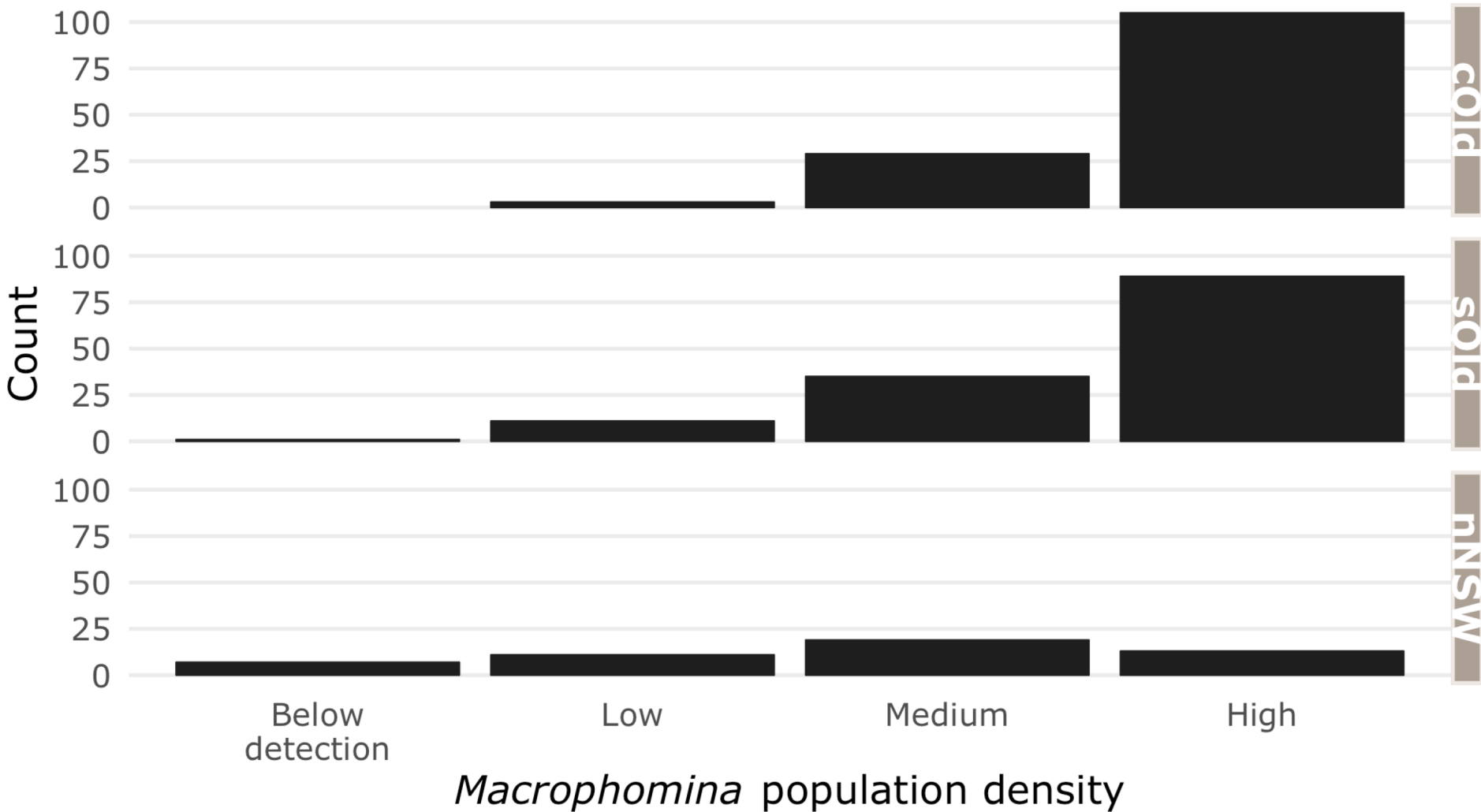
1. Soil collected from previous crop row with no (0) stubble pieces
2. Soil collected from previous crop row with 15 stubble pieces
3. Soil collected from previous crop row with 30 stubble pieces
4. Soil collected from off the plant row
5. Soil collected from off the plant row with 30 pieces of stubble from weeds or previous crops at the location

