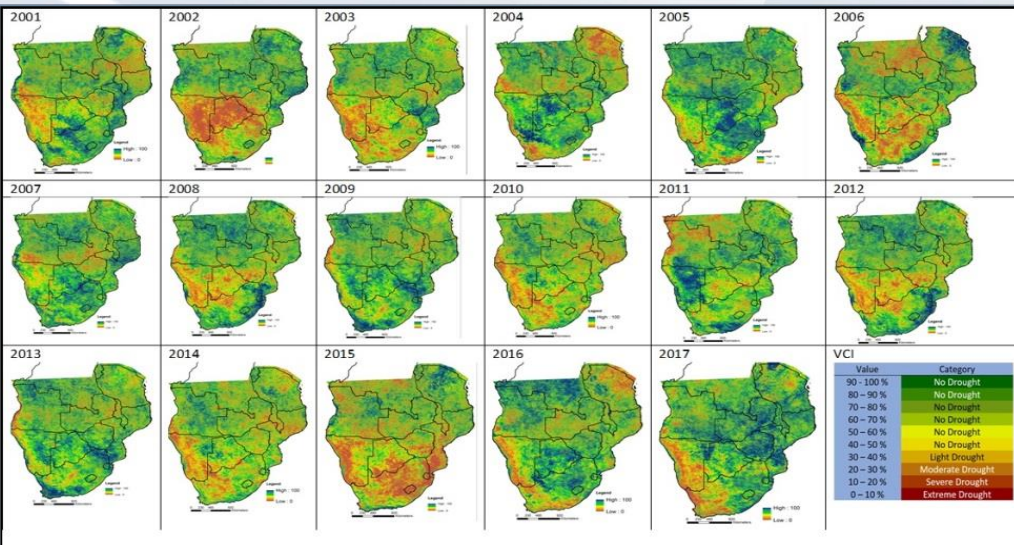# Precision agriculture

Transforming food crop production via innovative and adaptive earth observation technologies in precision agriculture.

Contacts: Dr Moses Azong Cho
Email: mcho@csir.co.za

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Making the case for precision farming in South Africa

Maps of South Africa by year 2001–2017 showing VCI (Vegetation Condition Index)

Value	Category
90 - 100 %	No Drought
80 - 90 %	No Drought
70 - 80 %	No Drought
60 - 70 %	No Drought
50 - 60 %	No Drought
40 - 50 %	No Drought
30 - 40 %	Light Drought
20 - 30 %	Moderate Drought
10 - 20 %	Severe Drought
0 - 10 %	Extreme Drought

Table 1: Maize production by provinces from 2009/10 to 2015/16 production season (Tons)

Season	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
PROVINCE							
Western Cape	18 000	14 000	30 000	33 000	33 000	45 000	45 000
Eastern Cape	80 000	68 000	92 000	107 000	111 000	70 000	76 000
Northern Cape	609 000	538 000	606 000	601 000	664 000	712 000	710 000
Free State	5 076 000	4 052 000	4730 000	5334 000	6247 000	2264 000	2214 000
KwaZulu-Natal	524 000	450 000	516 000	519 000	559 000	454 000	522 000
Limpopo	210 000	173 000	226 000	300 000	307 000	248 000	310 000
Mpumalanga	2 745 000	2 190 000	2504 000	2666 000	2783 000	2108 000	2319 000
Gauteng	685 000	543 000	552 000	617 000	648 000	441 000	442 000
North-West	2 868 000	2 332 000	2574 000	2226 000	2898 000	914 000	1141 000

