



Department of  
**Primary Industries and  
Regional Development**

GOVERNMENT OF  
WESTERN AUSTRALIA

# Heavy soil: alkaline, sodic and dense

A challenge for yield improvement



# Take home

Ripping not providing yield increase

Surface applied gypsum helps soil properties

Exchangeable Sodium Percentage (ESP) >10% good measure of responsiveness

Mounding without covers ineffective

Surface mulching promising

# Understand the problem

## Sodicity

high sodium content, >6% of cations

## pH<sub>(water)</sub>

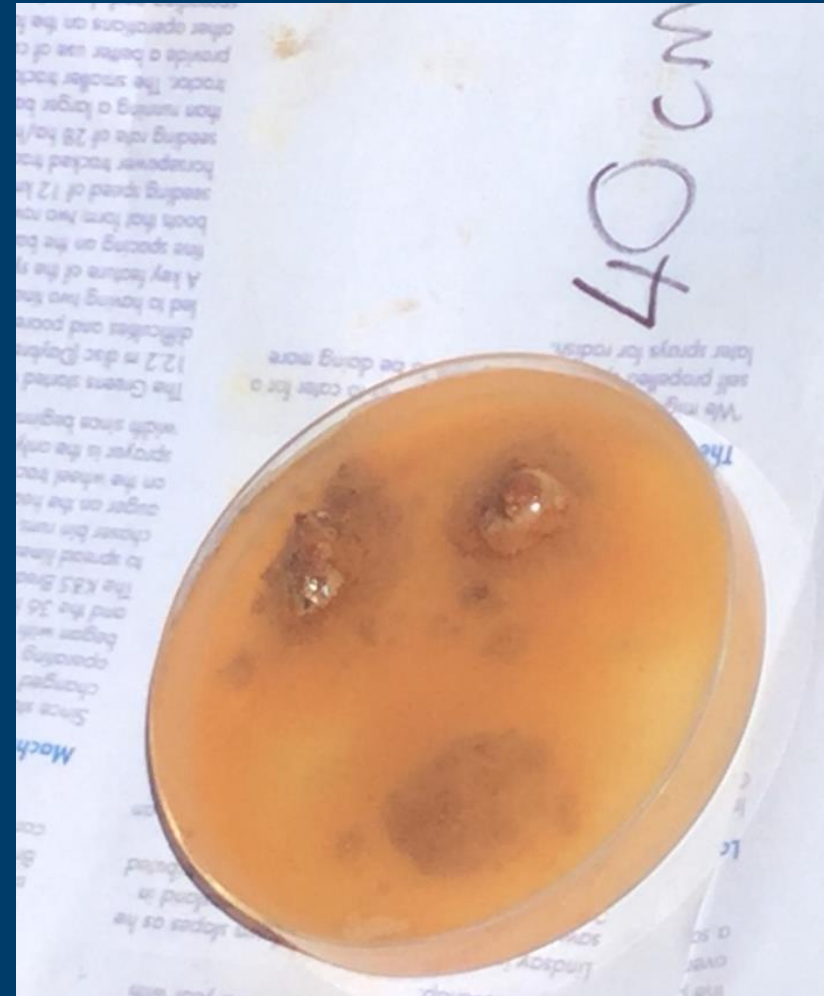
alkaline, >8.1

