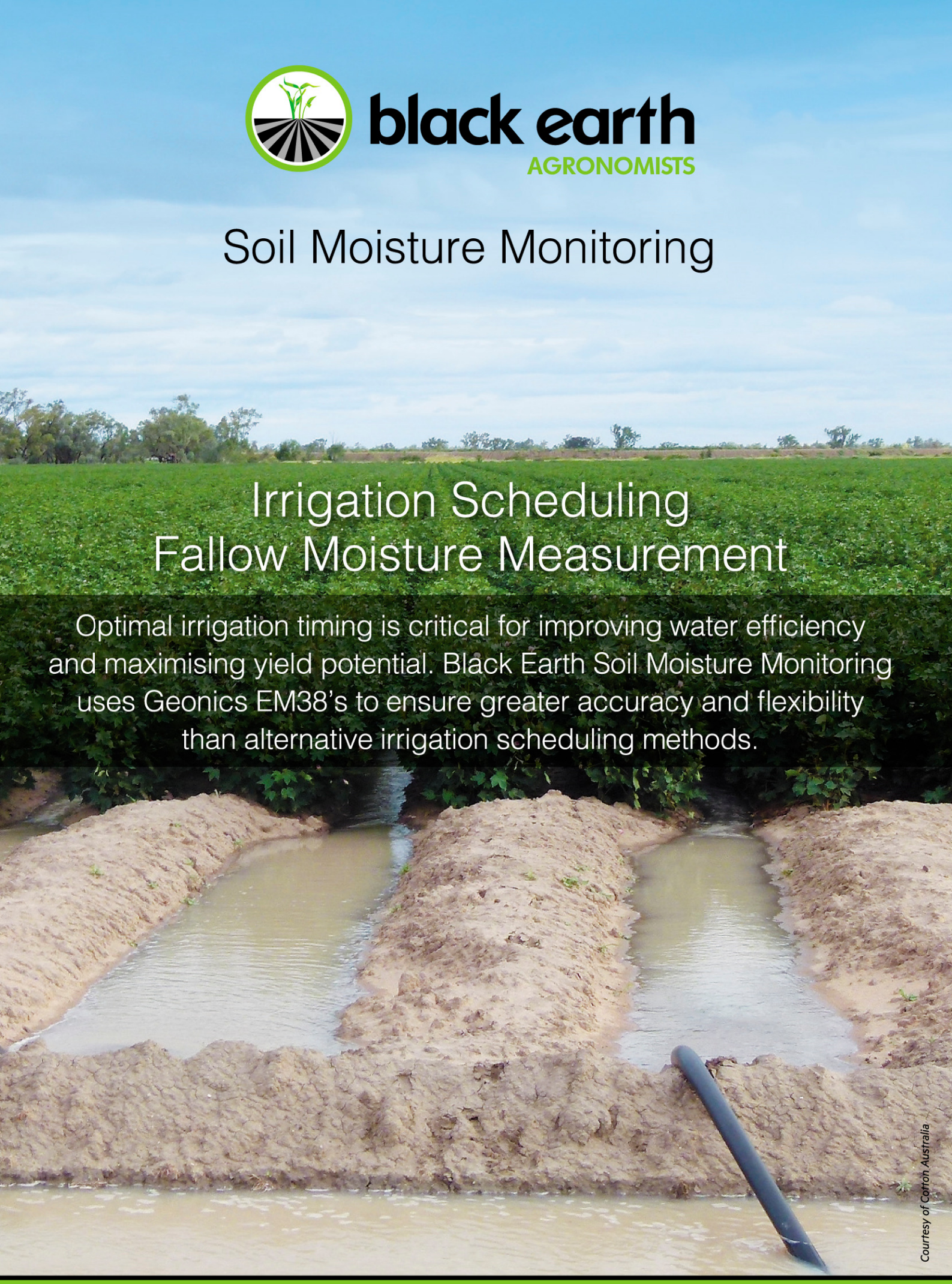
black earth
AGRONOMISTS

Soil Moisture Monitoring

Irrigation Scheduling
Fallow Moisture Measurement

Optimal irrigation timing is critical for improving water efficiency and maximising yield potential. Black Earth Soil Moisture Monitoring uses Geonics EM38's to ensure greater accuracy and flexibility than alternative irrigation scheduling methods.



Courtesy of Carton Australia

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www.blackearth.com.au

Black Earth Agronomists have been evaluating the EM probe for the past four seasons in conjunction with CSIRO and the Queensland Department of Natural Resources.