Source Statistics and Economic Analysis

- Climate change
- Farm abandonment
- New pests e.g. fall army worm

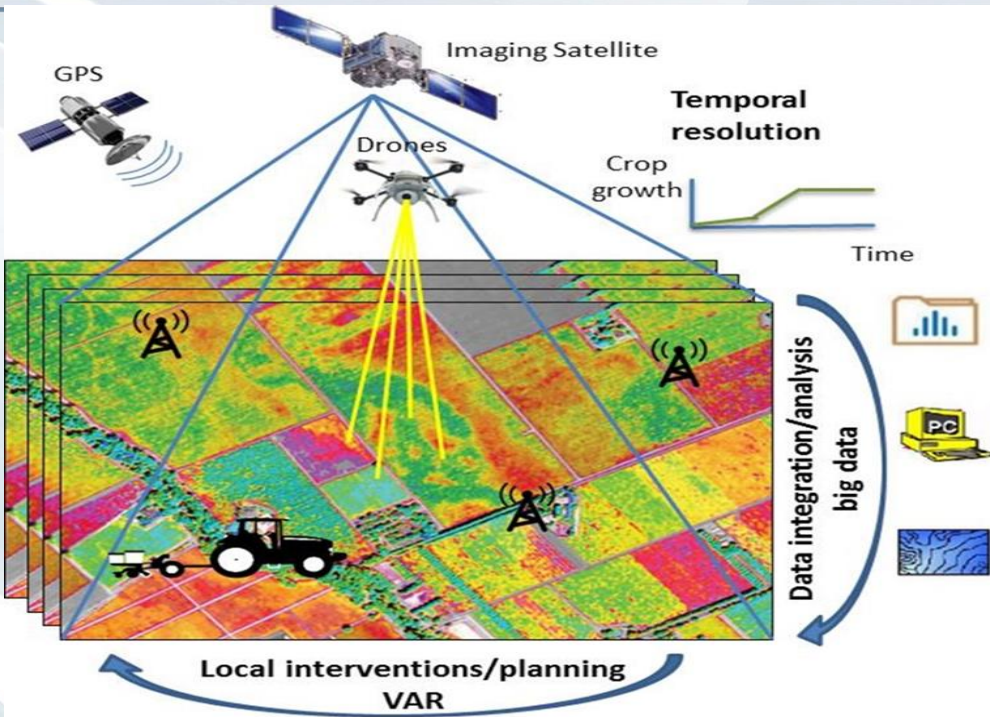| Coordinates	Historical date	Current period
24°33'44.81" S 29°47'28.02" E	12-04-2003	05-07-2017
24°18'00.14" S 29°24'44.00" E	26-11-2002	07-08-2016
23°01'53.79" S 28°56'00.82" E	31-01-2003	20-06-2018
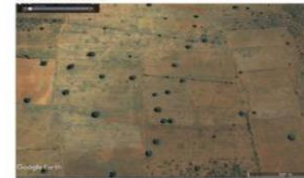
Impact of drought on maize production

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Precision Agriculture:

A smart solution to the challenges of climate variability and the high cost of production

Precision agriculture provides farm-level intelligence that enables farmers and investors to make the right decision at the right time and place e.g. when and where to plant, supply seeds/agrochemicals, irrigate, fertilise crop fields and what yields to expect when and where.

- **Transforming food crop production via innovative and adaptive earth observation technologies in precision agriculture**

- **The tools needed:**
  - Remote sensing
  - GPS, Data analytics
  - Farming equipment (ARC)

- Managing variations in the field accurately and precisely to grow more food:
 - using fewer resources and
  - reducing cost

