8.4.1 SPRING WATER USE TRIAL – MONITORING THE EFFECT OF CULTIVATION PRACTICES ON CROP PERFORMANCE

Researchers:
Prof Robert White, Dr Robert Edis, Gary Clark, *University of Melbourne*
Colin Hacking, Wes Arnott, Scott Chirnside, *SFS Ltd*
Bruce Whightman, Dr Renick Peries, *DPI*

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Aim:
To identify whether there is an advantage in using deep ripping or shallow cultivation compared to direct drill to improve the ability of crops to utilize soil water at depth.

Method:
Two sites have been selected for this trial.

- **Site 1,** "Weering" Cressy
  owner Mr S. Chirnside
- **Site 2,** Gnarwarre,
  the eastern end of the Wilson block (SFS site)

Site 1 (Cressy)

Site 1, "Weering" Cressy - owner Mr S. Chirnside

The trial at this site is in its second year.
The treatments for 2002 were:

- Direct Drill.
- Shallow cultivation to 20cm (10cm deeper than 2001).
- Deep Rip (performed in 2001 to 30cm).
- Deep Rip with gypsum applied @2.5t/ha in 2001.
- Same as Treatment 4 with a further addition of gypsum @2.5t/ha added prior to sowing.

Planting date: 23/06/02

Variety: Rubrick Wheat
Sowing rate: 90 kg/ha
Fertiliser: 100 kg/ha MAP

Herbicides:
Roundup Max 800 ml/ha Goal Summer weed control 75 ml/ha 22/02/02;
Roundup Max 1.2 l/ha Ester 300 ml/ha Glean 25 g/ha 19/06/02

Insecticides:
Dimethoate Insecticide 85 ml/ha 19/06/02;
Fastac 125 ml/ha Dimethoate 85 ml/ha for aphids 14/08/02

Table 76: Actual Rainfall Recorded Total: 304.5mm

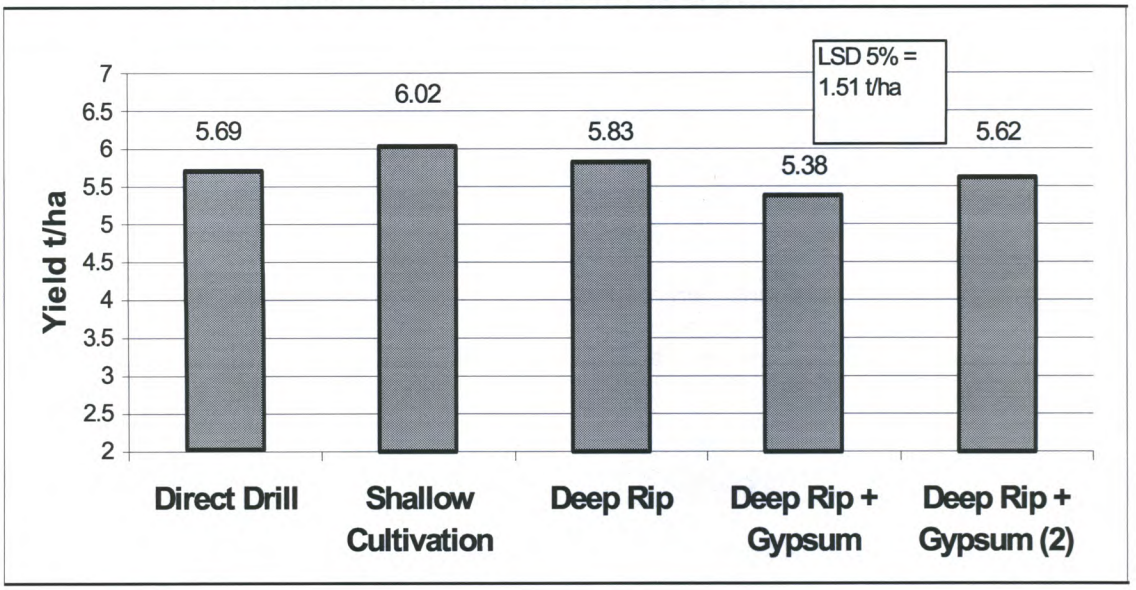
J	F	M	A	M	J	J	A	S	O	N	D
-	-	-	15	31	42.5	64.5	20	31.5	28	72	-