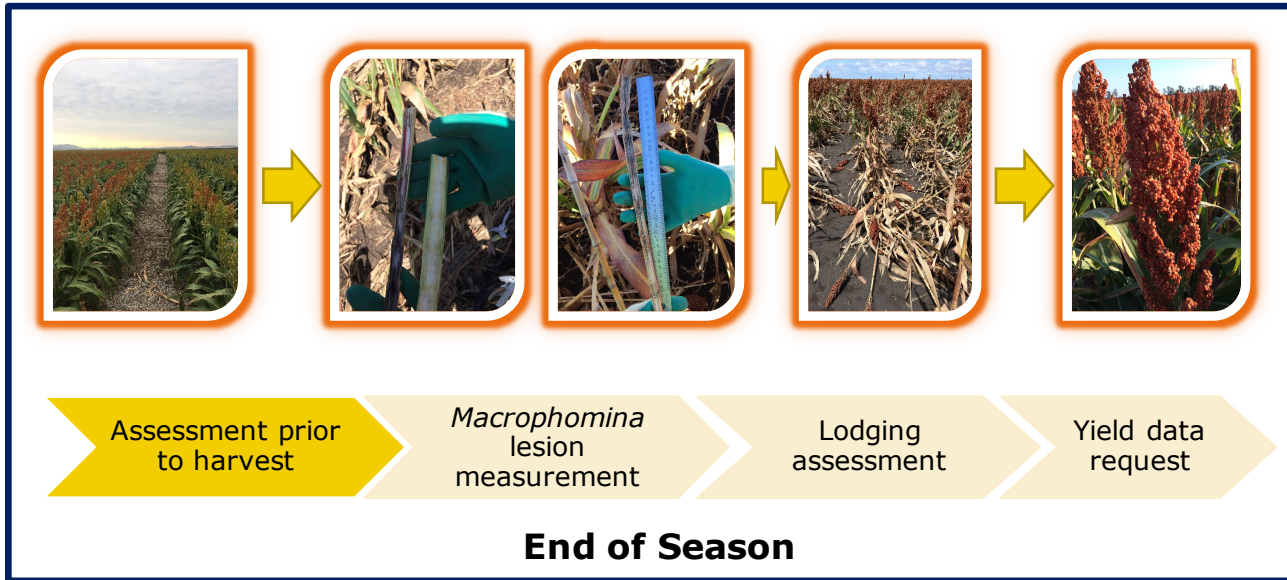


n = 73



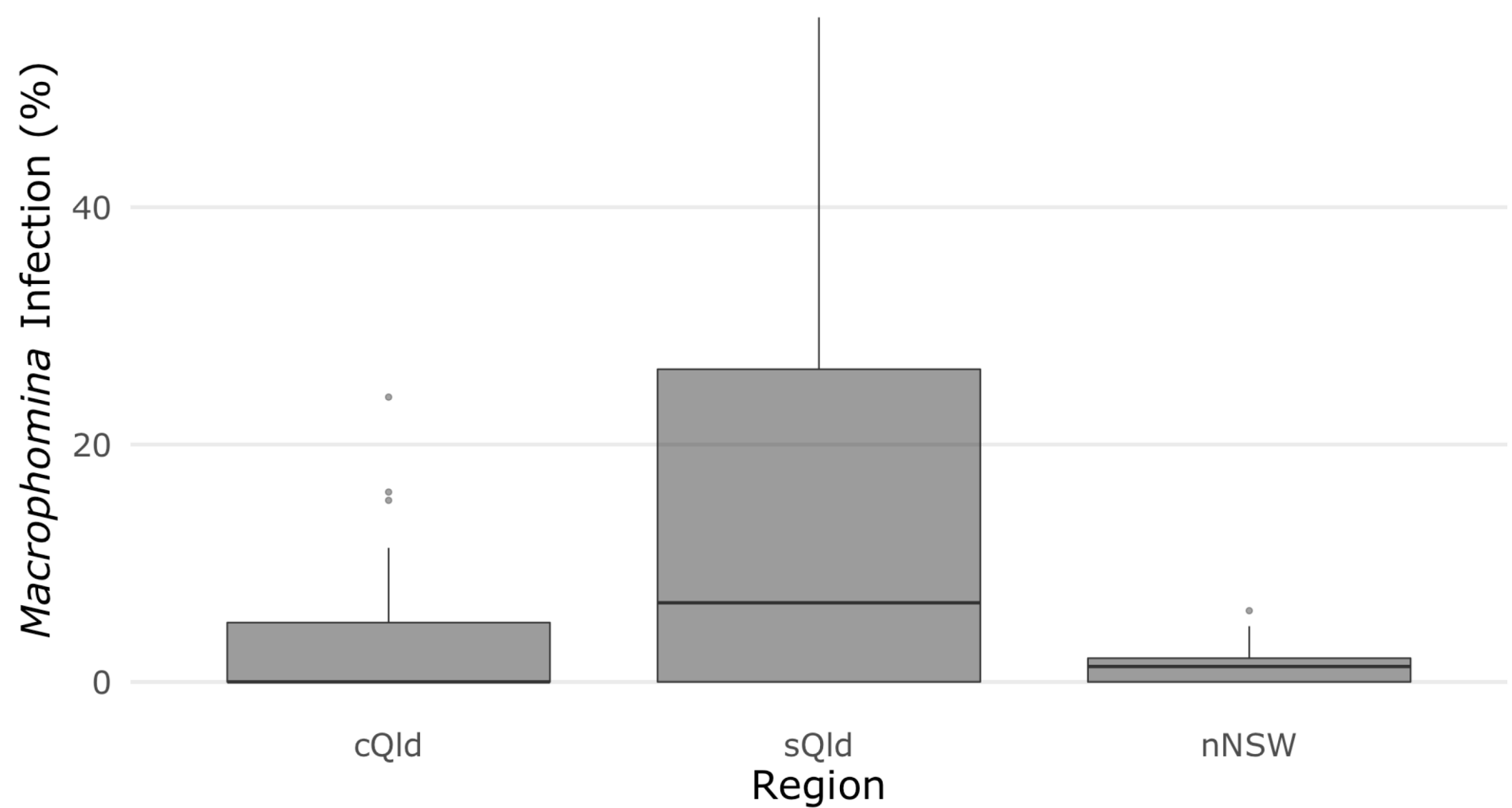
## PREDICTA®B Population Density Results







