# Soil moisture conservation through summer spraying

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Precision Agronomics Australia (PAA) recently conducted a summer weed spray demonstration to determine the effects on soil moisture conservation. Trial sites were selected based on differing soil types, and were spread over a large area, from Narembeen in the south, Beacon in the north, Kellerberrin in the west to Southern Cross in the east.

The trials were non-replicated single plots, 20m long and 10m wide, with a gap of 5 metres left between plots to reduce potential drift effects. The spraying treatment was applied via knapsack on the 13th, 14th and 15th of December 2012 using 6L/ha of glyphosate with a blue dye, ensuring a complete knockdown.

Soil coring locations were selected from the most uniform areas within each plot. Samples were taken at 10cm increments to a depth of 40cm, with an additional subsoil sample taken at 60-80cm. These samples were tested for nitrate, ammomium, pH, EC and Aluminium by CSBP, with moisture measurements conducted at DAFWA's Merredin office. A second soil core was taken at each sprayed and unsprayed plot at each location and analysed for moisture.

*Image 1 Picture taken at Mick Caughey's farm, showing differences in early vigour in a wheat crop between sprayed and unsprayed plots.*

The second visit on the 9th and 10th of January 2013 was timed 1-2 days before a heavy summer rainfall event to emphasise the differences in moisture content between sprayed and unsprayed plots.

The final soil coring for moisture was undertaken on the 26-27th of February, with thunderstorm activity again being taken into account.

Soil moisture has a positive effect on electromagnetic (EM) readings, so EM data was collected during the initial and final field trips.

The results varied significantly across the different trial areas. The Matt Steber and Scott Dixon sites were compromised by sheep grazing. However, the remaining trial

sites have shown an overall positive moisture conservation response down to 40cm. Effects were especially visible in early vigour as seen in Image 1.

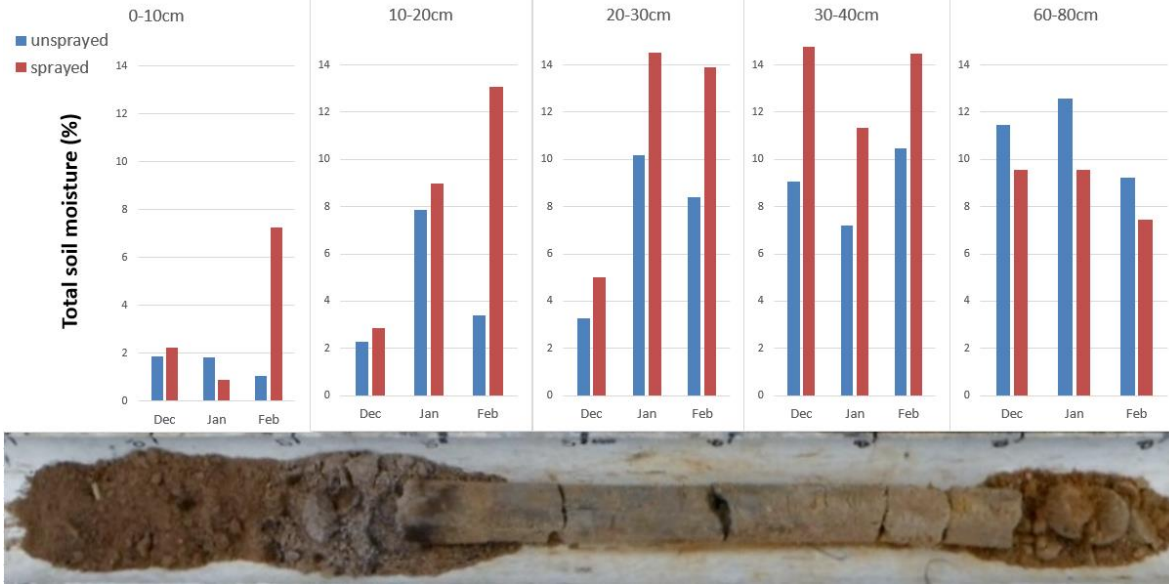


Figure 1 Total soil moisture content of sprayed and unsprayed treatments at each depth increment and soil core photo which is representative of the entire Narembeen trial site at Stuart Yandle's property.