Results:

Table 77: Sampling of All Plots by Hand on the 9/01/03 gave the following Yields:

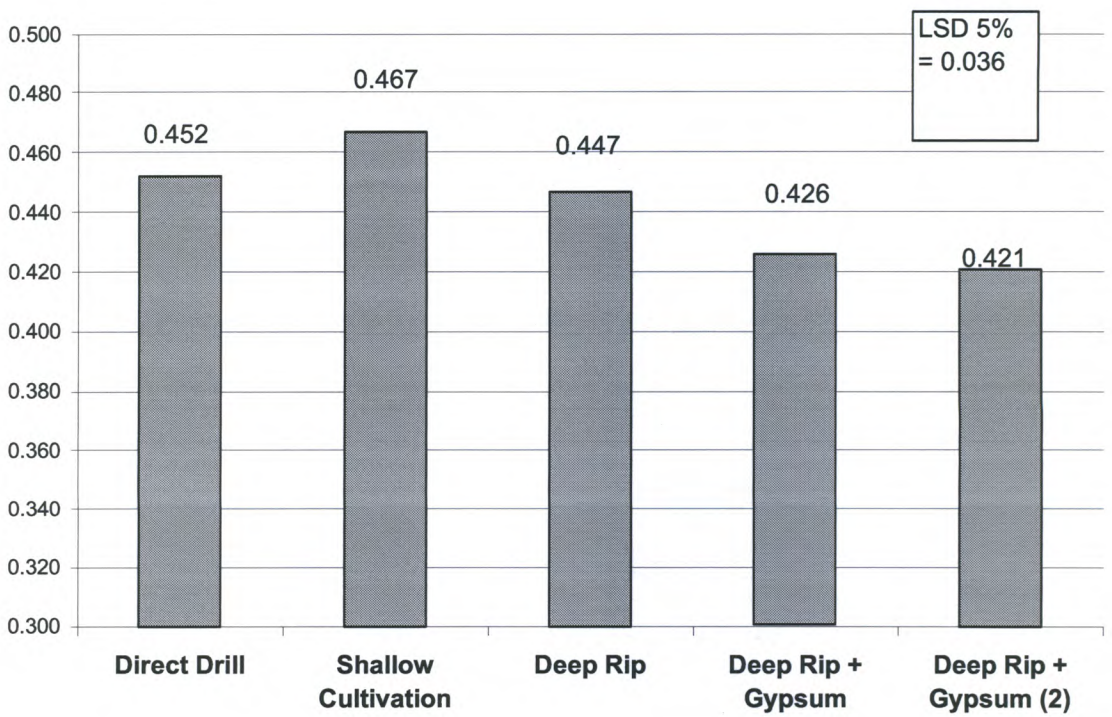
Treatment	Yield t/ha	Harvest Index
Direct Drill	5.69	0.452
Shallow Cultivation	6.02	0.467
Deep Rip	5.83	0.447
Deep Rip + Gypsum	5.38	0.426
Deep Rip + Gypsum (2)	5.62	0.421
LSD 5%	1.51	0.036

Figure 24: Weering Spring Water Use Trial Wheat Yield



The highest yield, although not significantly different, was the shallow cultivation treatment. This was the only treatment with any cultivation in 2002. Note that the treatment with gypsum addition in 2002 (ie two applications) gave a higher yield than the treatment with only the single application in 2001. Harvest index results show a significant difference between the treatments. The shallow cultivation was able to convert more of the dry matter to grain.

