Sugar Research Australia

sugarcane SOIL

The benefits of EC$_a$ MAPPING IN THE CENTRAL REGION

Figure 1. TSM unit in operation over a young soy crop

WHAT IS EC$_a$?

Apparent electrical conductivity (EC$_a$) is the ability of the soil to carry an electrical current. EC$_a$ is mostly influenced by soil texture, salinity, and water content. Trends in conductivity can provide useful information about the soil.

HOW IS EC$_a$ MEASURED?

There are two main ways to generate EC$_a$ data – conductive (e.g., Veris) or electromagnetic (e.g., Electromagnetic 38 (EM38) or Topsoil Mapper (TSM)).

The Veris machine measures the conductivity of the soil by passing a current between two coulters *(Veris Technologies, n.d.)*. The entire machine is towed behind a tractor in paths, generating EC data as it goes. Good electrical contact between the coulters and the soil is essential for reliable results. Row profile, coarse sand content and crop residue on the soil surface can interfere with obtaining good measurements.

EM mapping devices, such as the EM38 or TSM, do not rely on soil contact. An EM machine sends out low frequency radio waves and measures their interaction with the soil *(Baldinger & Baldinger, 2009; Pregesbauer, 2019)*. Crop residues are not an issue with this approach, although soil moisture levels are still an important consideration.

INTERPRETING EC$_a$ DATA

Once EC data has been gathered, it is processed and displayed as a map. EC and electromagnetic (EM) maps need careful interpretation to be useful. The conductivity of the soil is often used as a proxy for other properties, such as soil texture or cation exchange capacity (CEC). High EC zones often indicate heavier textured soils (e.g., higher clay content) and high CEC. However, they can also be caused by increased soil moisture or salinity *(Corwin & Lesch, 2005)*.

The process of relating EC/EM results to the block is called "ground truthing". This involves combining the map with soil testing and other observations to identify what the variation shown on the map is representing. For example, a high EC strip in a block could be caused by a winch row rather than differences in soil properties. These outside factors need to be considered when teasing out the underlying trends in the data.

USING EC_a ON THE FARM

EC and EM mapping have become increasingly popular as growers seek more information about the land they farm. They are often used to guide precision agronomy.

Variable rate fertiliser and soil amelioration programs can be more precisely determined using EC_a data. The data is used to target soil sampling locations and the results of laboratory testing is then used to recommend appropriate nutrient rates for different areas of the block. Research and demonstration projects conducted in the Central region have determined that variable rate applications result in reduced input costs without yield loss.

EC_a data can also be combined with other data sources, such as drone or satellite imagery or harvest yield maps, to identify spatial variations in crop performance and guide ground truthing activities. Adoption of EC/EM mapping and integration with other technologies will continue to influence farming practices in the future.

Contact your trusted advisor for more information or to discuss opportunities to undertake EC_a mapping on your farm.

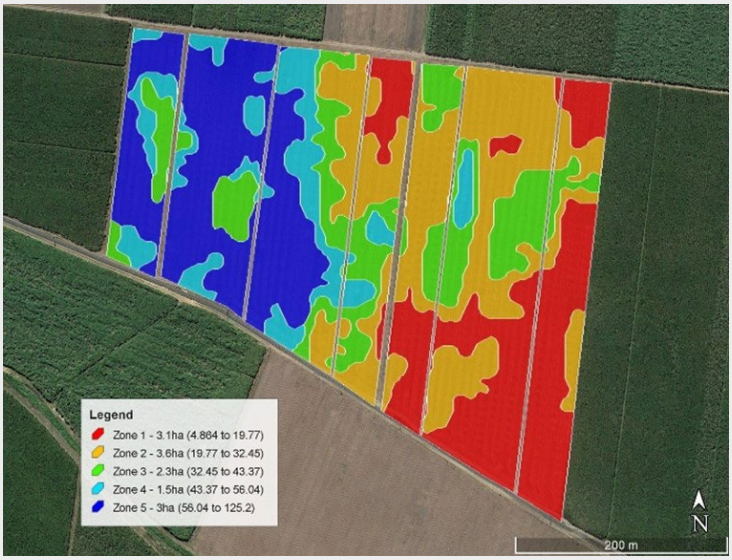

Figure 2. Typical EC map generated by TSM unit. Note the wide variation in ECa from 5 to 125 dS/cm

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MORE INFORMATION

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