

# WATER USE EFFICIENCY OF RYEGRASS/WHITE CLOVER PASTURE

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New Zealand's specialist land-based university



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Note:

This presentation was made on 7 Nov 2013 in Tauranga at the New Zealand Grassland Association Annual Conference.

It is associated with the following scientific publication:

Black, A.D. and Murdoch, H.M. 2013. Yield and water use of a ryegrass/white clover sward under different nitrogen and irrigation regimes. *Proceedings of the New Zealand Grassland Association*, **75**, 157-163. Online access: [http://www.grassland.org.nz/publications/nzgrassland\\_publication\\_2544.pdf](http://www.grassland.org.nz/publications/nzgrassland_publication_2544.pdf)



Annual

16

kg DM/ha/mm

Spring

22

kg DM/ha/mm

Summer

3

kg DM/ha/mm

Cocksfoot  
Urine Patch

**38**

kg DM/ha/mm

Cocksfoot  
Outside Patch

**17**

kg DM/ha/mm

# QUESTIONS

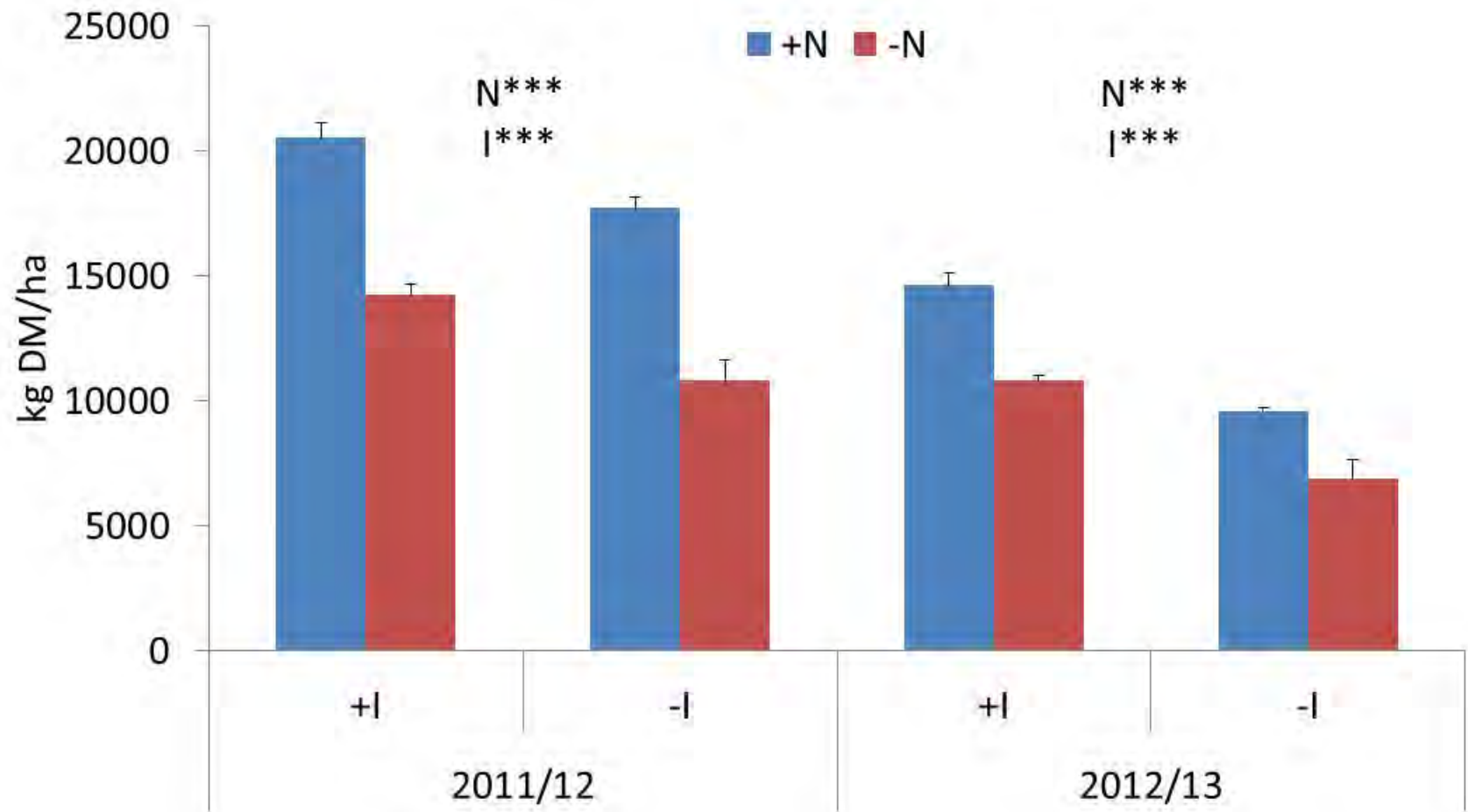
1. How does WUE respond to N?
2. Does the response depend on water supply?
3. Is the response consistent over time?
4. How can we maximise WUE on farms?