## Penetrometer Resistance

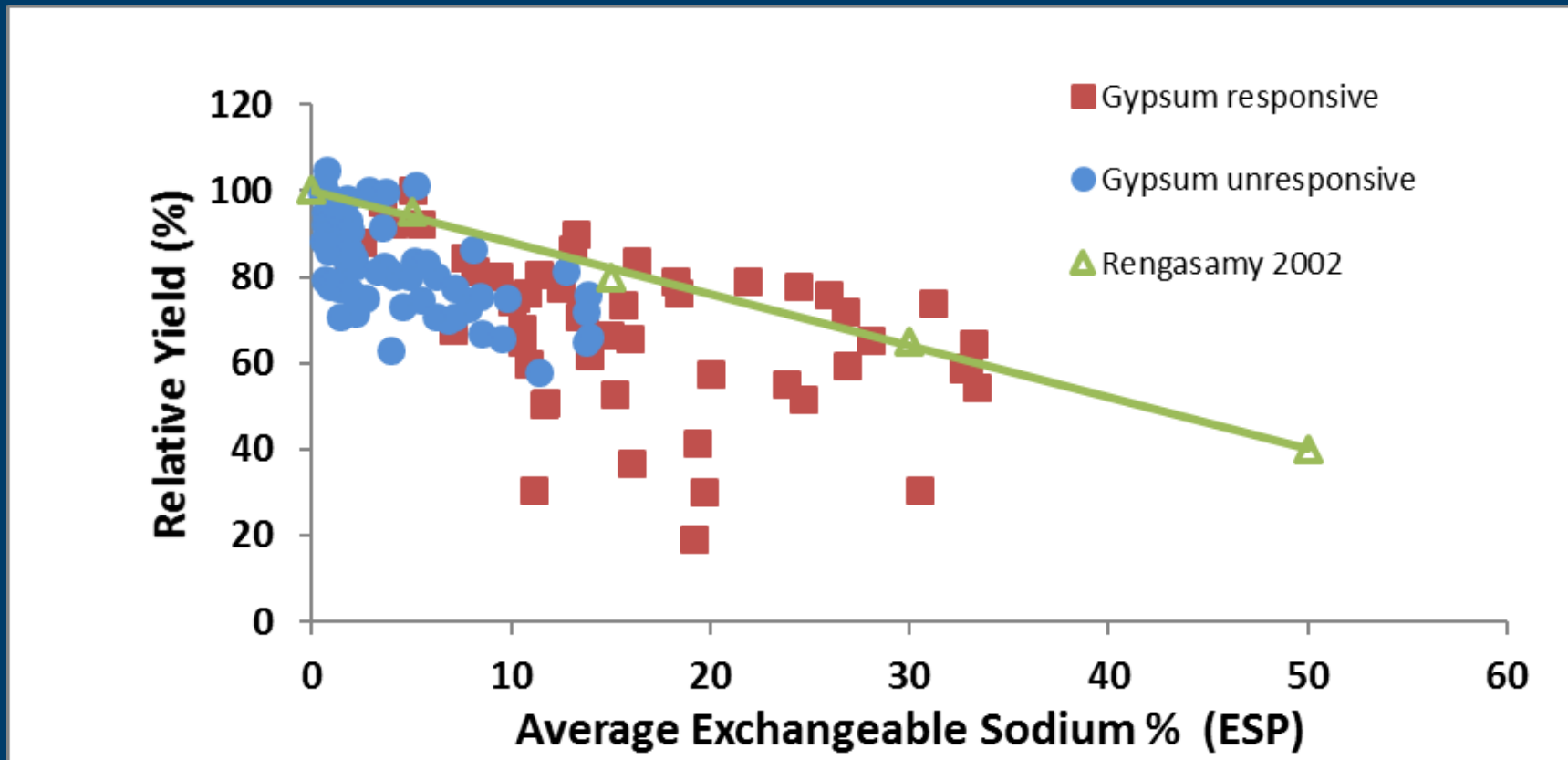
dense, >2.5 MPa

## Transient salinity

>0.3 dS/m



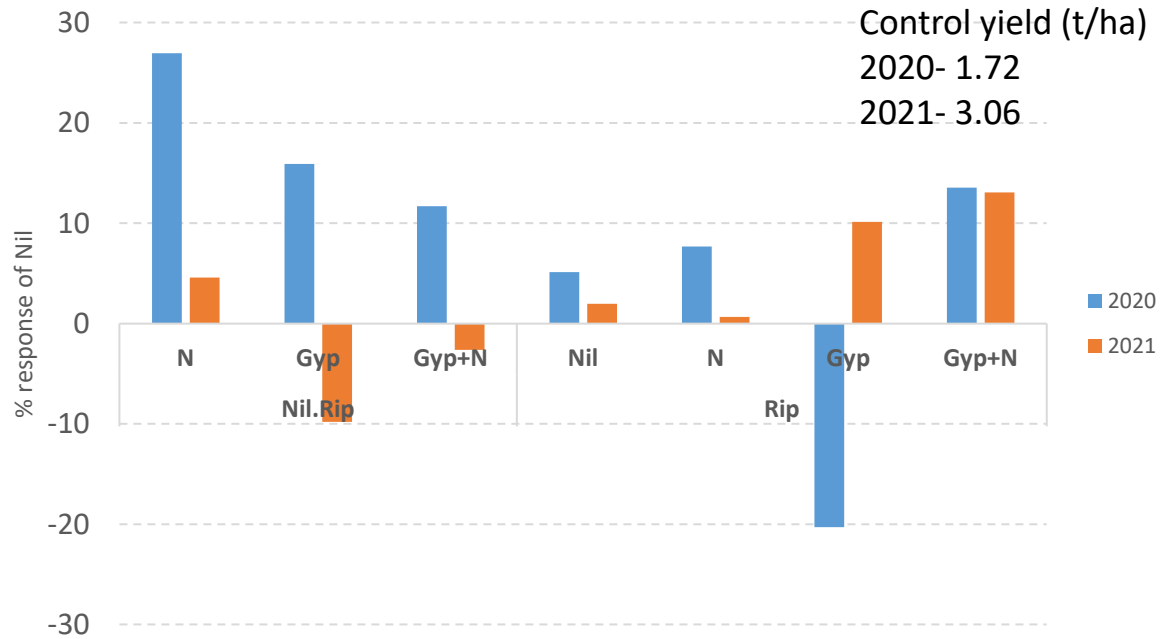
# Change chemistry +Gypsum



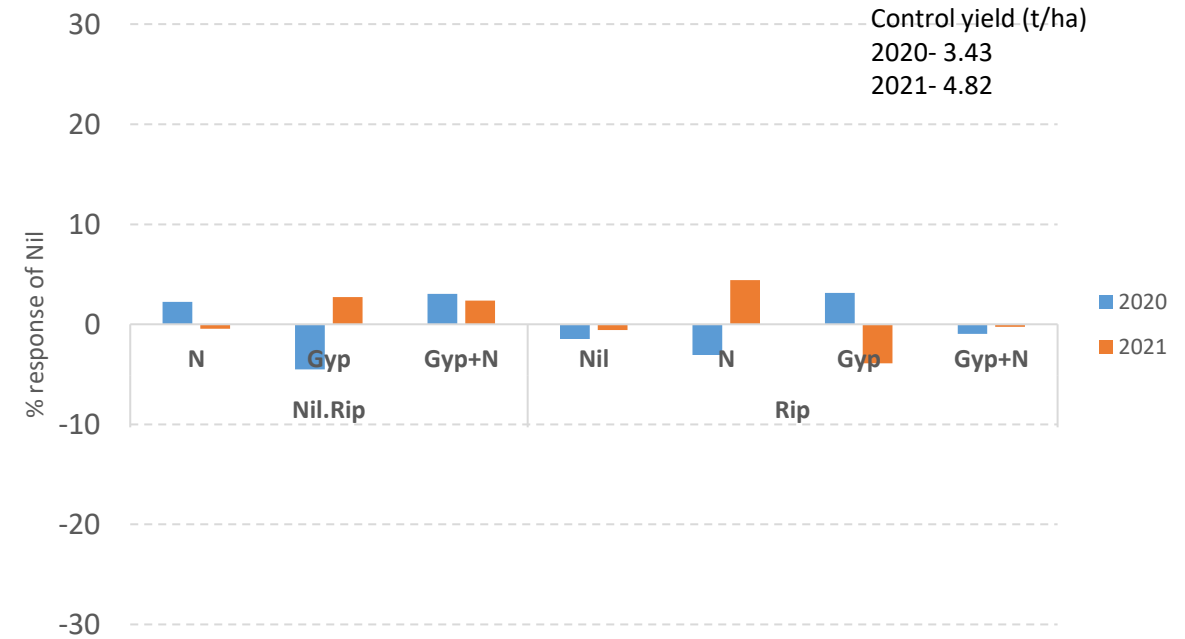
# Ripping = no response



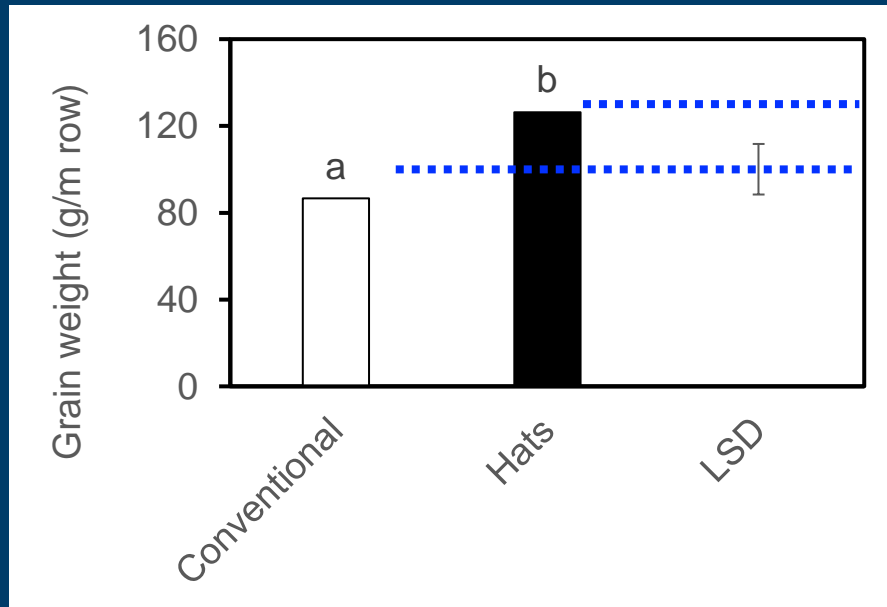