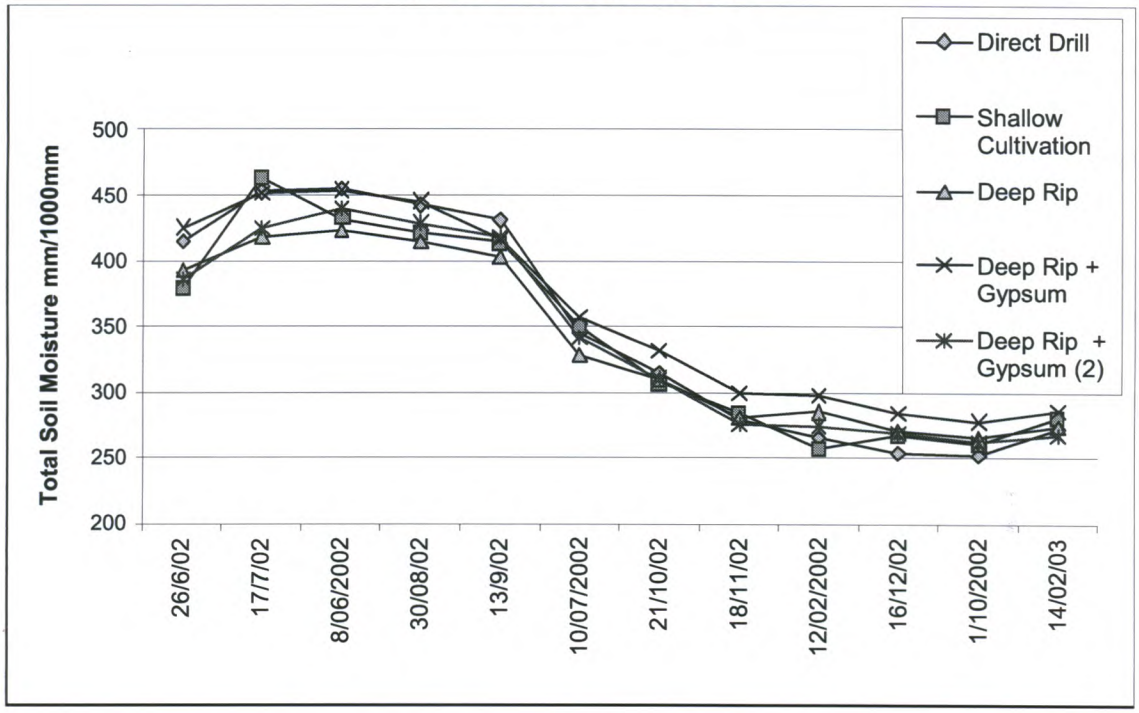
Figure 25: Weering Wheat Harvest Index



Soil Water

Soil water was measured to 100cm with a Neutron Probe, and in addition in some of the plots, a capacitance probe. The results of the Neutron probe are presented. All treatments had similar soil water through the season. This may reflect the low rainfall (approx 100mm less than the 2001 growing season) rather than the treatment.