# WUE EXPERIMENT



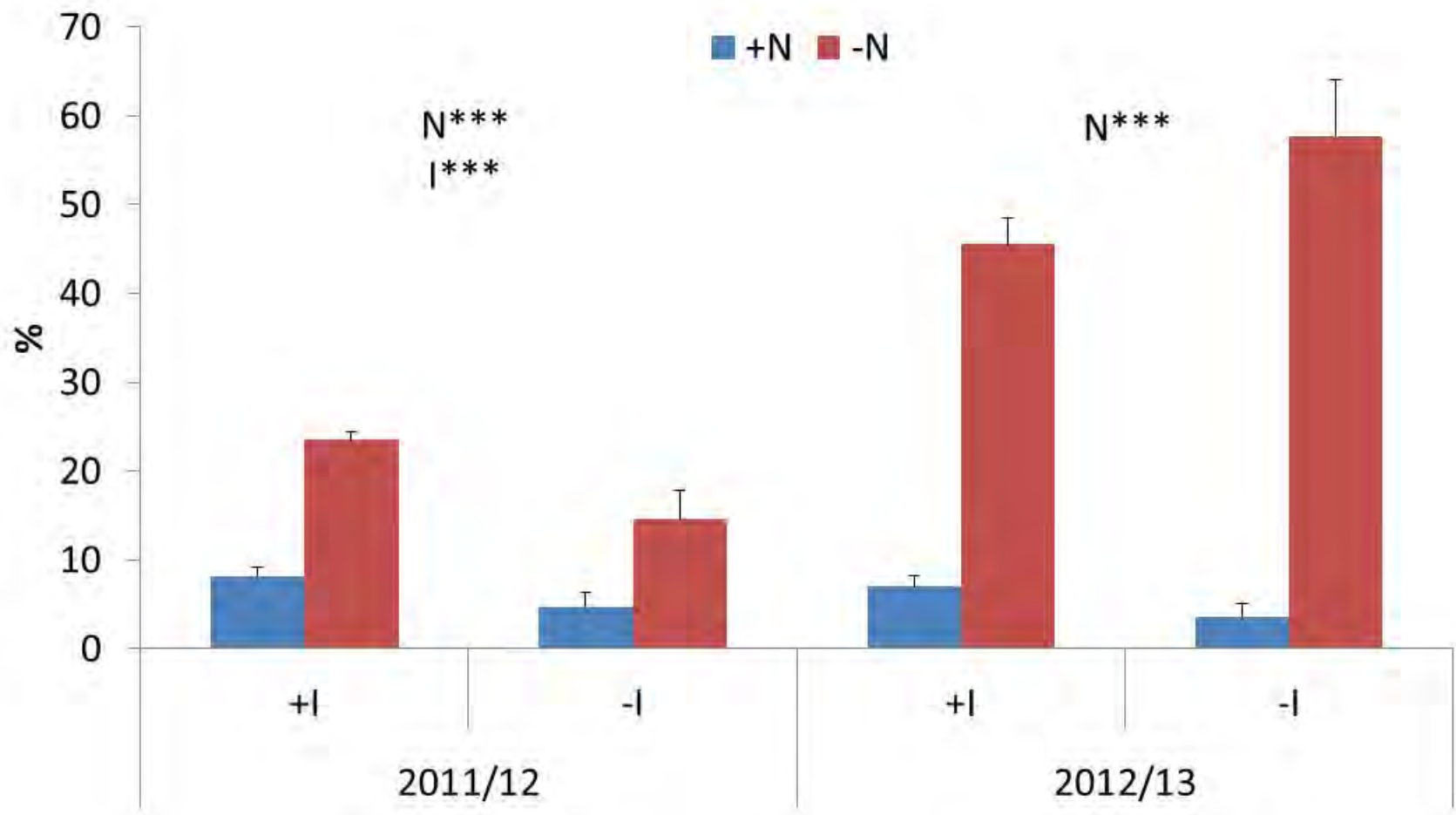
**WUE (yield/water used) over 2 years**

# N INCREASED TOTAL YIELD

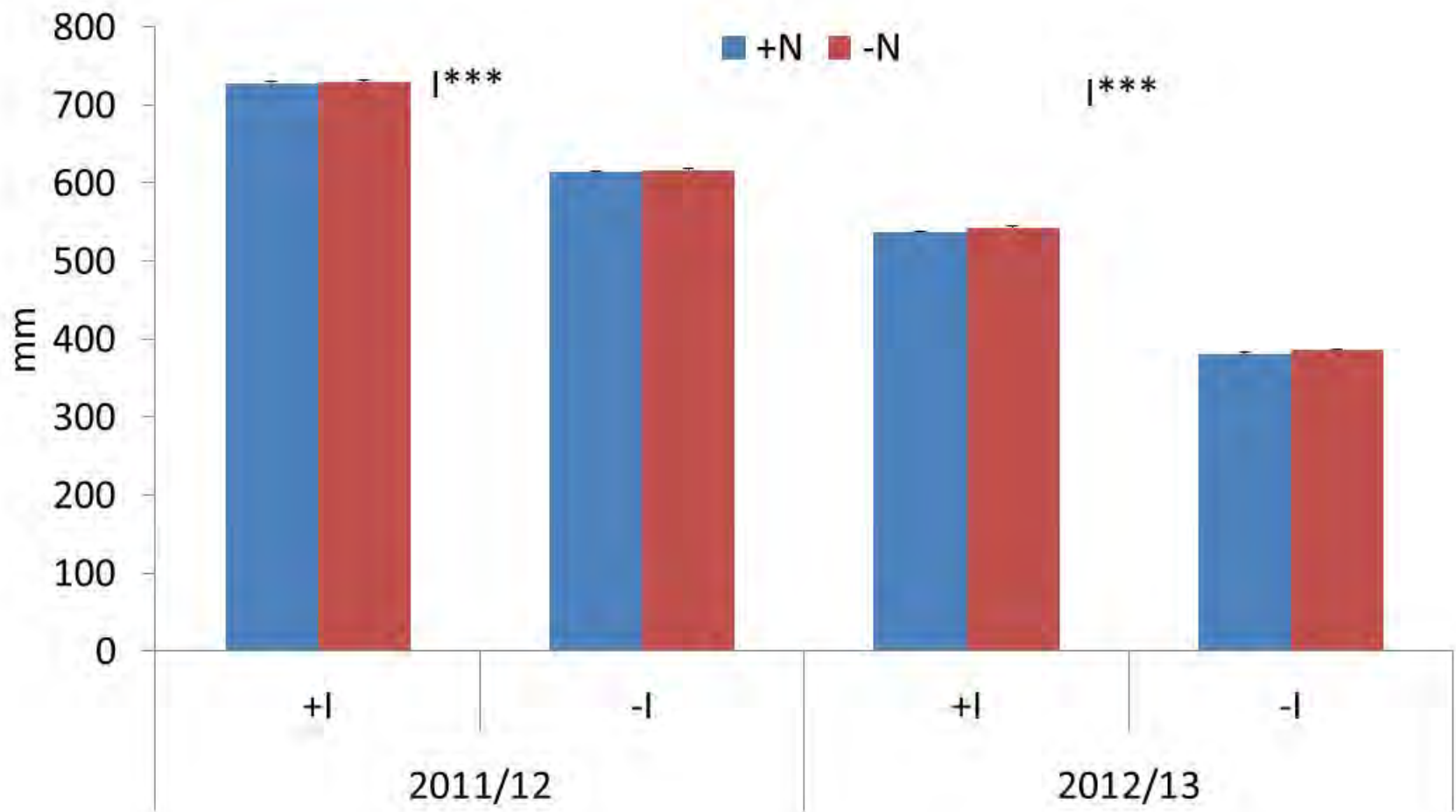