Our main Precision agriculture services:
Provision of timely and regular (e.g. weekly) information on soil and crop growth condition over large areas:
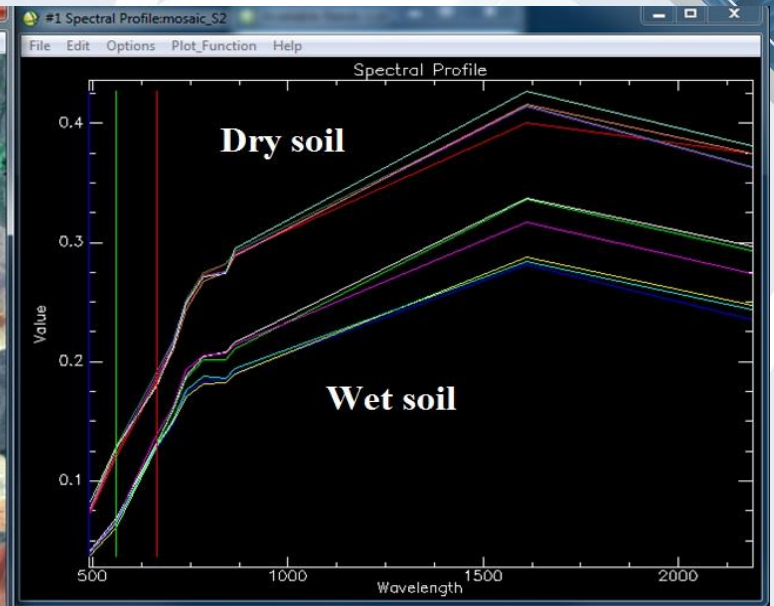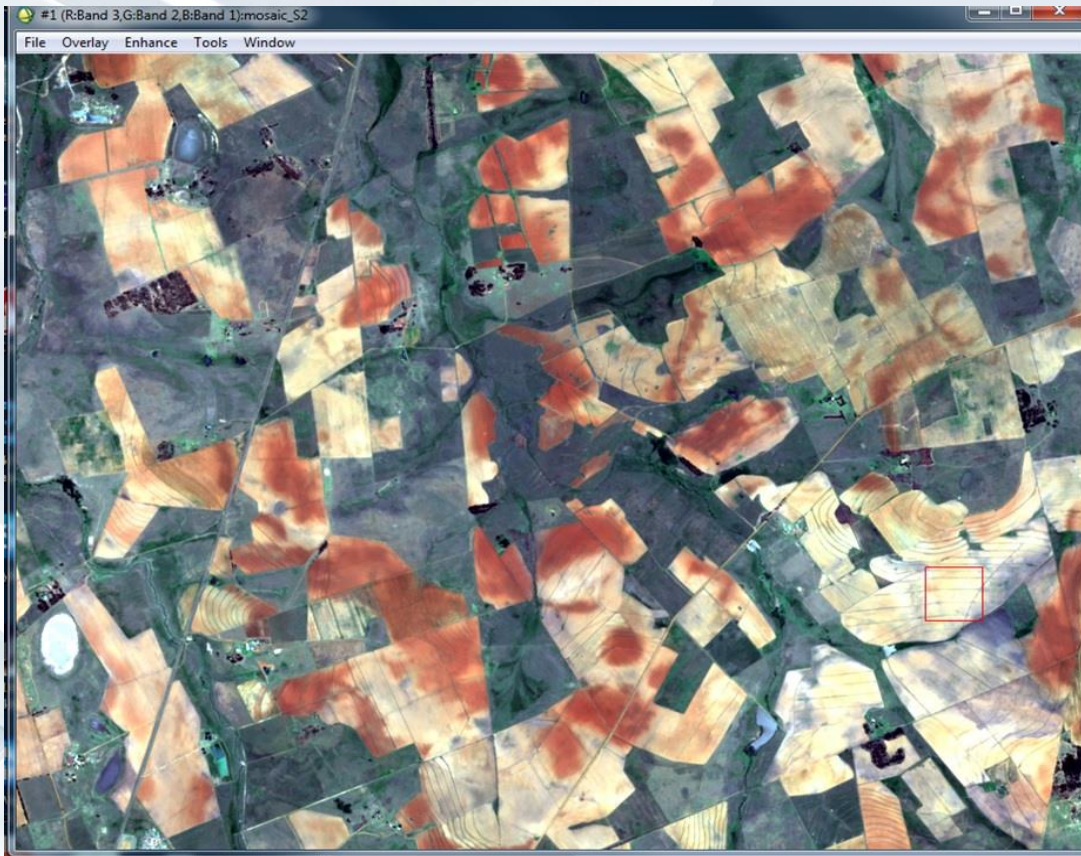
❑**Biomass development**