Figure 26: Weering Soil Water

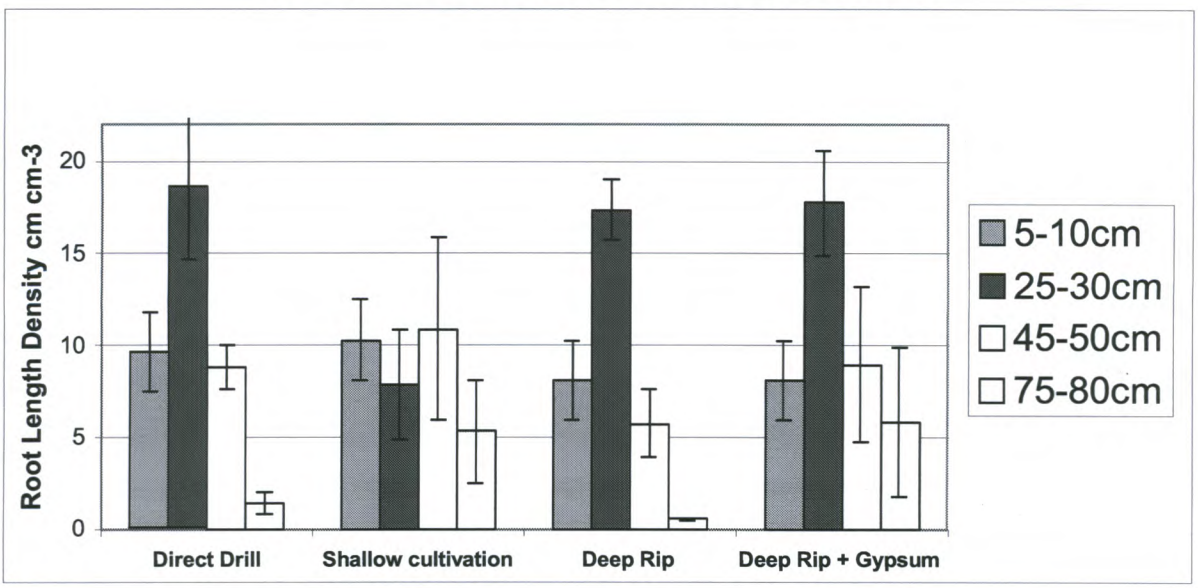


Root Length Density for the Weering Barley Crop 2001

Sampling of the roots of the 2001 Barley crop was undertaken in February 2002. Cores were washed of soil and the roots were recovered and then scanned for total root length. Overall there is no significant difference between treatments. Some interesting observations:

- shallow cultivation had an even root distribution down the profile
- there is a positive effect on rooting depth if gypsum is applied when deep ripping (this may counter dispersion affects)
- direct drill gives a similar root density profile to the deep rip.

Figure 27: Weering Barley 2001 Root Length Density



Site 2 (Gnarwarre)

Site 2, Gnarwarre, the eastern end of the Wilson block at the SFS site.

The whole site was previously under raised beds which were in need of renovation. The site was given an overall cultivation to depth of 20cm prior to working into raised beds. An additional treatment of Deep Rip to a depth of 60cm with and without addition of gypsum @2.5t/ha a was applied. Thus the four treatments are:

- Direct Drill
- Shallow cultivation
- Deep Rip
- Deep Rip + Gypsum @2.5 t/ha.

Plots are 3 beds (1.7m wide) and 60m in length. Each treatment is replicated 4 times.

Planting date: 29/05/02
Variety: Gairdner Barley
Sowing rate: 90 kg/ha
Fertiliser: 100 kg/ha Granulock

Herbicides: Tigrex 700 ml/ha 22/07/02, Tristar 1.5 l/ha 30/07/02

Insecticides: Dominex 125 ml/ha 22/07/02

Harvest was performed on the center bed of each plot with a plot harvester from the Birchip Cropping Group. Yield data shows no significant differences between treatments. This may be due to the whole site being cultivated and inconsistent rainfall. There appears to be a penalty for deep rip without any added gypsum.

Table 78: Actual Rainfall Recorded Total: 353mm

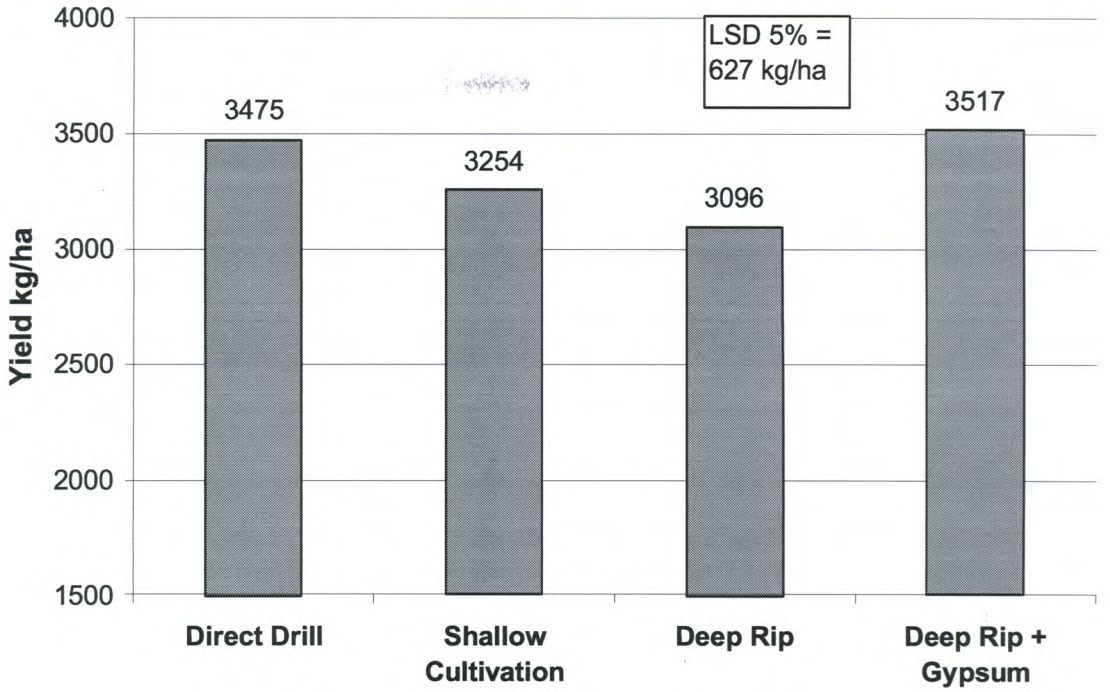
J	F	M	A	M	J	J	A	S	O	N	D
-	-	-	20	33	61.5	61	52	43	39	43.5	-