The **advantages** of **irrigation scheduling** include:

- Minimising crop water stress and water logging events.
- Improving energy, water and labour efficiency through more effective irrigation.
- Improving WUE and fertiliser effectiveness through reduced surface runoff and deep drainage.
- Maximising productivity and increases net returns through increased yields and improved crop quality.
- Additional cropping opportunities through savings in irrigation water.

Source: WaterPAK

How does an EM38 work?

The EM38 Probe emits an electro-magnetic current into the soil and then measures the signal that returns to the device. The electro-magnetic conductivity of the soil depends on the soil's clay content, the amount of stored water and the salt content of the soil profile.

Because we calibrate the instrument to your soil's clay and salt content, we can calculate directly the amount of stored water at any location in the field.

The **benefits** of using an **EM38** for irrigation scheduling:

- **Calibrated to your soil**
  - Unlike capacitance and neutron probes, we are calibrating the EM38 to the specific soils in which it will be used, improving overall crop management to maximise yield potential.
- **Strengthened accuracy**
  - The EM38 is the preferred industry standard for monitoring soil water content by CSIRO and Qld government scientists.
  - An EM38 measures a significantly larger volume of soil than other devices with up to 12 m^2 of soil per site. A neutron or capacitance probe measures as little as 0.09 to 0.9 m^2 of soil.
  - Cracking in the soil does not affect the result.
- **More flexibility**
  - If a location is not giving us the right information we can just sample elsewhere.
  - If a figure appears wrong or unrepresentative, samples can be taken elsewhere.
  - You want to know if it's worth it to continue irrigation, we can check.
  - You want to compare two different irrigation practices or moisture retention strategies, we can check.

Low cost, **High** reward potential

Yield loss due to water stress can be quite significant. Every **day that you are late irrigating** can cost up to 1.6% of total yield potential in cotton. The EM38 allows us to provide you with precise timing for irrigating. This is especially important when considering the high boll loads present in Bolgard II and Bolgard III when the crop could be using as much as 10 mm of water per day.

Yield loss (%) per day of water stress
(extraction of > 60% plant available water).
(Source Yeates et al. 2010#, Hearn and Constable 1984*).

	Past Conventional*	Bollgard*
Squaring	0.8	1.1
Peak flowering	1.6	1.7
Late flowering	1.4	2.7
Boll maturation	0.3	0.69^

^ 14d post cut out

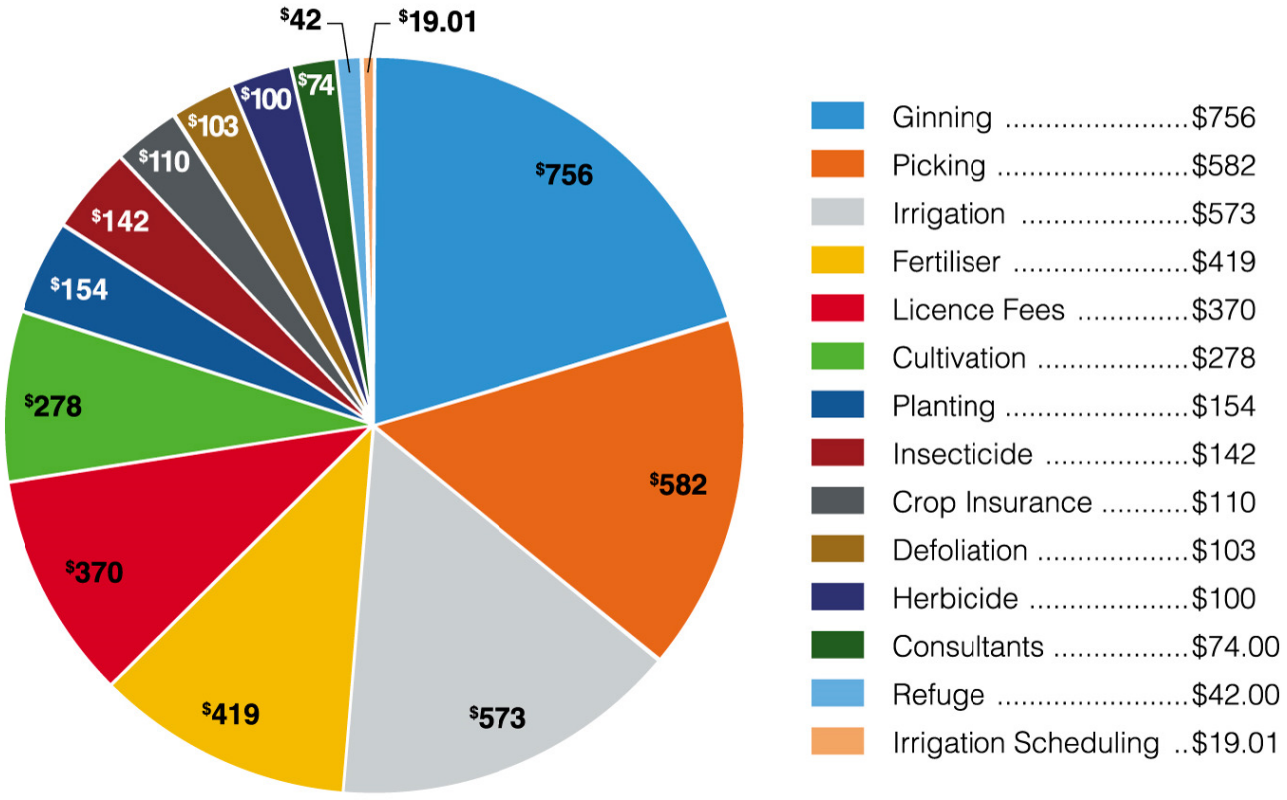
To find value in this service you would only have to improve yield by 1/20 (5%) of one bale/ha.