❑**Water and nutrient stress**

❑**Disease and pest infestation**

❑**Yield forecasts**
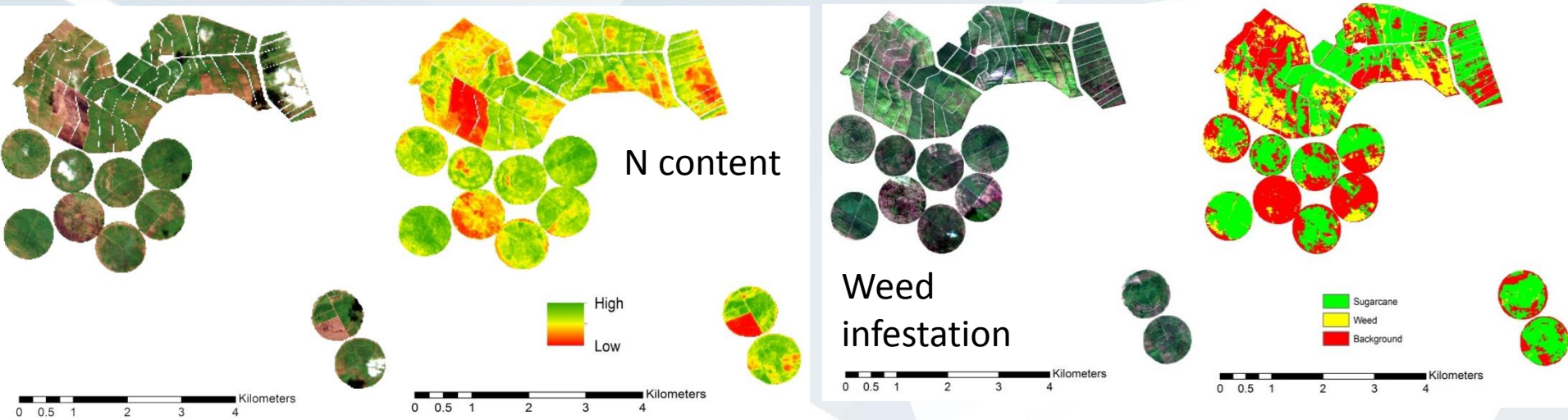
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# CSIR