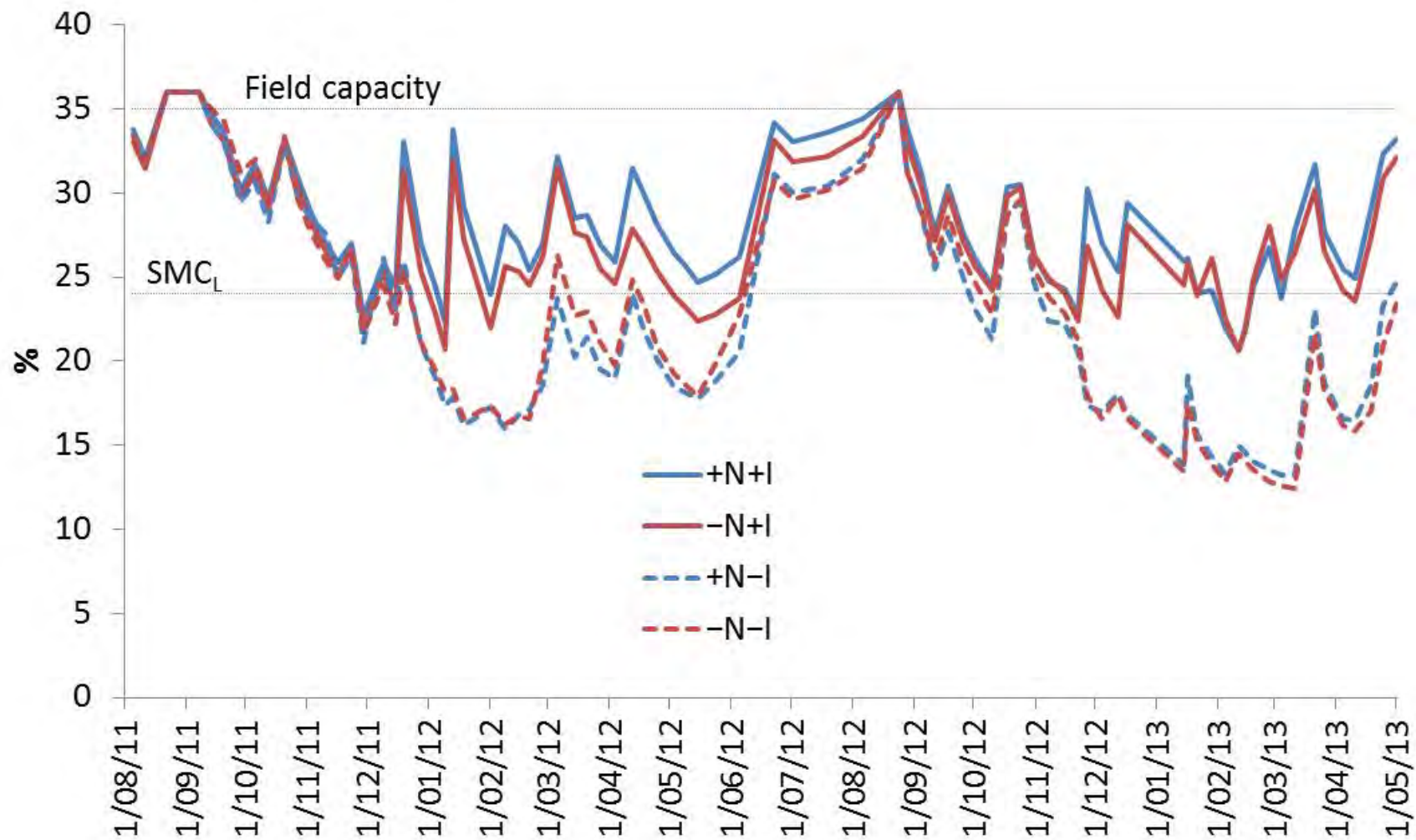
# AND SUPPRESSED THE CLOVER



# BUT WATER USE WAS THE SAME



# SOIL MOISTURE CONTENT





With N

**27**

kg DM/ha/mm