The first example below comes from Stuart Yandle's property in Narembeen which consists of a deep loamy duplex. The soil moisture differences at depth show that spraying summer weeds at this site had a positive effect on conserving soil moisture down to at least 40cm (see Figure 1).

The effect on soil moisture is clearly illustrated in the difference between the initial and final EM surveys (Figure 2). The EM difference shows that soil moisture increased across the sprayed treatment as no other variable which would affect EM readings (e.g. clay content or salinity) changed over the summer period.

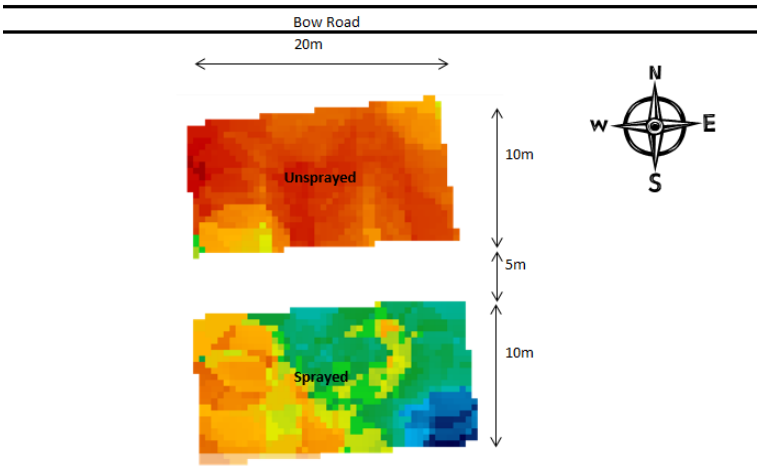


Figure 2 EM difference between initial survey (December) and final survey (February) highlighting differences between unsprayed and sprayed plots at Stuart Yandle's Narembeen trial site.

The soil moisture data shows that at least an extra 40mm of soil water was retained across the sprayed plot compared to the unsprayed plot at this location.

Closer to Southern Cross, at Clint DellaBosca's sandy loam site, there was little difference between treatments at 0-10cm, however clear differences are evident at 10-40cm in February. The unsprayed plots had slightly higher soil

moisture than the sprayed plots in December and January; however this is most likely to be a result of natural variability.

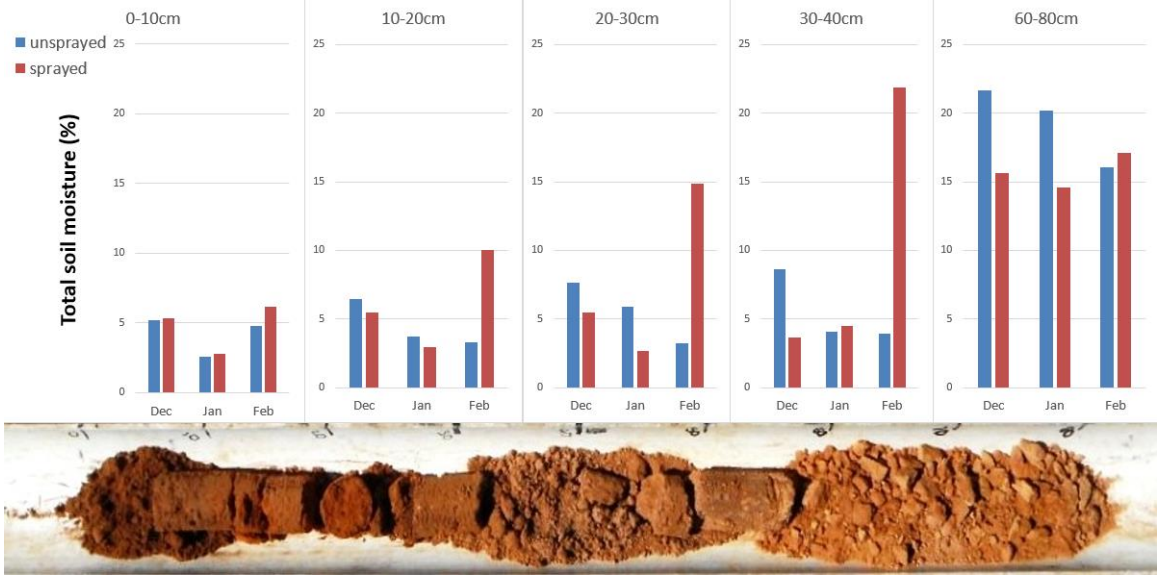


Figure 3 Total soil moisture content of sprayed and unsprayed treatments at each depth increment and soil core photo which is representative of the entire Southern Cross trial site at Clint Della Bosca's property.