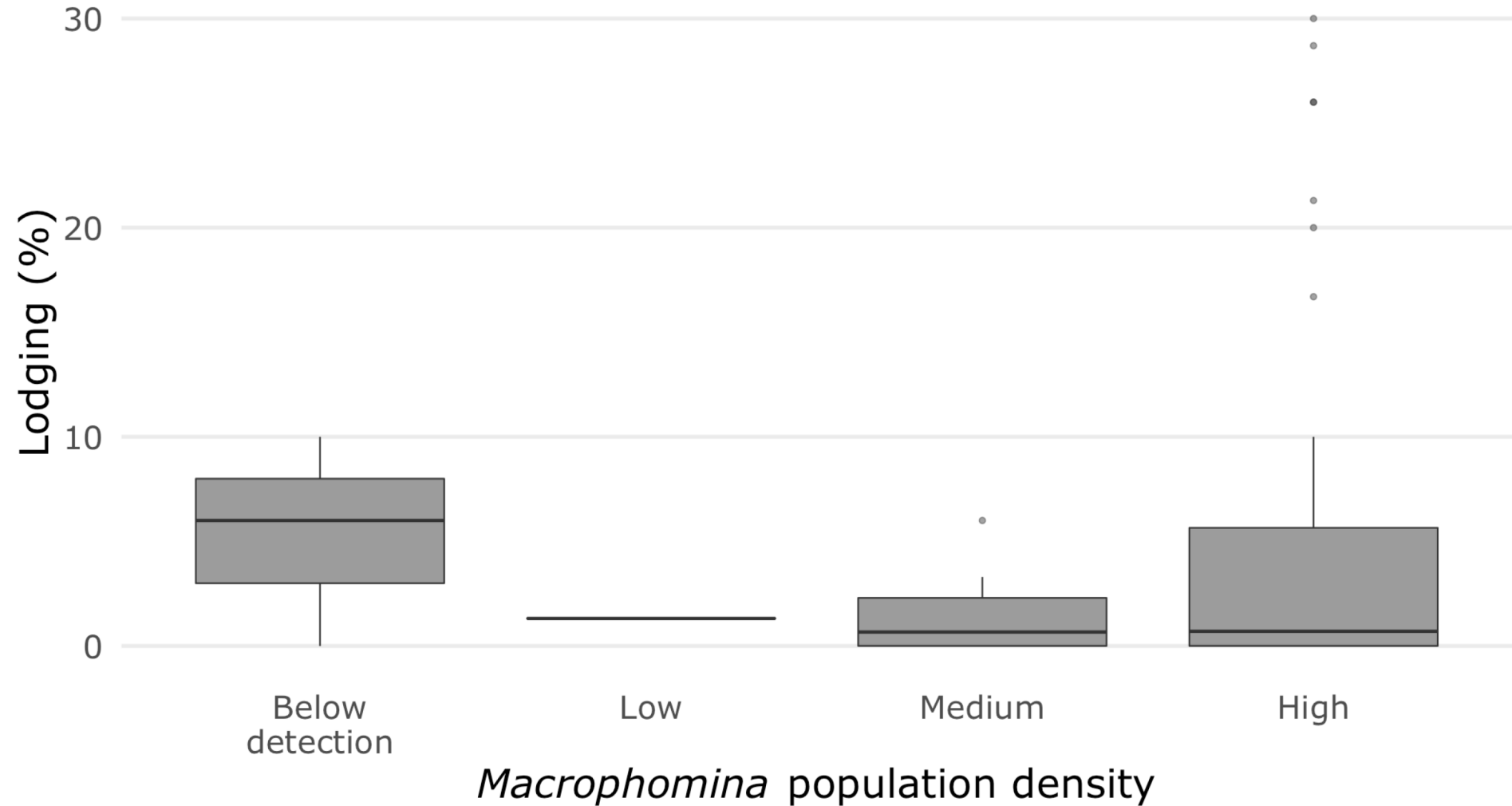
**PREDICTA®B End of Season Assessment**





# Research

## *PREDICTA®B End of Season Assessment*







# Research

## *Results 2016/17*

### **Central Queensland**

- Few sorghum crops in 2016/17 season
- Hot dry conditions, however
- Little charcoal rot developed, likely due to in-crop rainfall from ex-cyclone Debbie

### **Southeast Queensland**

- Hot dry conditions likely limited the crop yields reducing the impact of charcoal rot