Capabilities and offering in the industry and public sector
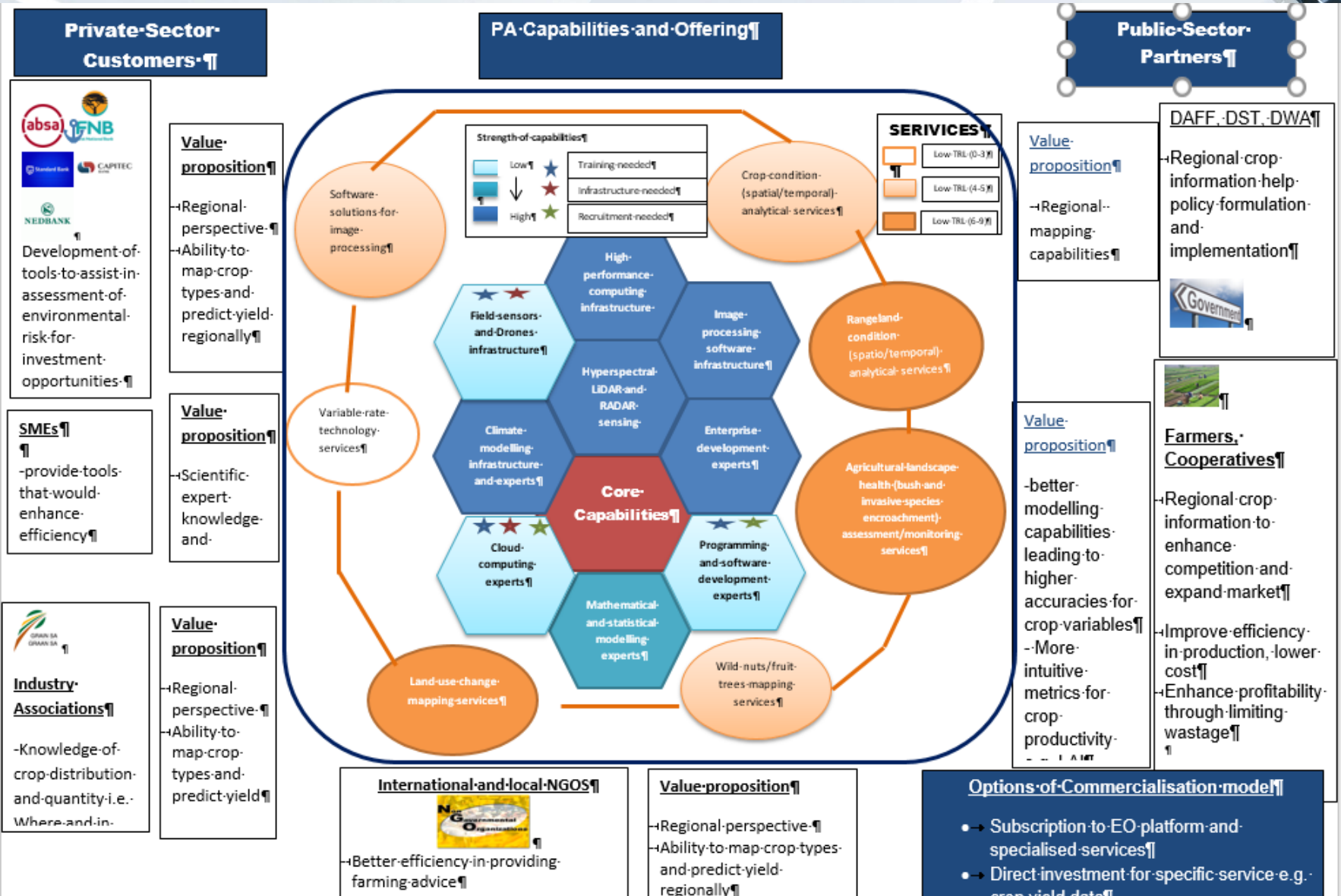
Sentinel-2 imagery is suitable for agricultural applications

