5.2 RAISED BED MAINTENANCE

5.2.2 LISMORE

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The Lismore observations were undertaken with the same objectives as stated above for the Gnarwarre trial, but rather than using a range of treatments in a standard design, we decided in the first instance to make yield and soil water measurements on a single bed-renovation treatment (shallow cultivation to 6" or to furrow depth) that had been carried out by the farmer.

Methodology:
Yield measurements were taken from three random samples from each of the two main treatments; ie. Renovated versus un-renovated beds situated side by side and sown to a crop of barley. For soil water measurements an adjacent perennial pasture area was sampled as the control. The raised bed area had been under pasture until two years earlier when part of it was converted to raised beds for cropping. Therefore the complete set of treatments for comparison were,

a. Control (perennial pasture)
b. Raised beds (2 years old-not renovated)
c. Raised beds (2 years old and renovated).

Harvest Date: 20 December 2002.

Results and Discussion:

Table 65: Grain Yield and Harvest Index (HI) – Lismore 2002 Raised Bed Renovation

Treatment	Grain Yield T/ha	HI (%)
Control	4.4	53.5
Shallow Cultivation	4.0	52.6

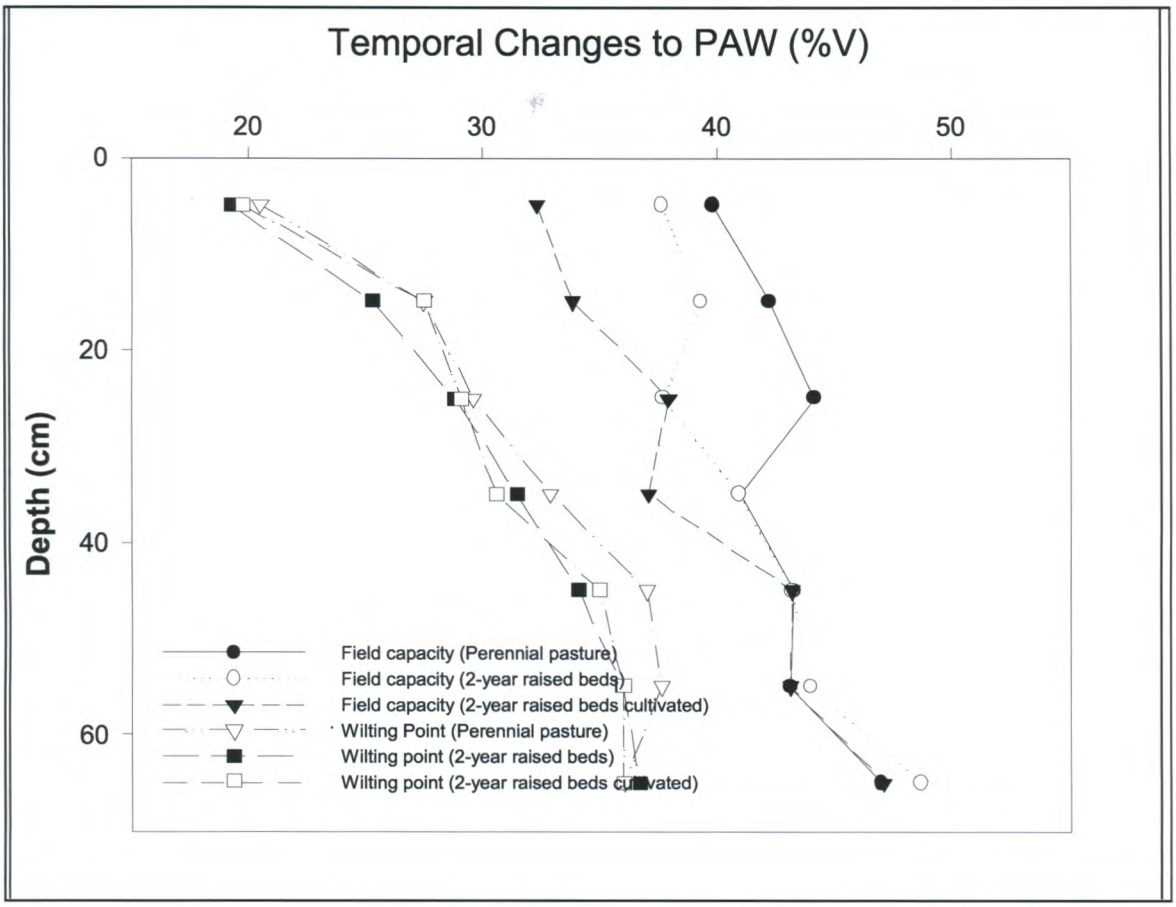
It was observed that in its implementation of the shallow cultivation treatment, there were disturbances to the tilth of the topsoil, which was never fully rectified. Even at the end of the season large clods of soil remained at the surface that appeared to interfere with the establishment of the crop earlier in the season. This disruption appeared to create differences in seed-soil contact that eventually resulted in a less dense crop on shallow-cultivated beds. This also resulted in greater exposure of soil in this treatment that would have had adverse consequences for plant water use particularly during the grain-filling spring season. These events may have contributed to the marginally lower HI and grain yield in the cultivated treatment.

Figure 17 shows changes to plant available water (PAW) with the imposition of the different treatments. We may consider the perennial pasture as a system in long-term equilibrium where there would be stable upper and lower limits of PAW. At the Lismore pasture site, when fully wet, the profile will hold approximately 70mm of plant available water to a depth of 70cm as shown by the field capacity and wilting point curves. Figure 17 also shows that with the installation of the raised beds, the upper limit of PAW has dropped probably because of the disruption to pore structure and changes to organic matter, which should rectify in a few years with further cropping cycles.

Figure 17 shows that the shallow cultivation treatment at the commencement of the 2002 cropping season has further reduced the upper limit of PAW, while the lower limit (wilting point) has not moved to have an impact on PAW. The movement of the upper level of PAW clearly demonstrates that any sustainable change to crop/pasture productivity through improved water use cannot be expected immediately after the change in land use has been brought about. As the "system" achieves equilibrium the soil water dynamics appear to improve and begin impacting on subsequent crops (see Gnarwarre systems trial results 2002/03 in this edition).

The growing season rainfall at Lismore (363mm) was higher than at Gnarwarre (333mm) and also had a much higher rainfall during the pre-growing season (Summer/Autumn). However, the observations suggest that due to the heavy texture of the soil (more dense than at Gnarwarre), the profile was never fully replenished at any stage during the year. This appears to indicate the importance of soil water dynamics in the active root zone of the crop. Any agronomic and/or mechanical operation that will create a greater depth of permeable soil will undoubtedly contribute towards productivity and also lead to yield stability across unfavourable years.

Figure 17: Temporal Changes to Plant Available Water (PAW) in the Lismore Bed Renovation Trial.



Conclusion:

The first-year response of a shallow cultivation treatment (as bed renovation) was not significant and barley yield was marginally superior in the control. This is in contrast to the results at Gnarwarre where opposite trends were observed, but on a lighter soil. In the heavier Lismore soils, it may be worth looking at the deep ripping option as the higher rainfall compared to Gnarwarre may result in a different soil water use pattern. The shallow cultivation treatment also should be monitored for a further year or two until the system achieves equilibrium.

Acknowledgments:

The support of the Grains Research and Development Corporation in conducting this research programme is gratefully acknowledged.

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