# Research

## Results 2017/18

### **Central Queensland**

- Highest population densities of *M. phaseolina*
- Low incidence of infection

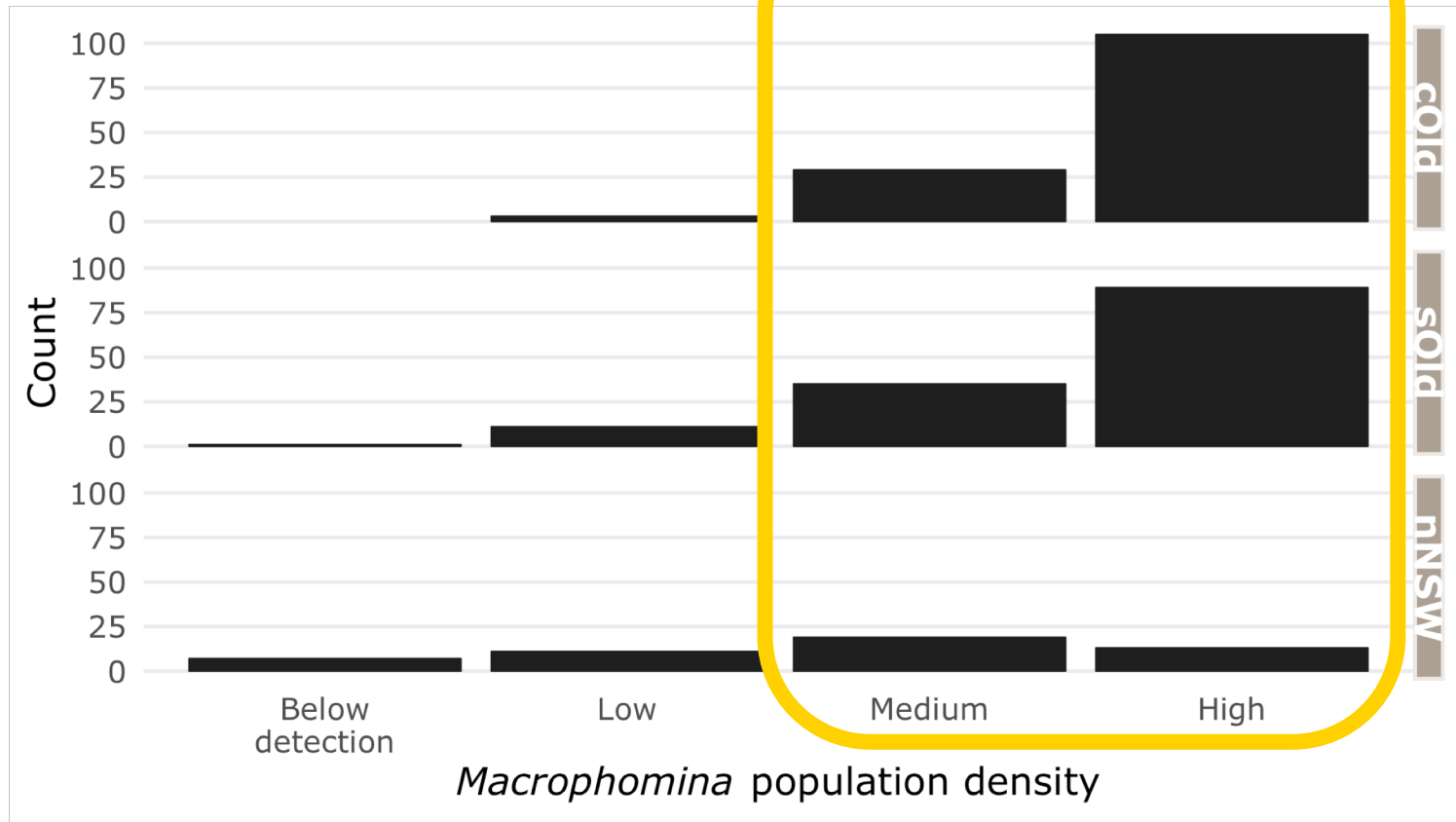