CSIR's offering: farm-scale assessment to facilitate precision management
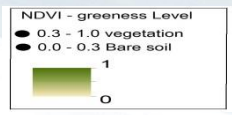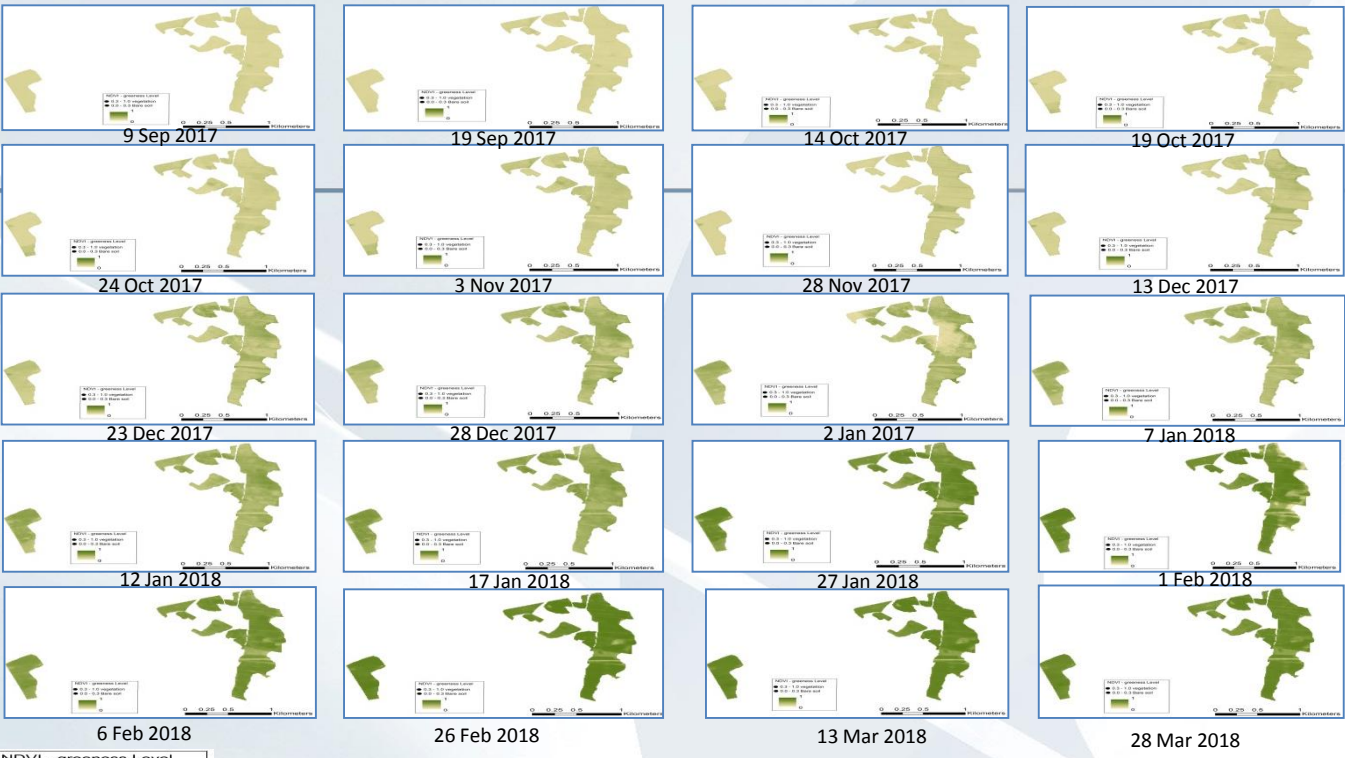