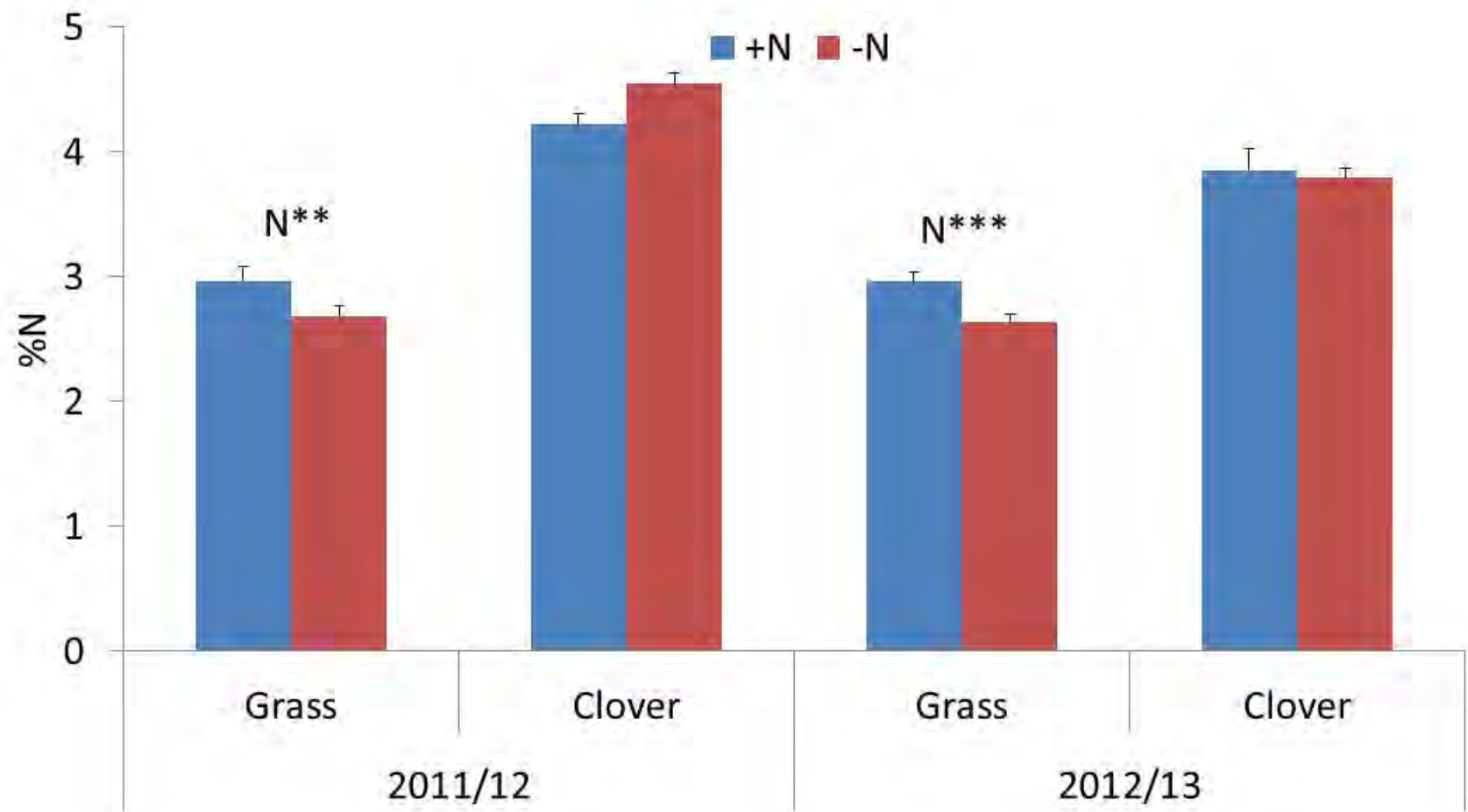


Without N

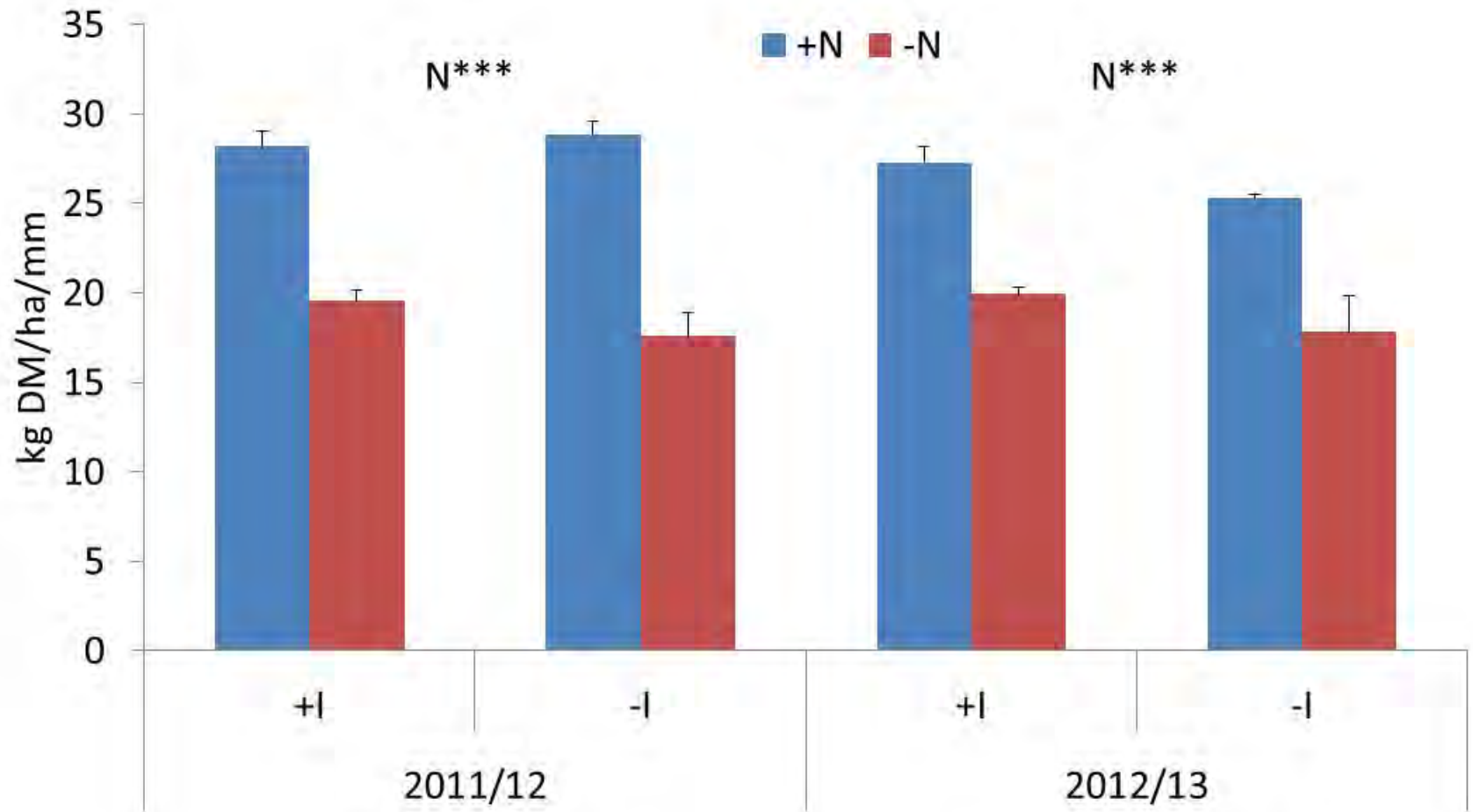
**19**

kg DM/ha/mm

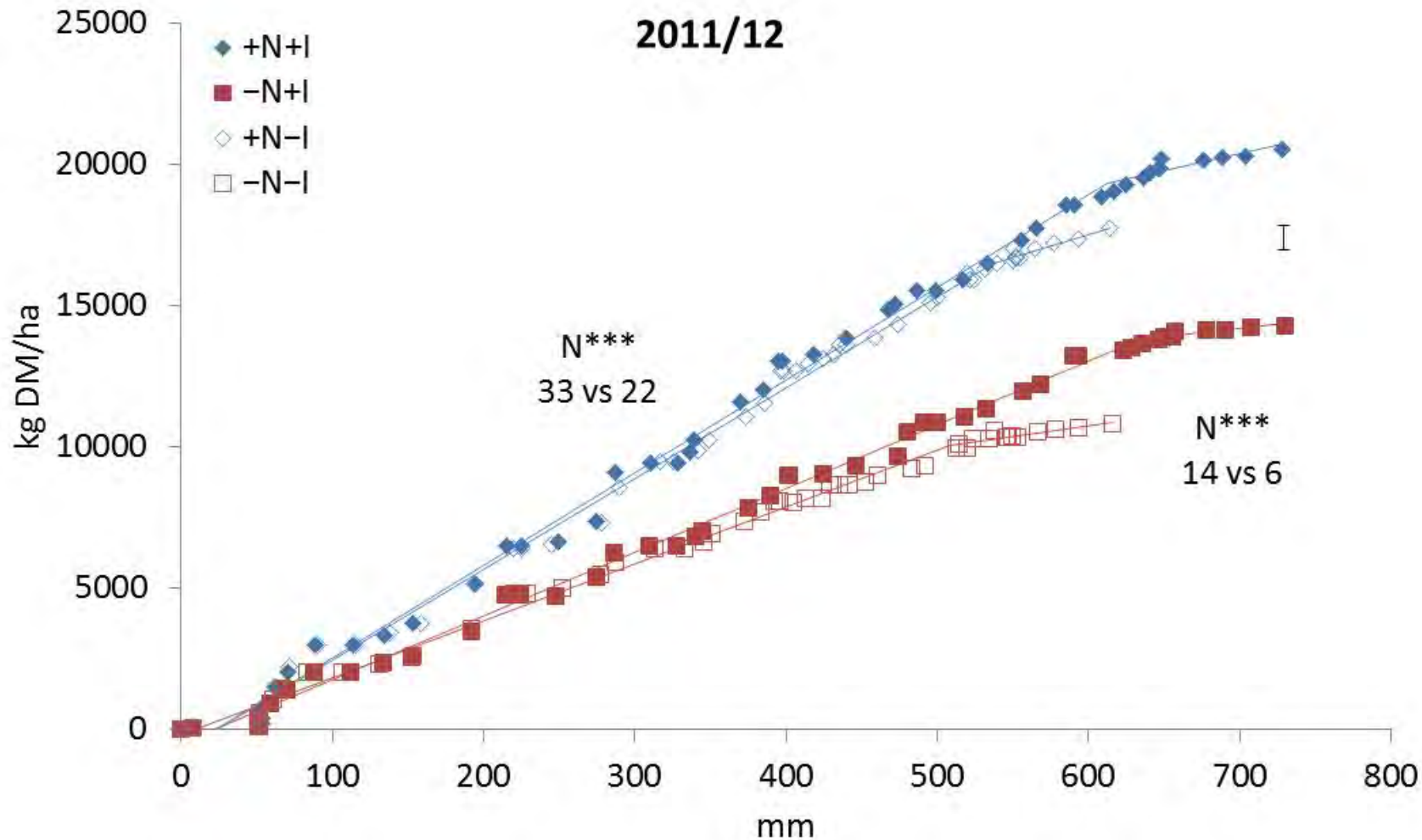