### **Southeast Queensland**

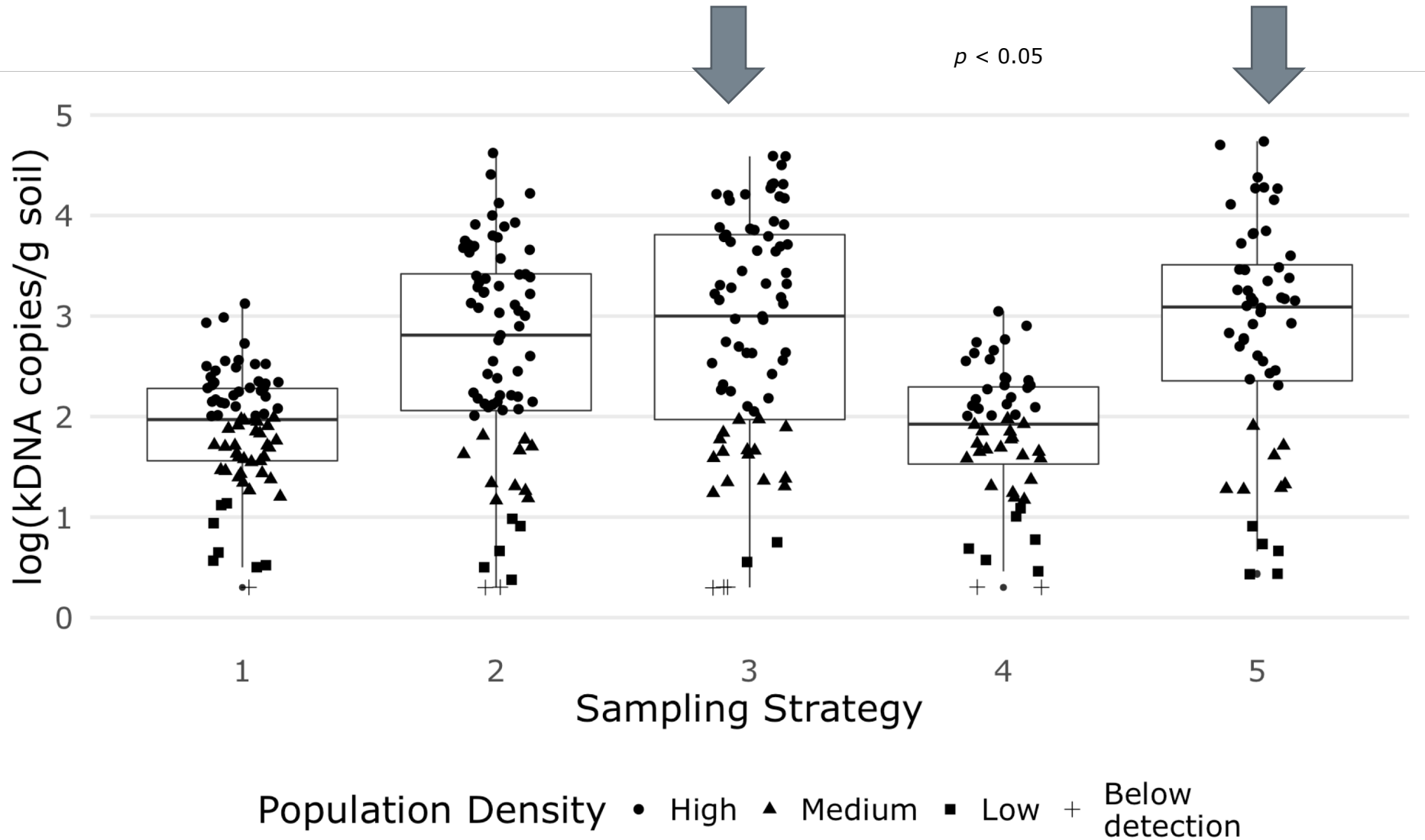
- High population densities
- Highest levels of lodging and infection