N content

Weed infestation

One of our current projects – monitoring sugarcane production by small scape farmers and impacts

09/04/2019   04/05/2019

Legend:
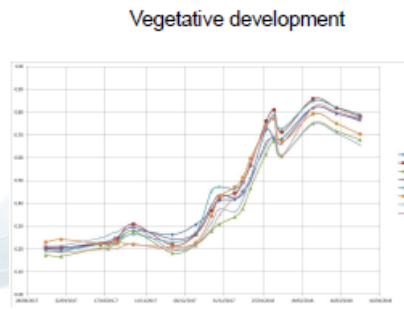- Sugarcane (green)
- Weed (yellow)
- Background (red)
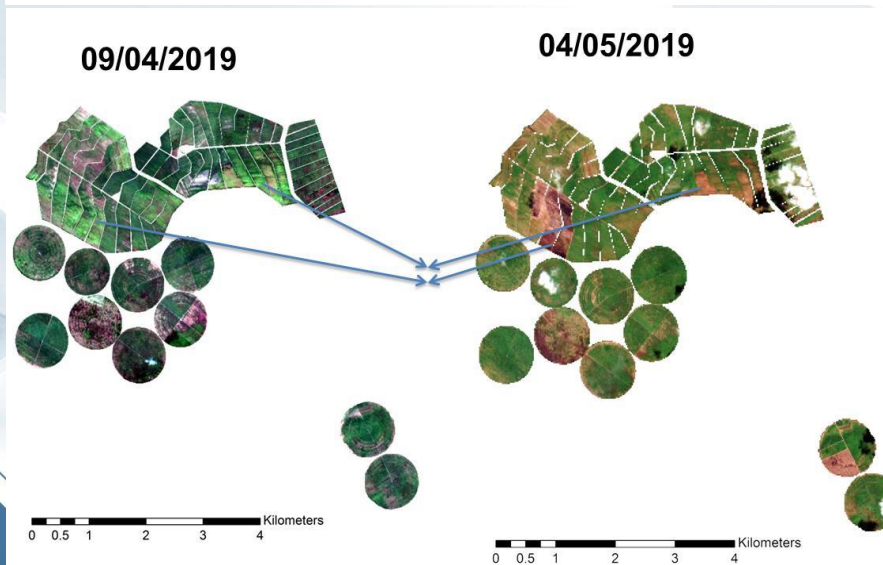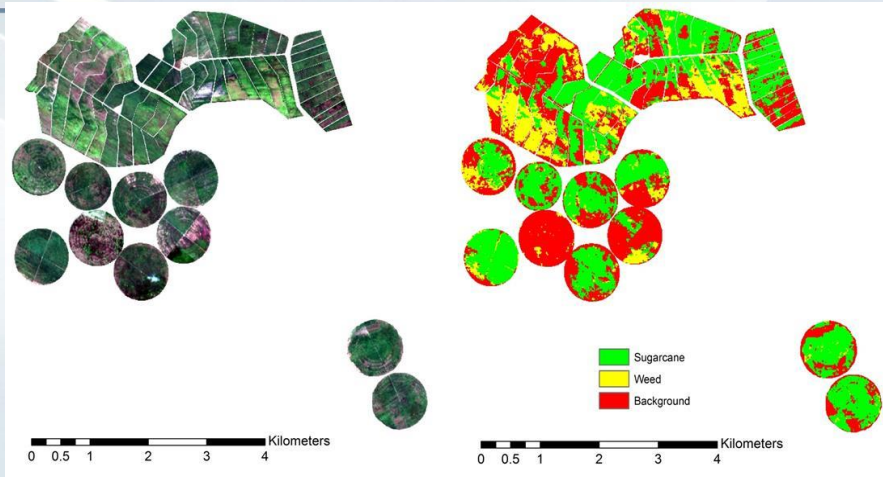
Outcomes

- Reduced cost of production
- Increased production – Data on Inter-field comparison (anomalies) has the potential to increase competition among smallholder and large commercial farmers
- Increase quality of farm produce – early detection of crop stress
- Reduced energy and water consumption – Variable rate application of farm inputs
- New SMMES in provision of precision agriculture services
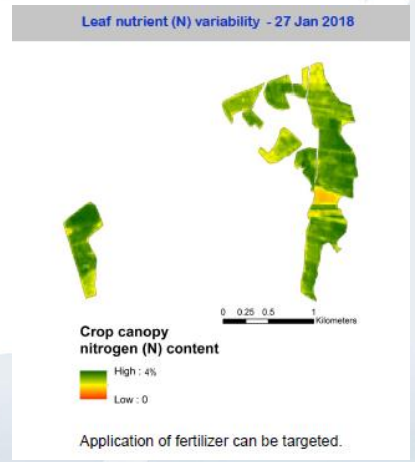- Increased number of new farmers

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9 Sep 2017

19 Sep 2017

14 Oct 2017

19 Oct 2017

24 Oct 2017

3 Nov 2017

28 Nov 2017

13 Dec 2017

23 Dec 2017

28 Dec 2017

2 Jan 2017

7 Jan 2018

12 Jan 2018

17 Jan 2018

27 Jan 2018

1 Feb 2018

6 Feb 2018

26 Feb 2018

13 Mar 2018

28 Mar 2018

NDVI - greeness Level
- 0.3 - 1.0 vegetation
- 0.0 - 0.3 Bare soil

Vegetative development

Vegetative development

Nutrient deficiencies would have been detected if farms were monitored on a weekly basis

Leaf nutrient (N) variability - 27 Jan 2018

Crop canopy nitrogen (N) content
- High : 4%
- Low : 0

Application of fertilizer can be targeted.

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Thanks for your attention

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