

Irrigated maize in cotton systems

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Zea mays: Maize or corn?

- Queensland and New South Wales = corn
- Victoria (and New Zealand) = maize
- Therefore:
 - Aerial ping-pong or All Blacks fan = maize
 - Wallabies fan = corn



Why is corn becoming more popular on cotton farms?

- Strong commodity prices (\approx \$320-350/tonne) driven by record consumption
- Flexible planting dates – Late August to January
- Flexible harvest dates
- Short growing season
- Can be used as a refuge as part of a Bollgard II resistance strategy
- Diverse marketing options – silage, feed grain, processing grain (chips, flour, waxy, high amylose)
- Anecdotal evidence of improved cotton yields after a corn crop



Anecdotal evidence of yield improvements

- South Burnett – 10-12 bales/ha (cotton-corn) compared to 7.5 bales/ha (back-to-back cotton)
- Dalby and Moree growers have reported up to 25 % cotton yield increases in fields coming out of corn compared to continuous cotton

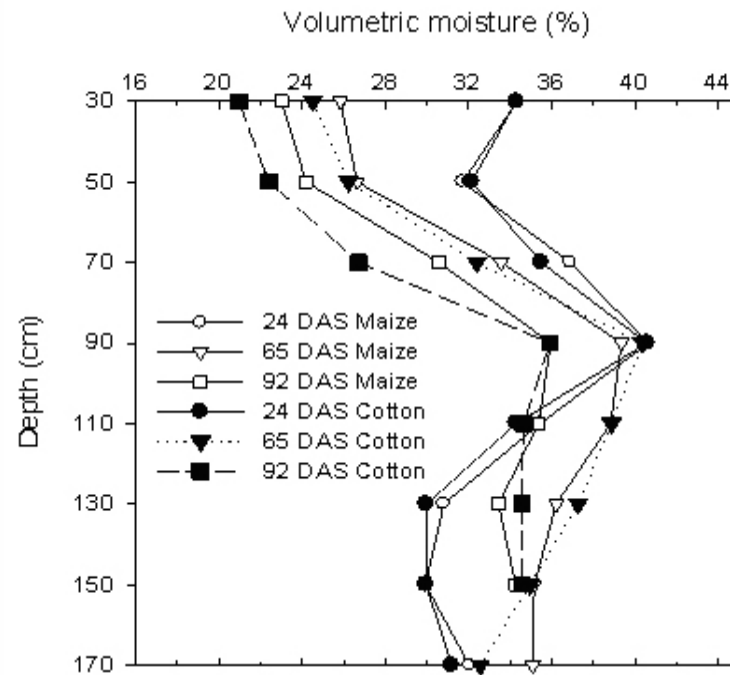


Gatton research

- Investigating the quantitative yield and economic benefits of maize in irrigated cotton-based systems (Alison Devereux)
- 2007-08
 - Water excluded from cotton and corn:
 - 38 days after sowing until maturity – prolonged water stress
 - 71 days after sowing until maturity – short water stress
 - Soil moisture and root mass measurements



Gatton results – soil moisture (prolonged water stress)



Gatton results – root mass (prolonged water stress)

	24 DAS		65 DAS	
	Corn	Cotton	Corn	Cotton
	kg/ha			
0-20 cm	95	393	1220	305
20-40 cm	60	140	391	141
40-60 cm	0	26	179	79
60-200 cm	82	15	82	92
Total	239	575	1875	619



Gatton results – key findings

- Soil water extraction is greater in cotton compared to corn
 - More soil water is available to the following cotton crop
- Corn generally has a higher root mass than cotton
 - Increased number of macropores meaning better soil drainage and water availability

