Advising with PA

Michael Wells, *Precision Cropping Technologies*

Working from the soil up Michael Wells, finds that EM38 maps and elevation data, combined with targeted on ground soil sampling usually provide key clues to causes of yield variability. He specialises in gathering data and using GIS software to interrogate the data to build new layers to help answer specific questions.

The results of his work enable him to report to a farmer where inputs and management could be modified in line with paddock variability. But it is the land manager and/or agronomist who use his information to determine the final rates or management changes applied.

The following example illustrates how his PA consultancy assisted a broadacre farmer and his agronomist to make more targeted decisions in their mission to improve paddock productivity.

The initial concern was with areas of the paddock that regularly waterlogged in average to wetter seasons. This resulted in yield loss and caused trafficability problems for spraying and other management tasks. Several seasons of yield data had been collected and the farmer was keen to asses the causes and possible solutions to the variability.

A survey of the paddock was conducted with an EM38 coupled with an RTK GPS. The result was an EM38 map showing major changes in soil profile conditions over the paddock and a Digital Elevation Model (DEM) depicting detailed changes in topography (Figure 1).

soil samples to help interpret the EM38 map are critical

The DEM was used to generate new topographic data layers that identify the areas of the paddock that were likely to harvest water or to pond and eventually waterlog. Figure 2 shows the elevation map overlayed with the new layers. GPS coordinates are linked to the maps allowing the farmer to visit areas of interest in the paddock and prioritise areas that needed remediation to minimise future waterlogging.

These data layers can be integrated with yield data to identify the effects that potential waterlogging areas had on production in wet and dry seasons.

Based on the maps a series of surface drains were created to prevent water entering or remaining in an area.

Having applied changes to remediate waterlogging the map created from the EM survey was used to evaluate the application of gypsum. The map showed where major changes in soil conditions occurred. Soil samples were collected at targeted locations and analysed to help interpret the EM38 map; this is a critical step. There can often be a strong relationship between soil change and yield maps. The soil testing provides an insight into which soil properties are influencing the production and is a guide to how management might be adjusted.

The soil tests showed varying levels of sodicity over the paddock. This suggested an opportunity to better target gypsum rates, rather than use the farmer's normal approach of a blanket rate of 2.5t/ha. A map of sodicity variation was generated. From this gypsum rate zones were created using gypsum modelling and assistance from the agronomist (Figure 3). The farmer modified his existing spreader to variable rate control to apply gypsum differentially according to the zone map.

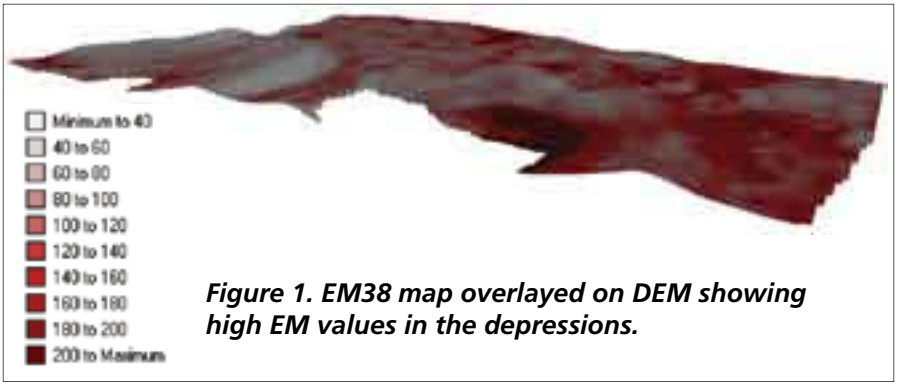

Figure 1. EM38 map overlayed on DEM showing high EM values in the depressions.

Table 1 shows the new gypsum plan based on the zones created compared to the normal spreading and the financial impact of this change.

It should be noted that 30% of the paddock falls in the brown zones and does not require gypsum; previously 2.5t/ha of gypsum would have been applied. Conversely there are areas (dark green) where the normal rate would be insufficient to generate a useful response. A surface layer of gravel disguised the subsoil problem and caused the farmer to misjudge the need for gypsum in these areas in the past.

The gypsum from the areas of zero requirement has been redirected to the problems areas, increasing the chances of a positive response.

Within the region that did not need gypsum, an area that would benefit from clay spreading/delving was isolated. The EM map combined with targeted soil coring was used to generate a map of the depth to clay in the area targeted for clay spreading. This map was used for real-time navigation, guiding the operator to areas where delving was appropriate, separating these from the parts were clay spreading was more economical. The soil removed in the remedial activities for waterlogging was used in the clay spreading.