Canna



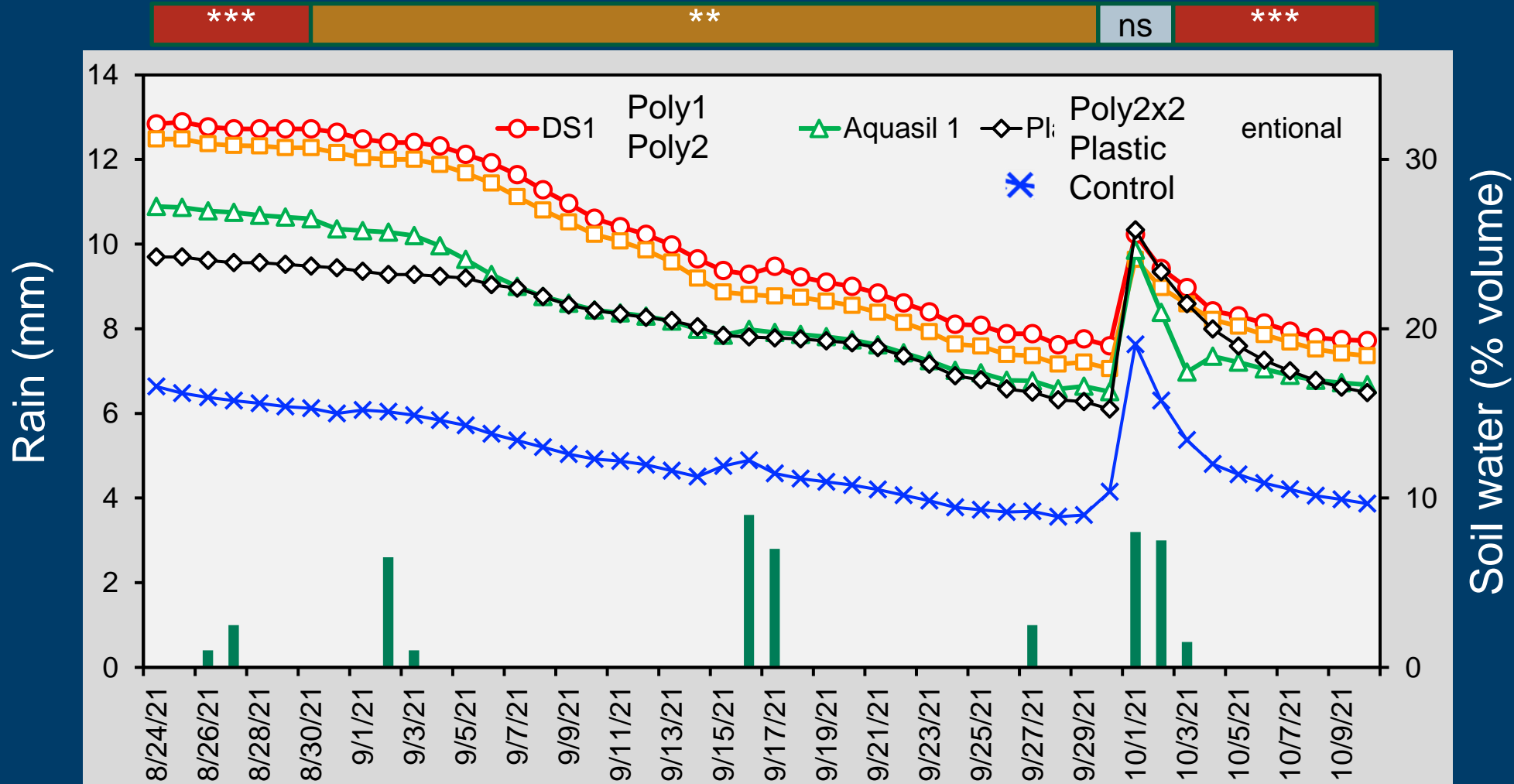
Mingenew



# Add water +Mounding



# Covering mounds increases water content



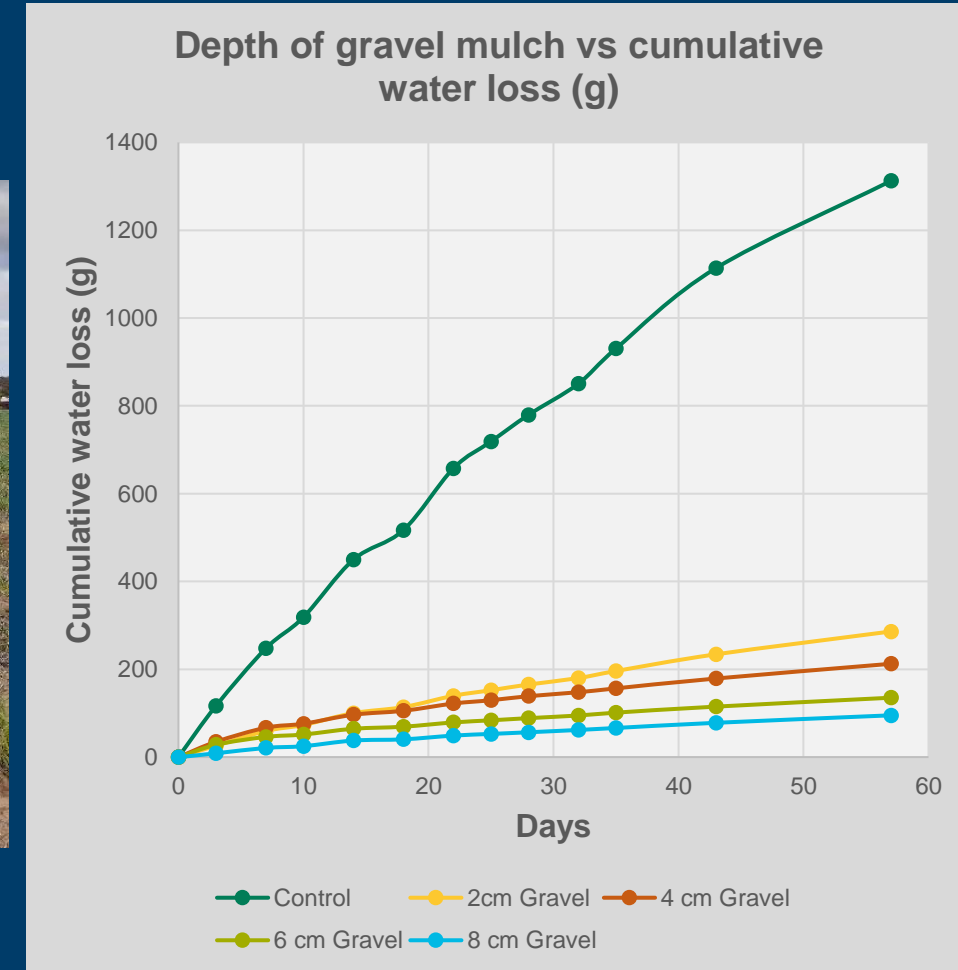
# Mulching to reduce evaporative loss



Organic mulches  
chaff/header row  
Lake Grace 2021