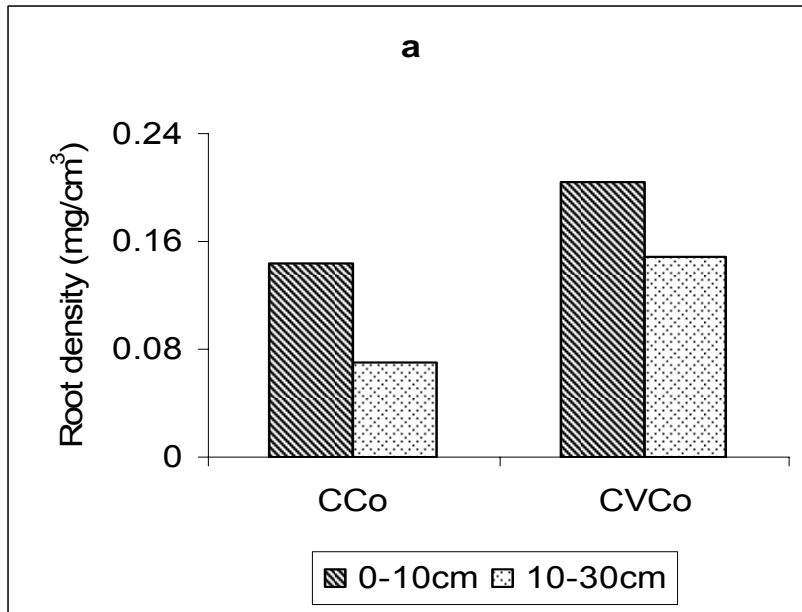


Narrabri research

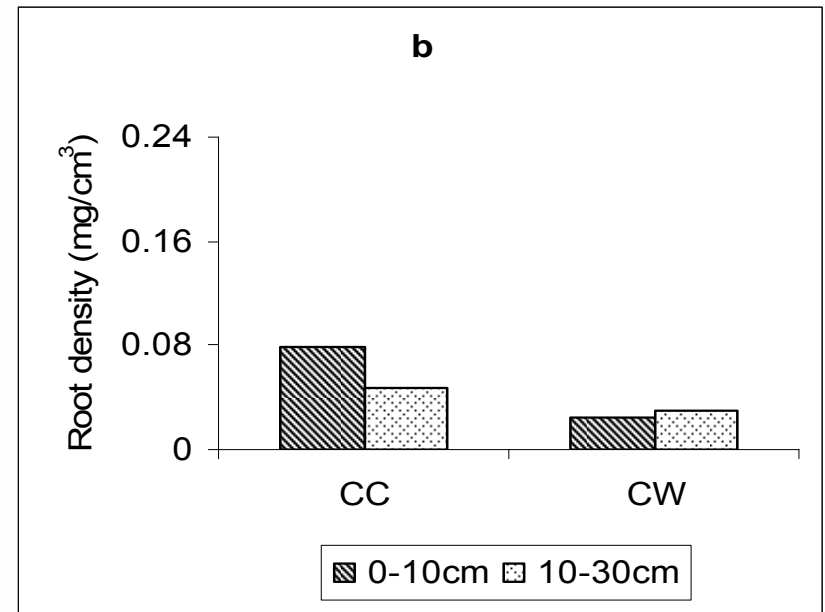
- Long term rotation trial at ACRI (Nilantha Hulugalle)
- 2006-07
Study of four cotton-based rotations including corn (James Terry)
 - Differences in organic carbon, carbon fraction and microbial biomass