By February there were significant differences in the samples taken in the 10-40cm depth range, where on the unsprayed plot, there was 50mm of moisture in the soil. On the sprayed plot however, there was significantly more soil moisture present, with approximately 224mm measured.

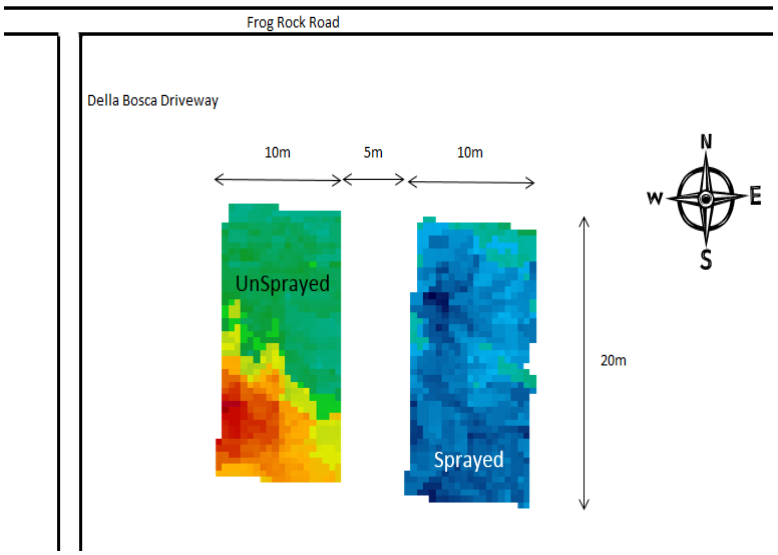


Figure 4 EM difference between initial survey (December) and final survey (February) highlighting differences between unsprayed and sprayed plots at Clint Della Bosca's Southern Cross trial site.

The EM difference across the two treatments was consistent with the measured changes in soil moisture, with highly visible differences between the sprayed and unsprayed treatments (Figure 4).

Across the sites, there was an overall increase in soil moisture conservation in the sprayed plots. In the top 40cm of soil the results are presented in Table 1.

**Table 1 Summary of differences between sprayed and unsprayed plots from Dec to Feb for the top 40cm across all trial locations.**

| Grower name | Location | Soil type | Soil moisture difference (0-40cm) |
|---|---|---|---|
| Butcher | Bodallin | Sandy earths | +14.60mm |
| Caughey | Merredin | Calcareous loams | +25.38mm |
| Della Bosca (Sand) | Southern Cross | Shallow sandy loam | +60.10mm |
| Della Bosca (Gravel) | Southern Cross | Gravelly loam | +10.30mm |
| Dixon | Kellerberrin | Alkaline shallow duplex | +45.65mm |
| Gillet | Bencubbin | Calcareous loamy earths | +10.70mm |
| Kirby | Beacon | Shallow loamy duplex | +9.30mm |
| Steber | Doodlakine | Sandy duplex | +8.74mm |
| Yandle | Narambeen | Deep loamy duplex | +41.4mm |

Across all sites, PredictaB tests concluded that two sites (Matt Steber and Stuart Yandle) had potential Crown rot issues. For all other trial locations, soils were analysed for CCN, Take-all, and different strains of Fusarium nematodes. All locations reported “low” or “below detectable limits”.

Precision Agronomics Australia will be conducting an in-season assessment of the trial sites and an interview with each grower to get an understanding of agronomic issues such as pests, disease and rainfall that may have affected the trial results. Grain yield assessments from harvest cuts will be analysed and presented in a final report which will be made available on the GRDC website.

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