Gravel/Sand Mulch  
Ravensthorpe 2020



Gravel mulch - glasshouse  
Esperance 2021

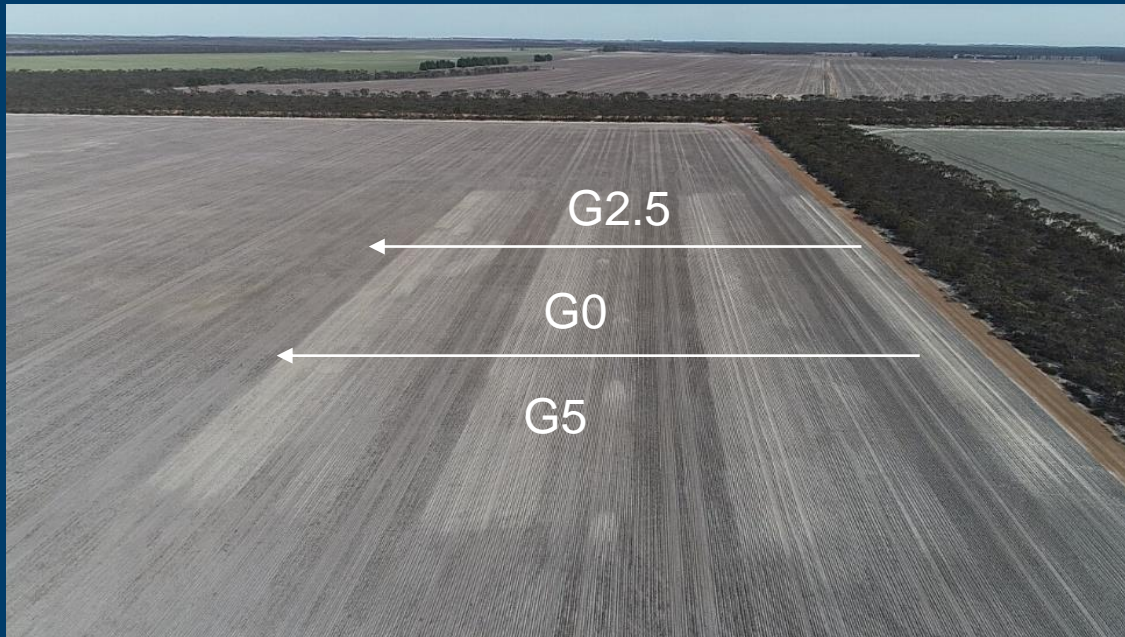


# Mulching to reduce evaporative loss

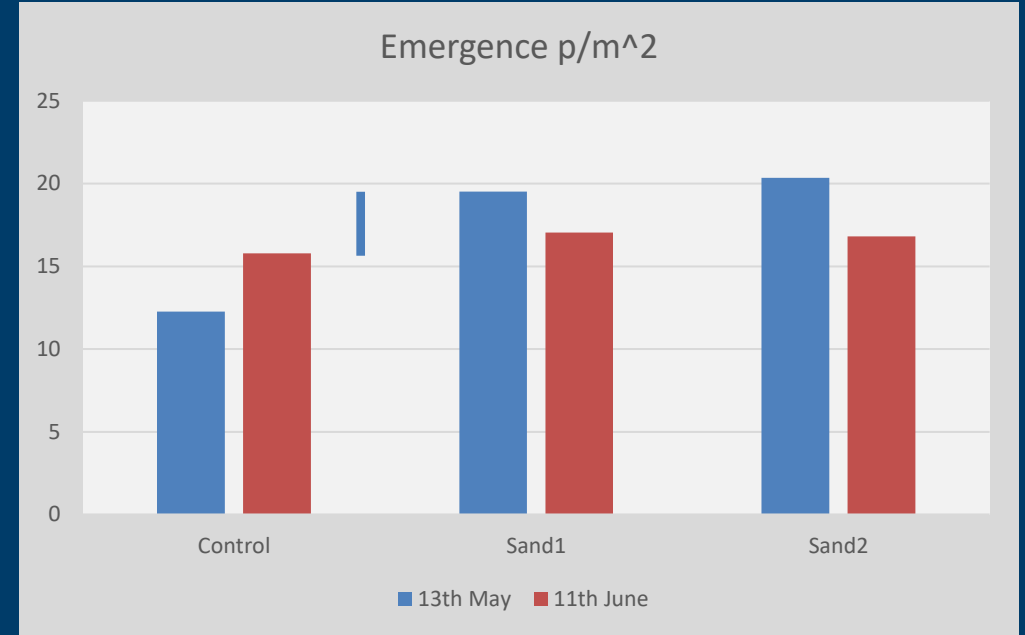
Alkaline loamy duplex

Treatments

Sand (0, 2, 4 cm) x Gypsum (0, 2.5, 5 t/ha)