Narrabri study – root density



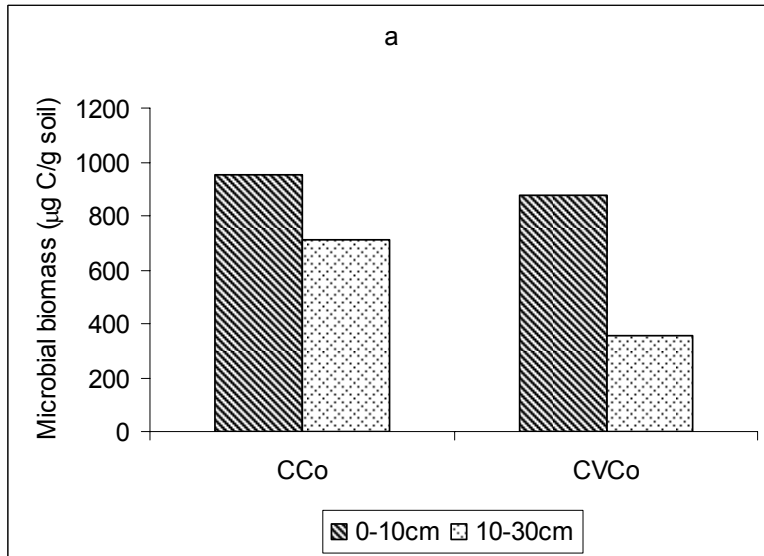
Cotton-corn Cotton-vetch-corn



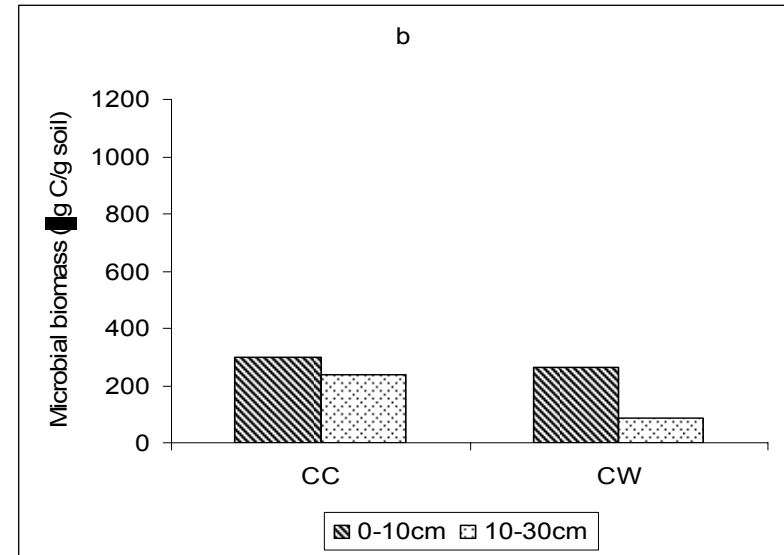
Continuous cotton Cotton-wheat



Narrabri study – microbial biomass



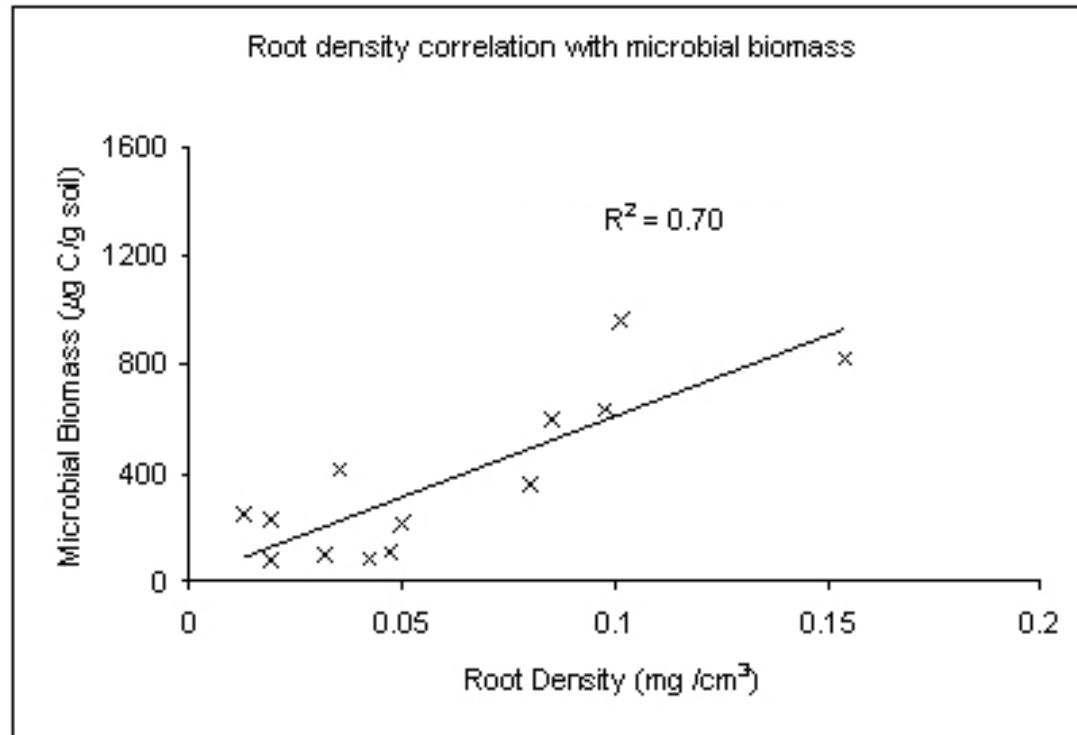
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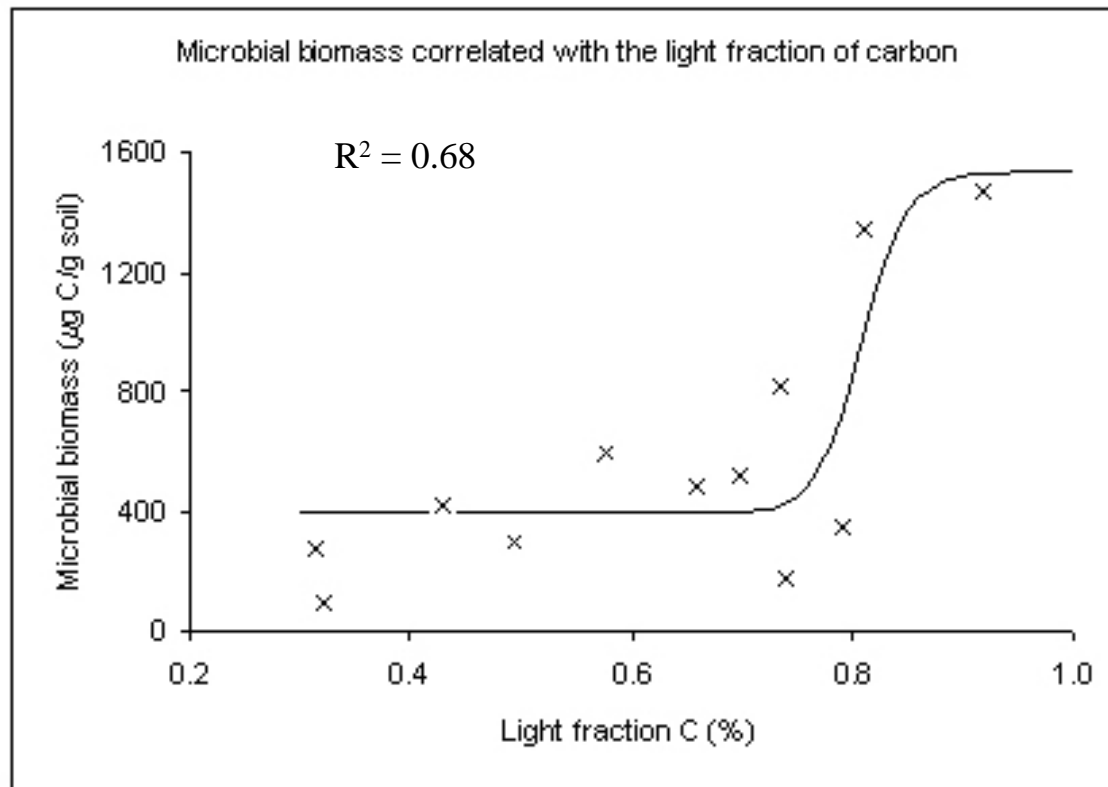
Continuous cotton Cotton-wheat



Narrabri study – root density: microbial biomass



Narrabri study – labile carbon



Narrabri study – key findings

- Root density is higher in rotations that include corn
- There is a positive relationship between root density and microbial biomass
- There is a positive relationship between microbial biomass and labile carbon
- Potential improvements in soil porosity and structure in following cotton crop



Narrabri research – yields (2007-08 season)

Treatment	Lint (bales/ha)	Lint (t/ha)
Continuous cotton	8.2	1.9
Cotton following corn	8.8	2.0
Cotton following wheat	8.8	2.0

Treatment	Total dry matter (t/ha)	Grain (t/ha)
Corn following cotton	6.9	4.4
Corn following corn	8.0	6.4

Long term rotation trial



Conclusions and more questions

- Corn improves soil condition in the cotton rotation
 - Labile carbon, microbial biomass = soil porosity, soil structure
- More available moisture is left in the soil after a corn crop (c/w cotton)
- These factors are likely to give better plant growth in following cotton crop

- Are these the drivers behind yield improvements of cotton following corn?
- What are yield increases likely to be?
- What are the long-term impacts of introducing corn into the cotton rotation?
 - Improved sustainability?
 - Improved returns



Acknowledgements

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 - Nithantha Hulugalle, Cotton CRC/NSW DPI
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 - Daniel Tan, University of Sydney



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Thank you