### **Northern New South Wales**

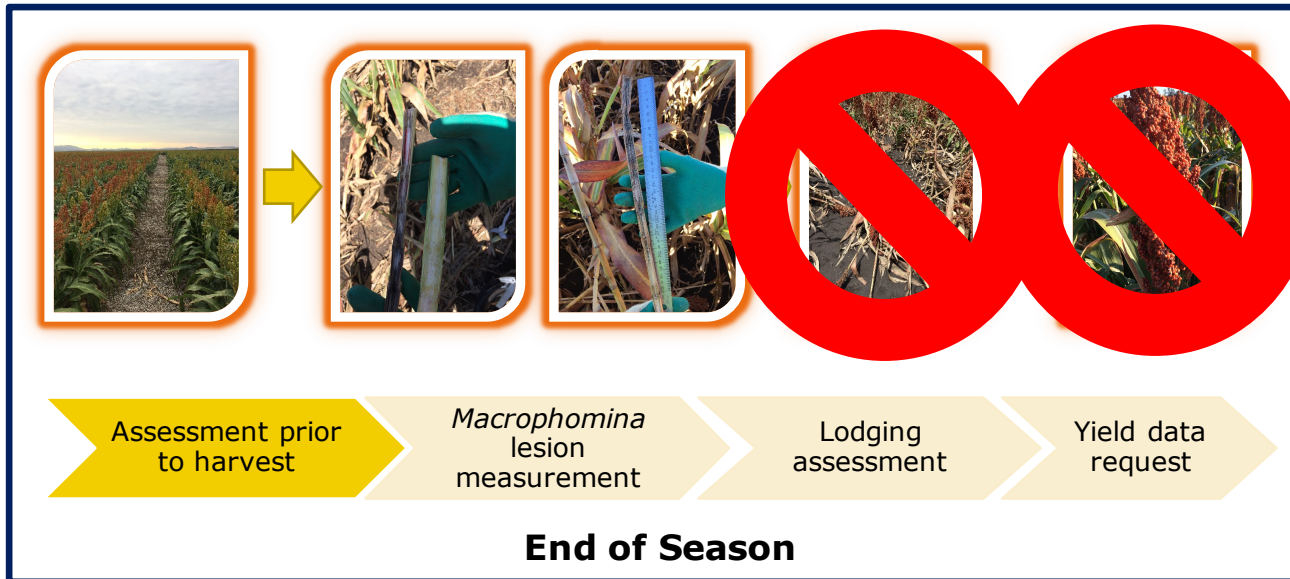
- Lowest population densities of *M. phaseolina*
- Also lowest lodging

## Conclusions





*However...*





# Research

## *Acknowledgments*

Special thanks to sorghum growers for allowing access to their paddocks for sample collection.



GRDC Projects DAQ00186 and DAS00137