Table 79: Barley Yield

Treatment	Yield kg/ha	Test Weight kg/hl	Protein %
Direct Drill	3475	66.35	8.70
Shallow Cultivation	3254	65.50	8.18
Deep Rip	3095	65.85	8.58
Deep Rip + Gypsum	3517	65.00	8.93
LSD 5%	627	1.52	1.27

Photo 11: Tube installed for neutron probe assessment of soil moisture

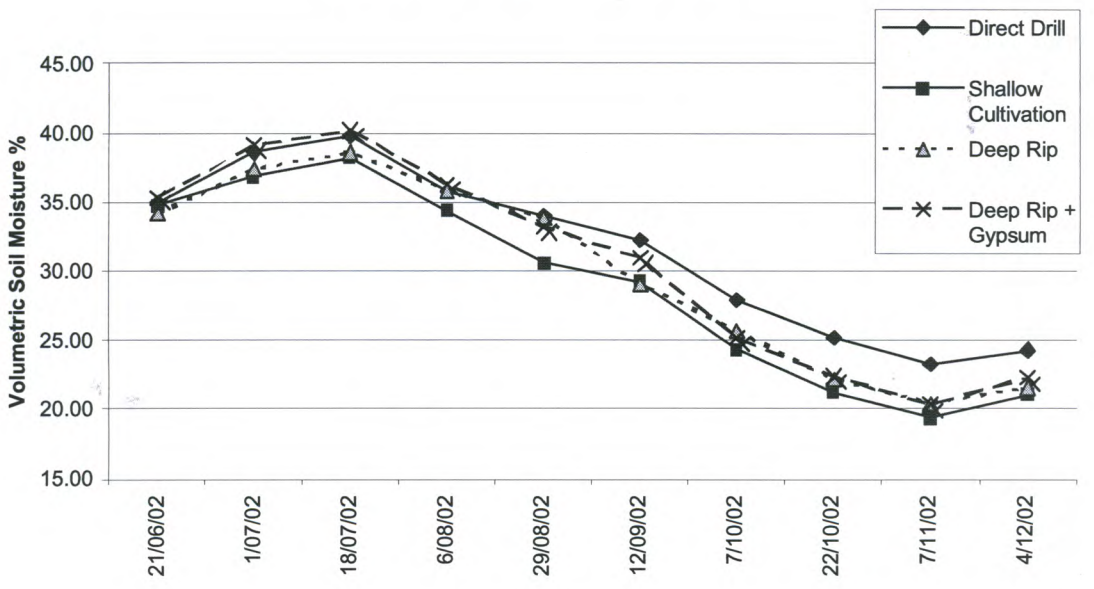
Figure 28: Gnarwarre – Spring Water Use Trial - Barley



Soil Water

Soil water measurements were taken from every plot with a Neutron probe, and for comparison purposes, a capacitance probe in some of the plots. As for the Weering site there appears to be very small differences between the treatments.

Figure 29: Gnarwarre Soil Water



Conclusions:

Deep cultivation has not shown the promised increase in yield that was seen in 2001 at Weering. This may be due to the low or variable rainfall pattern of 2002. It appears though that some cultivation can benefit the grain yield and also the harvest index. At this stage it would appear when deep ripping that an addition of gypsum is beneficial.