# HERBAGE N



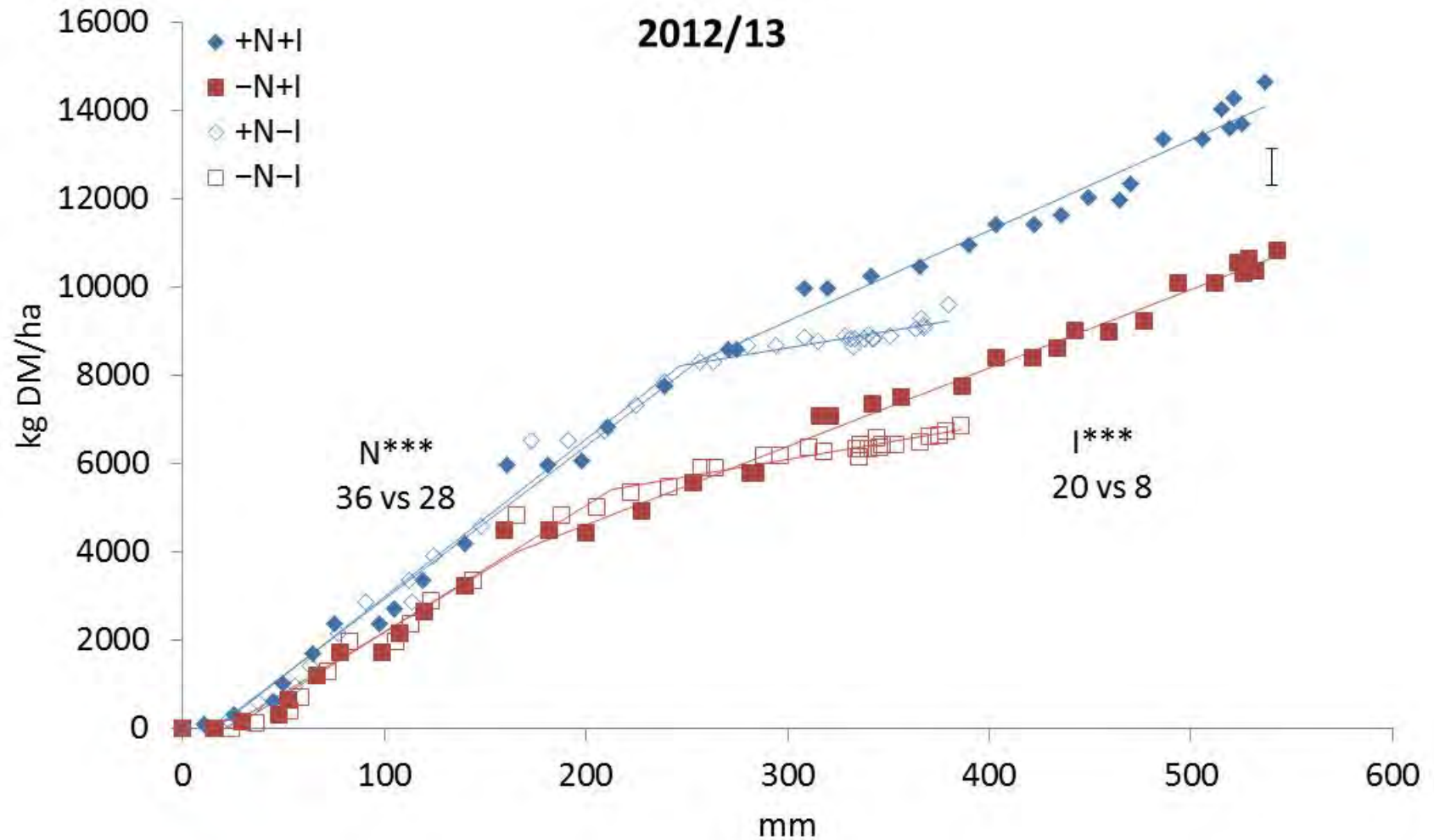
# WUE CONSISTENT OVER SOIL MOISTURES



# CONSISTENT OVER TIME



# CONSISTENT OVER TIME





Lucerne

**40**

kg DM/ha/mm

