Optimising
Irrigated Grains

# Focus Paddock Results – Riverine Plains

## What was the aim of the focus paddock?

Test several amelioration strategies for a heavy clay soil under a lateral pivot irrigator

## Did your focus paddock go according to plan? If not what did you do differently?

The site, a maize crop that had been winter fallowed, was identified as potentially having sub-soil issues. Seven deep soil samples were taken at 0-10cm, 10-30cm, 20-30cm, 30- 60cm and 60-90cm on the 17 September 2019. The results showed high levels of sodium (>6%) in 5 out of the 7 samples and the depth of the sodicity varied between 20cm and 90cm.

The subsoil amelioration work was done on the 15 October 2019 using a purpose-built machine. There were two sub-soil manure treatments (3 and 5) and three comparative treatments (Control, 1, 3 and 4). Treatment 1: Poultry Manure 20t/ha surface applied, treatment 2 Dip rip only, treatment 3 Sub soil poultry manure 20t/ha, treatment 4: gypsum surface applied (5t/ha), treatment 5 Subsoil mixture of poultry manure (15t/ha) and gypsum (3t/ha). The major issue with the demonstration was the poor germination of the maize, where the paddock had been ripped.

Some of the things that could be done differently:

- determine an optimum time for deep ripping within the rotation and within the year.
- allow adequate time for the deep ripping to settle before sowing the crop after the deep ripping.
- poor establishment due to a rough surface is a high risk of income loss for a farm, so mitigating this risk by either breaking down the large clods using a speed tiller and grader board, allowing more time between ripping and sowing the crop, or sowing a crop that is less susceptible to a rough surface (eg Faba Beans).
- Using a demonstration machine, presented practical limitations, which could be improved once commercial equipment is available (eg compatibility of three-point linkage and blockages).

## What results have you collected?

The paddock was sown to P1756 Maize on the 6 November 2019. There was poor plant establishment in and adjacent to the rip lines in the three ripped treatments (treatments 2, 3 and 5). In these areas, due to the rough nature of the ripped soil, the plant population was about one quarter of the optimum number. Plant counts taken by the farmer showed that outside the rip lines, plant numbers were adequate at around 90,000 plants/ha. The site was hand harvested on 28 April 2020. From each treatment 4 rows were selected that had even plant establishment. *Note: the results of this work do not take into account the negative yield effect of poor establishment.* For each row, a 13m length was measured and the cob was removed from every fifth maize plant: the total area sampled was 10m2 (based on a row width of 0.769m). All samples were weighed and one representative sample from each treatment was taken. Total kernal number was estimated by counting the number of kernals along the length of the cob and multiplying that number by the number of kernels around the circumference of the cob. The grain yield of each sample was estimated by multiplying the total kernel number by average kernel weight (taken from a representative 1000 grain weight sample). The grain

estimates, on average were 87% of the total cob weight. The 87% grain weight conversion was applied to all samples to calculate average grain weight per treatment. Grain moisture was measured at 19.4% and as such, all yield measurements were converted to the industry standard of 14%.

The two sub-soil with poultry treatments (treatment 3 and 5) yielding 16t/ha and 17t/ha respectively, higher yielding then the control (13.3t/ha), deep rip only (14.6t/ha), poultry manure surface (13.5t/ha) and gypsum surface (13.7t/ha). *Note: these results are based on sub-samples from the treatment that were not affected by poor germination and do not reflect the overall yield from the treatments*. Yield measurements from the farm header showed little difference between treatments (yielding approximately 13t/ha), suggesting that the benefit of higher yields in the sub-soil manuring treatments, were lost by the poor establishment of the maize around the rip lines.

### How do the results compare with farmer practice? How is this different from district practice?

The results suggest that it may be possible to achieve higher yields by sub-soil manuring, compared to the current farmer practice of not using sub-soil manuring, however the first years results from this demonstration were confounded due to poor establishment. Other issues that need to be addressed include ease of use of subsoil machine such as manure blockages. Some of the suggestions to overcome these issues include: tillage to break down the large clods; using a larger seeded crop such as faba beans and allowing more time between the ripping and the sowing of the crop for the ground to settle. Another issue is knowing and achieving the optimum moisture content of the soil for subsoil manuring.

### What was the financial benefit or cost of your project? How does this compare with district practice?

The cost of the sub-soil amelioration with poultry manure has been estimated at $1,800/ha. The benefits of the amelioration are expected to occur over a 5-year period. As the results were inconclusive in the first year, measurements are required in subsequent years to see if the project is financially viable.

### Focus Paddock Acknowledgement

Riverine Plains would like to acknowledge the following local support for this project. Soil samples were analysed by Ehsan Tavakkoli, NSW DPI. IK Caldwell staff assisted with providing treatments, site selection and paddock monitoring. The subsoil amelioration work was done using a machine that had been used for demonstrations by Murray Local Land Services thanks to funding from Catchment Action NSW. John Fowler (Murray LLS) and Don Griffin (NSW DPI) assisted with the demonstration. The Dye family provided equipment, soil ameliorants, land labour and implemented the soil amelioration treatments.

### GRDC Acknowledgement

The optimising irrigated grains project is part of the GRDC investment in ICF1906-002RTX, FAR1906-003RTX and UOT1906-002RTX.