The farmer, with his agronomist, used the EM38 map for further field investigations. The map was loaded onto an iPAQ handheld computer equipped with a GPS and used to navigate to the major soil zones to assess ryegrass pressure. Areas previously prone to waterlogging were identified as having higher ryegrass populations. A variable rate map will be made to allow on-the go targeting of these areas with a higher rate of pre and post emergent grass herbicide.

These outcomes for improved management decisions have been a combination of using new technologies for generating greater knowledge and a willingness of the farmer and his agronomist to use this to relate the maps to real life features in the paddock.

For more information
Michael Wells, (08) 8636 2474,
michael@pct-ag.com

Figure 2. The elevation map overlayed with areas most likely to capture water (red). The asterisks mark drainage areas and where water will ultimately be trapped.

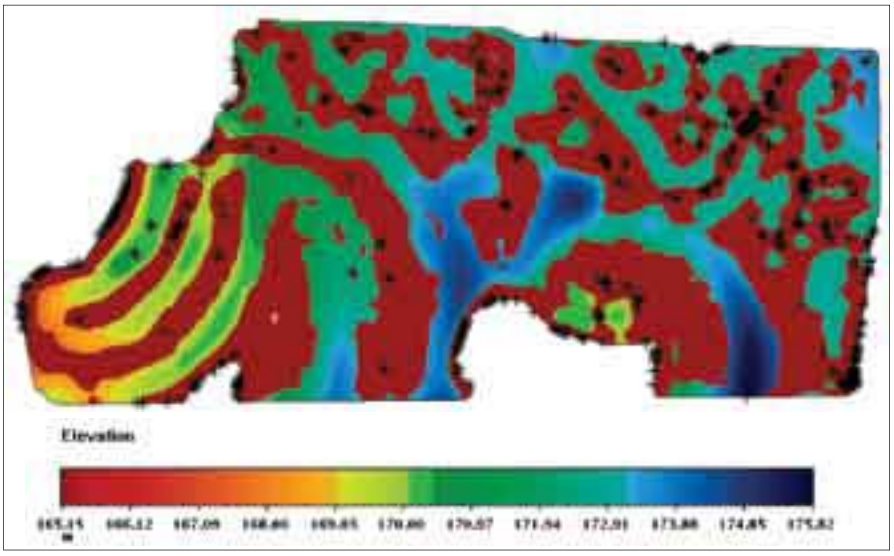

Figure 3. Gypsum application zones and rates based on the EM38 map and targeted soil sampling and gypsum modelling. (key see Table 1)

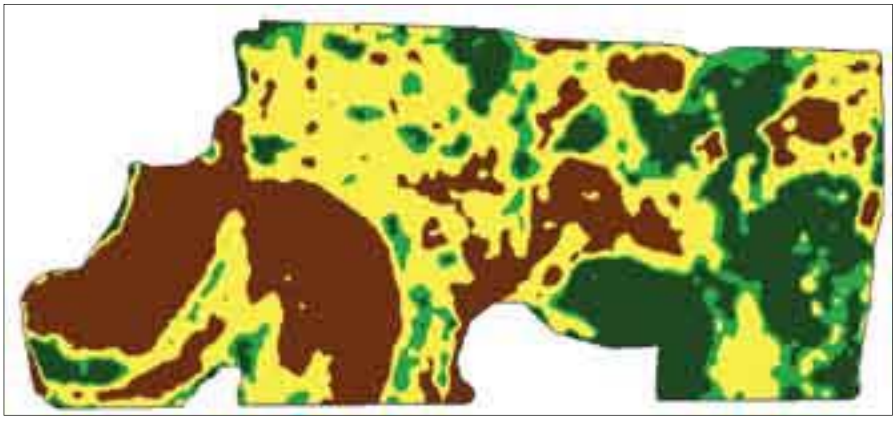

Table 1. The financial implications of a single rate of gypsum compared to targeting gypsum rate to the level of sodicity.

Zone		Area ha	Rate t/ha	Gypsum Tonnes	Gypsum Spread/tonne	$/ha on Ground	Total cost
Whole paddock		187	2.5	467.5	$28.00	$70.00	$32,725.00
1	0	57.8	0	0	$28.00	$0.00	$0.00
2	2.5	70.3	2.5	175.75	$28.00	$70.00	$12,302.50
3	3.5	22.5	3.5	78.75	$28.00	$98.00	$7,717.50
4	4.5	36.9	4.5	166.05	$28.00	$126.00	$20,922.30
							$40,942.30