Grass/clover

**20**

kg DM/ha/mm

Ryegrass – N

**13**

kg DM/ha/mm

Without N

**19**

kg DM/ha/mm

With N

**27**

kg DM/ha/mm

Dairy pasture

20

kg DM/ha/mm

Conservative?



HOW CAN WE INCREASE WUE ON FARMS?



'Rosabrook' subterranean clover



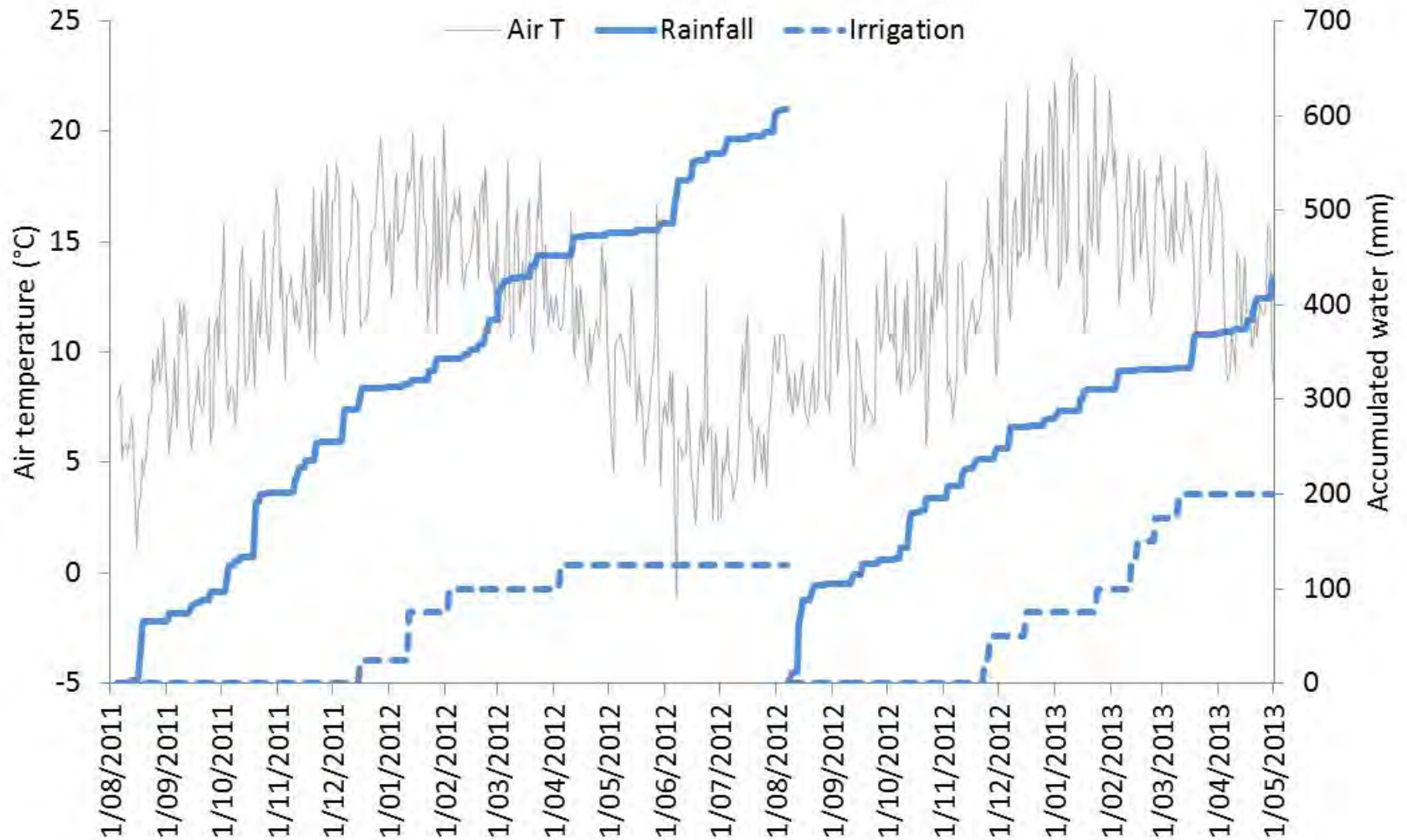
# Russell lupin grazing trial at Sawdon Station