Assuming $500/bale cotton price and 40.47ha field.

The outlay for this service is especially reasonable when comparing it against other costs associated with growing cotton.

Costs / ha of Furrow irrigated cotton (RRF Bollgard)

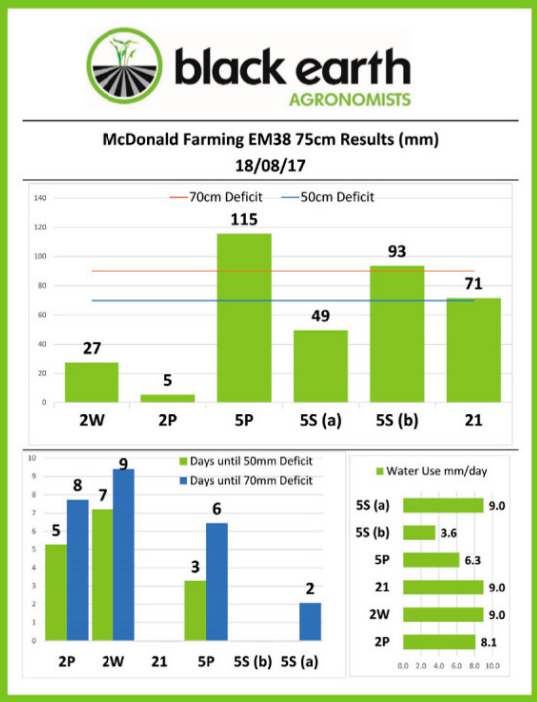
*NSW DPI Cotton Gross Margins



Our irrigation scheduling service

For cotton, readings will be performed with an EM38 in each nominated field **twice weekly** over 14-17 weeks depending on planting time and seasonal conditions. Readings will be taken in **three** different sites at a GPS location at the head end of the field where the first irrigation run will occur. These samples will then be averaged to provide a measure of the soil moisture content under the crop row. A **report** will be **sent directly** from the field via txt and email. The report will indicate the current deficits of each field as well as the number of days until that deficit will be reached, eg., 70mm deficit. Projected water use until the next reading will also be calculated using evaporation information from a local weather station.

Crops such as sorghum, corn or soybeans do not have the lengthy growing period of cotton. The costs associated with the Soil Moisture Monitoring Service in these crops would be adjusted accordingly.



We want to encourage growers to use this service in as many of their fields as possible so we have priced the service where the more sites you have the cheaper per site it is.

Irrigation Scheduling Service Pricing for Cotton

	1-2 Sites	3-5 Sites	6-9 Sites	10 Sites +
Per site	$950.00	$790.00	$660.00	$550.0
Price per acre (100 ac field)	$9.50	$7.90	$6.60	$5.50
Price per ha (40.47 ha field)	$23.47	$19.52	$16.31	$13.59

Fallow / Dryland (While already visiting the farm or providing bulk services). This pricing table assumes that a series of readings are taken by a Black Earth Agronomist in each 10 ha of the field during a regular visit.

	50 ac	100-400 ac	500-900 ac	1000+ ac
Total Cost	$70.00	$120-480	$500-900	$800+
Price per acre	$1.40	$1.20	$1.00	$0.80
Price per ha	$3.46	$2.97	$2.47	$1.98
Checks	2	4 to 16	20 to 36	40+
Price per check	$35.00	$30.00	$25.00	$20.00

Pricing for Fallow/ Dryland Soil Moisture Assessment is available upon request when a one-off farm visit is required.

If you would like to arrange a customised agronomy package or to learn more about what we do, fell free to contact:

black earth AGRONOMISTS

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