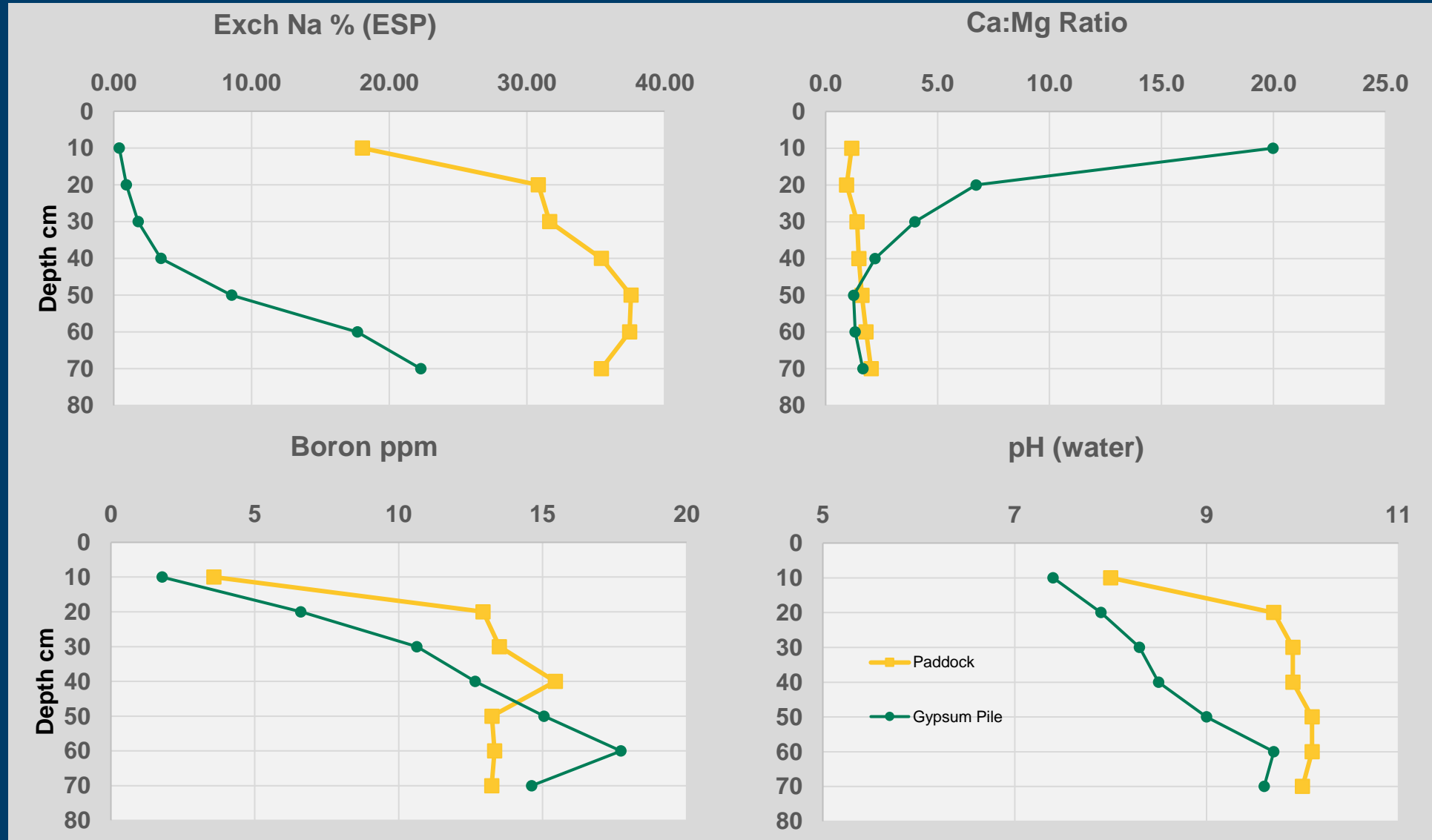


Canola 2020

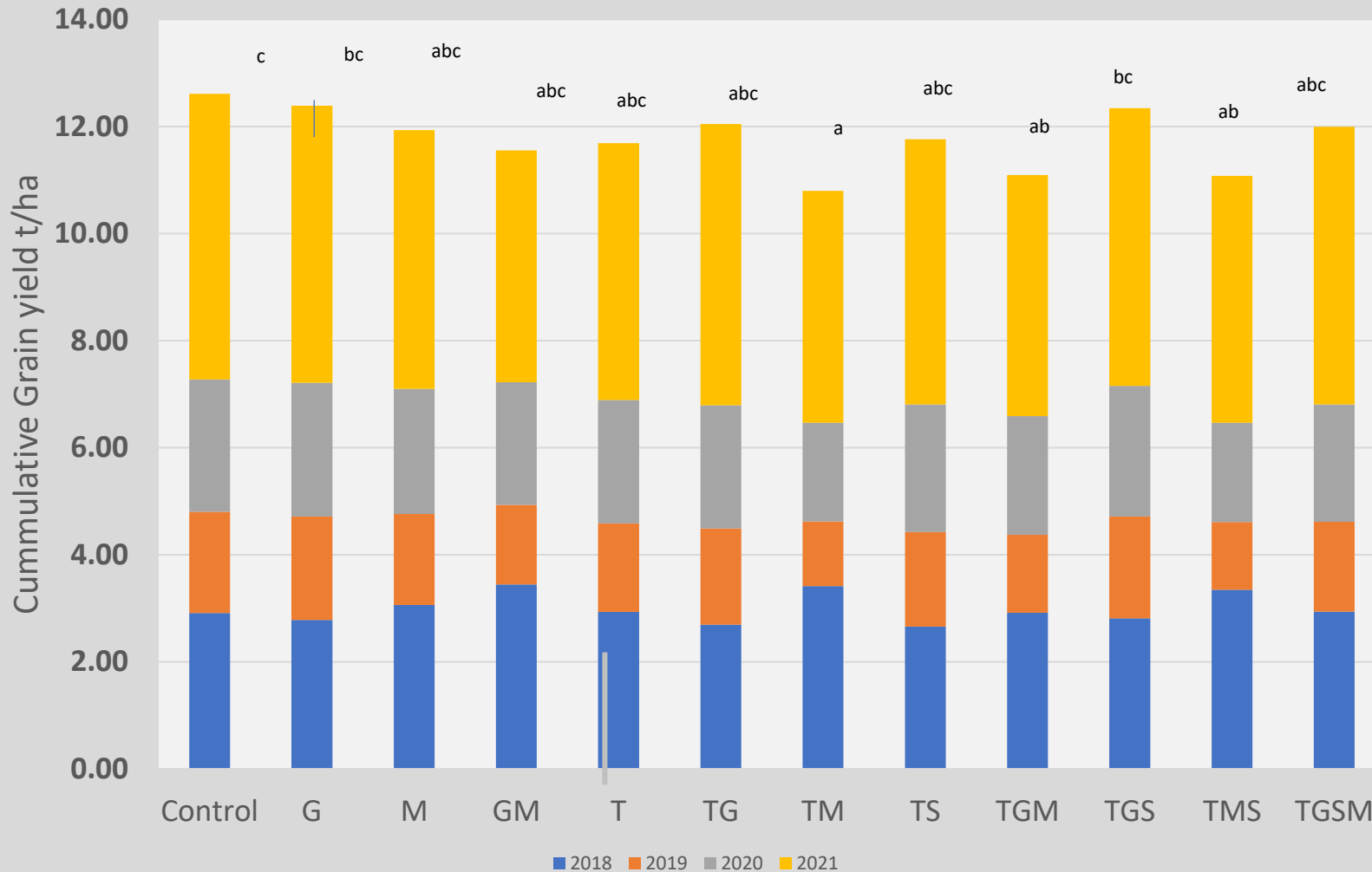


- Improved early emergence in dry starts
- No significant yield difference 2020
- Some evidence of greater water logging = water retention in sanded treatments.

