Sugar Research Australia

Information Sheet

IS14016

Soil Apparent Electrical Conductivity (EC_a)

One data layer that is commonly used for precision agriculture is a high-resolution map of soil electrical conductivity, sometimes called an 'EC_a' or 'EM' map.

Soil EC_a

Soil EC_a is a measurement of a soil's ability to conduct electricity. This is useful because it can give an indication of soil physical and chemical properties such as:

- clay content/soil texture
- moisture content
- salinity
- cation exchange capacity (CEC)
- bulk density
- organic matter content.

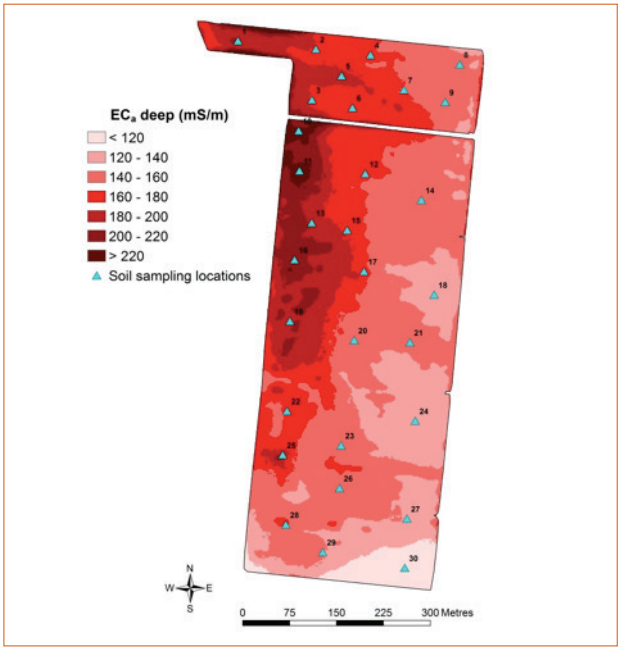
Because EC_a is affected by a variety of properties it should always be used in combination with soil samples. An EC_a map can serve as a guide for selecting soil sample locations to give you a more representative set of samples than traditional grid sampling.

Methods of collecting EC_a data

Currently two different instruments can be used to obtain EC_a soil data in Australian sugarcane. The Veris 3100 is a commercial instrument that connects to the back of a truck or tractor and runs over the soil surface. The tines must be in contact with the soil to measures the electrical *conductivity* of the soil.

Conversely, the EM38 is an electromagnetic induction sensor that measures how much the soil *resists* the flow of electricity. This instrument does not have to make contact with the soil surface to take an accurate reading. Both instruments produce similar results for precision agriculture purposes. Soil EC_a is often measured at two different depths: shallow (~30cm) and deep (~100cm).

When the Veris 3100 or EM38 are used in conjunction with a GPS, agronomists can create maps of soil EC_a that show areas of *relatively* high and low conductivity in a paddock or on a farm. The data alone cannot tell you what soil properties are, and they should always be used in combination with soil samples. EC_a can help you to identify ideal locations for soil samples that more accurately represent soil variability than traditional sample patterns like grids.



Above: EC_a map showing variation across a paddock and strategically placed soil sample locations (blue triangles) to cover the range of EC_a values. *Image courtesy of Rob Bramley, CSIRO, Waite Campus, Adelaide.*

Sugar Research Australia

Information Sheet

IS14016

EC_a and precision agriculture

An EC_a map layer can be combined with other map layers such as elevation and crop yield to give you a better understanding of why different areas are more or less productive. This can help you to create prescriptions for inputs like gypsum, lime and fertiliser applications.

Below: Example of EC_a information overlaid with elevation and yield data to develop management zones on a Burdekin cane farm.

Obtaining an EC_a map of your farm

Currently the easiest way to obtain an EC_a map is to hire a contractor at a cost ranging from $35/ha and up. EC_a maps have already been created for some areas so check with your local productivity services group to see if this information is available for your farm.