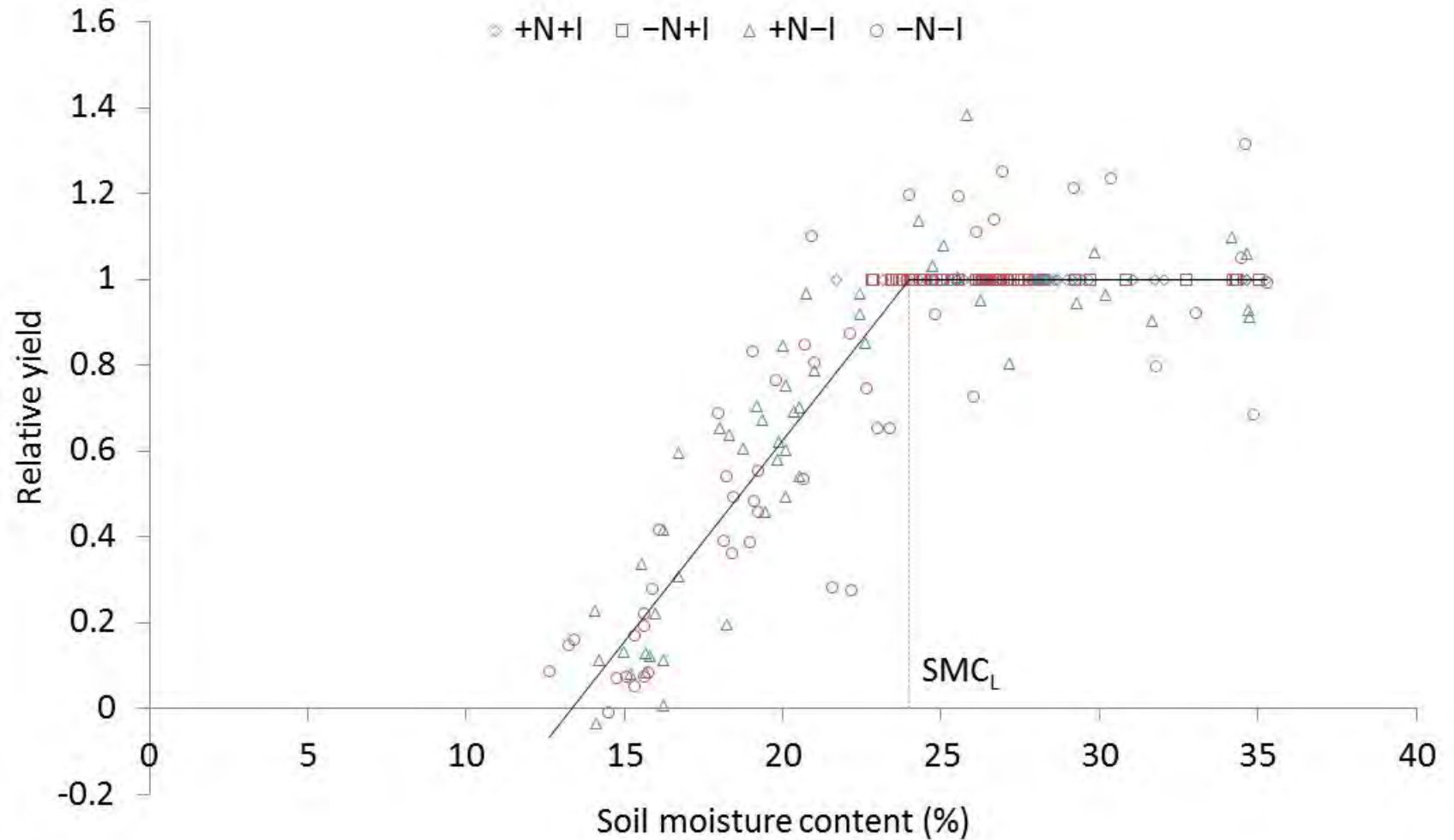
# CONCLUSIONS

1. Annual WUE was **27** kg DM/ha per mm with N and **19** kg DM/ha per mm without N
2. Robust across irrigated and un-irrigated regimes
3. Consistent for most of each year, but decreased over winter and the dry 2012/13 summer
4. High WUE can be achieved with strategic N fertiliser, pure legume stands, and high clover contents

# CLIMATE AND IRRIGATION



# CRITICAL SOIL MOISTURE CONTENT





# PLATE METER CALIBRATION