# Gypsum pile case study : Salmon Gums



# Provide structure – +gypsum, +OM

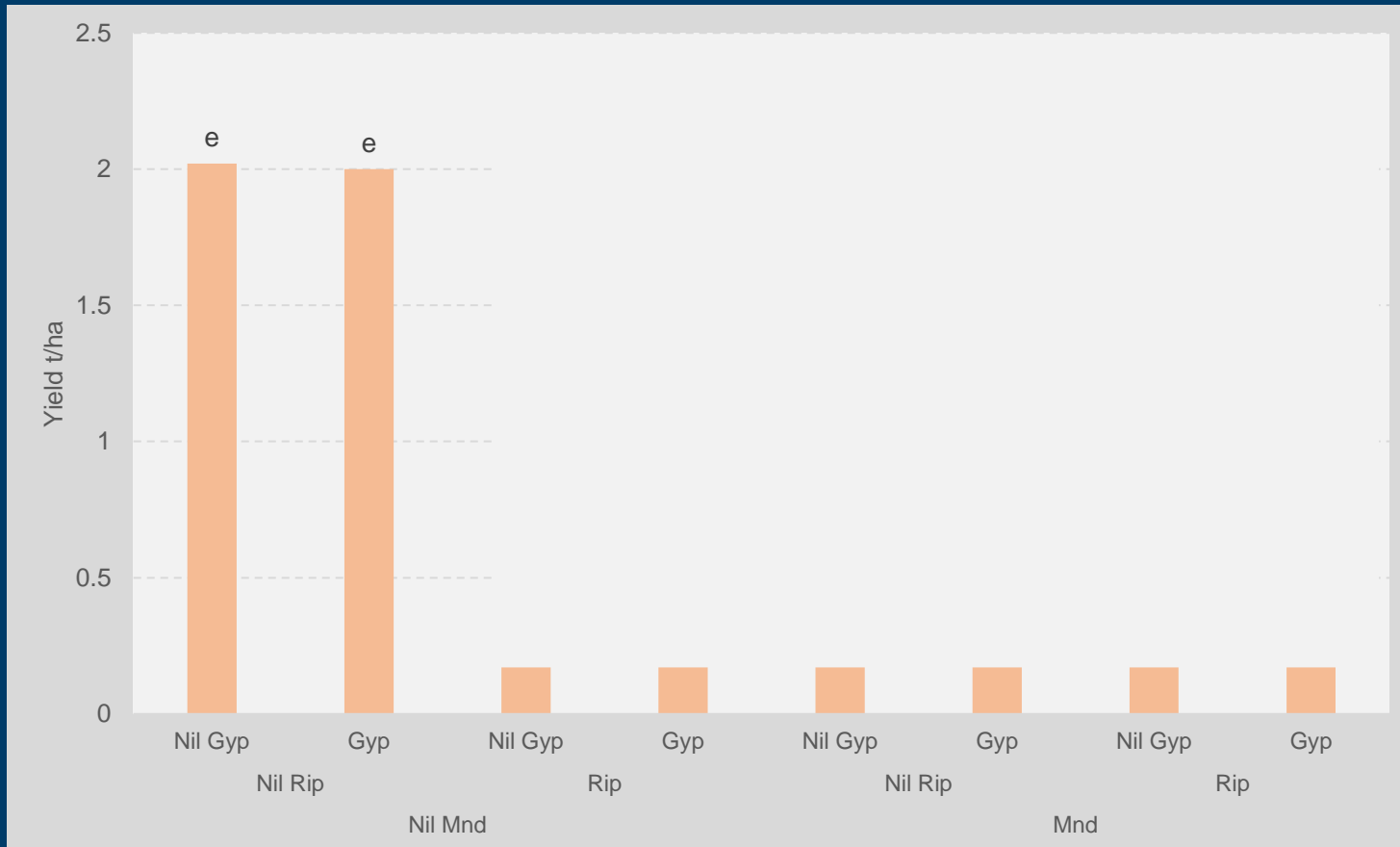


Lake Grace  
3 Decile 1 rainfall years

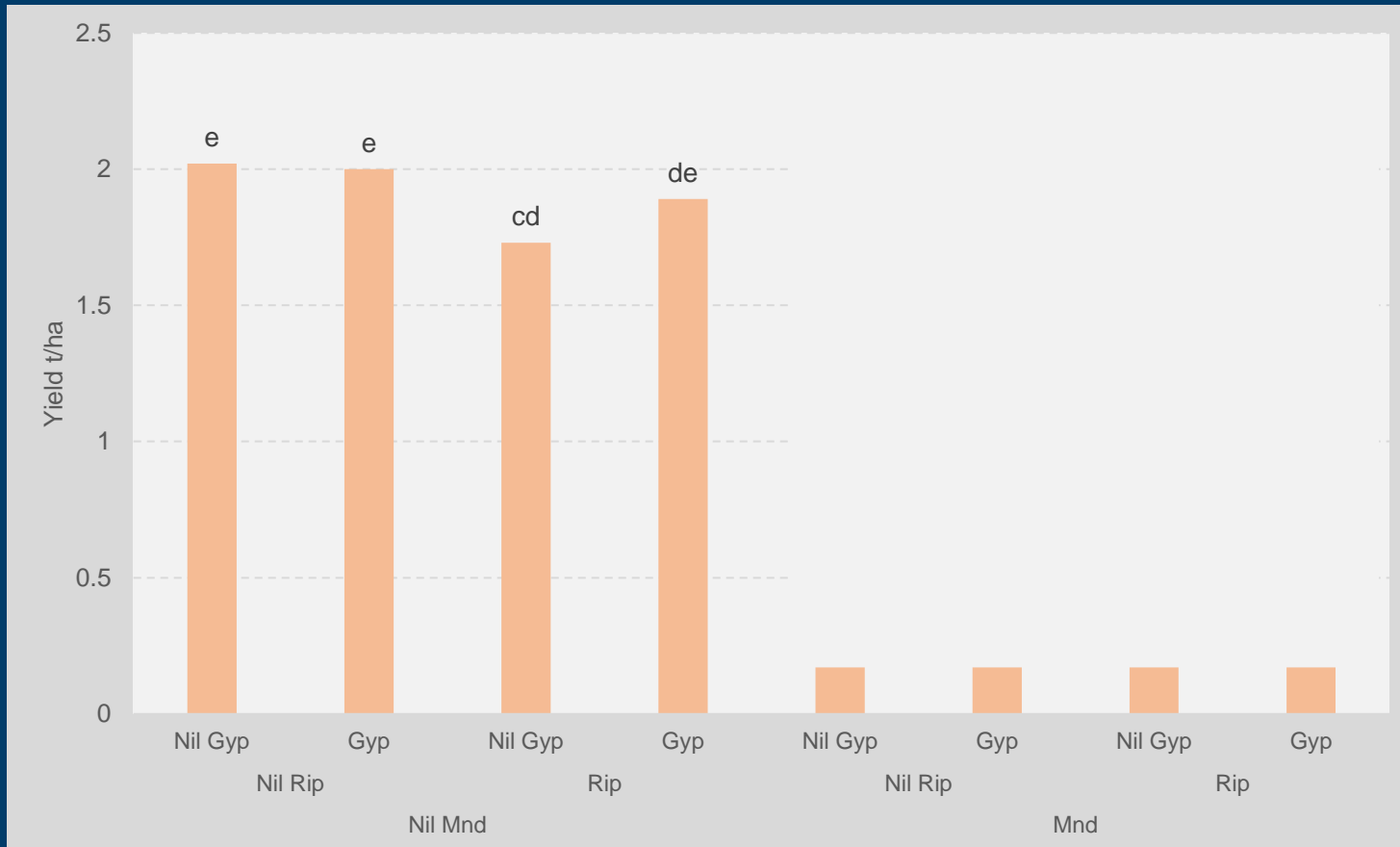
No significant differences

- G = gypsum 3t/ha
- S = Lucerne straw 8 t/ha
- T = Deep incorporation 60 cm
- M = composted chicken litter 10t/ha

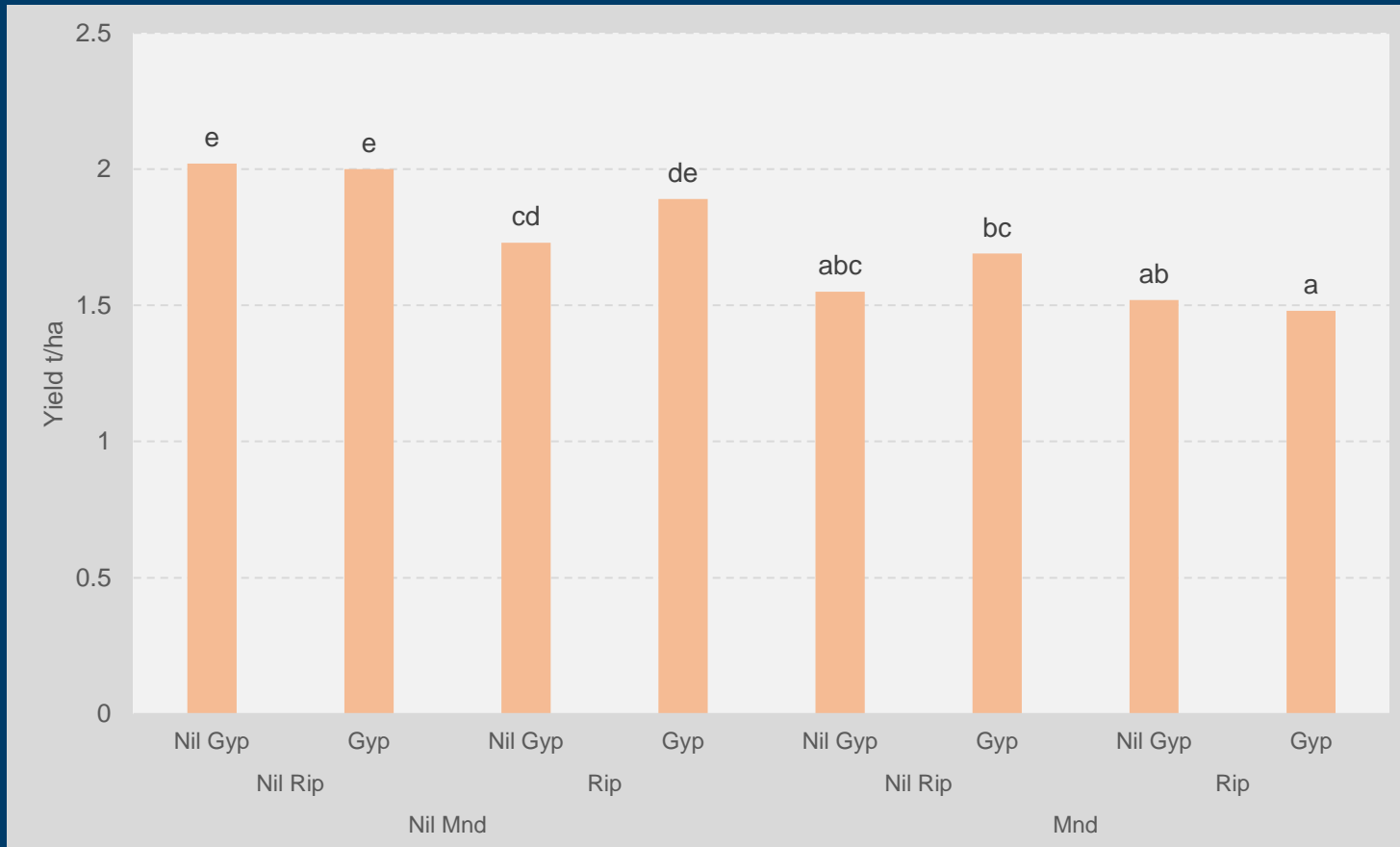
# Add water, reduce resistance, add structure



# Add water, reduce resistance, add structure



# Add water, reduce resistance, add structure



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Ripping not providing yield increase

Surface applied gypsum helps soil properties

Exchangeable Sodium Percentage (ESP) >10% good measure of responsiveness

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Surface mulching promising



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Dana Mulvaney

# Thank you

## Important disclaimer

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