

# Satellite based ICT for improved crop production in Gezira

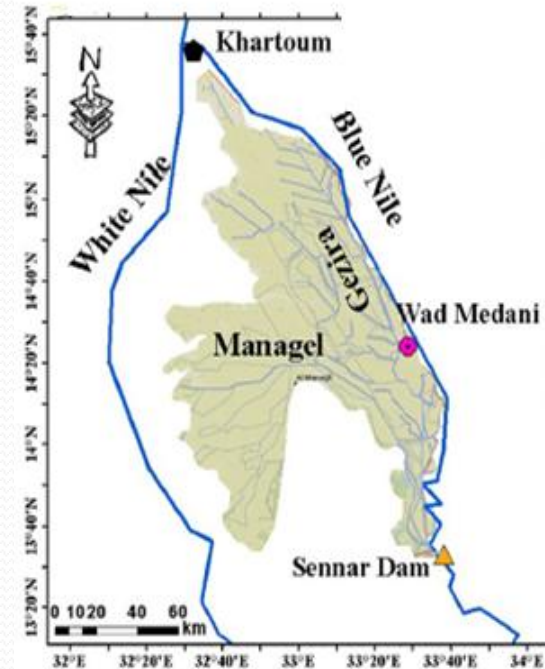
مشروع استخدام تكنولوجيا المعلومات والاتصالات القائمة على صور  
الأقمار الصناعية لتحسين إنتاجية المحاصيل في مشروع الجزيرة

Younis A. Gismalla

December 2015

# Background

- One year project/ winter 2014/2015,
- Funded by CTA /ICT4Ag
- Piloted in Gezira Scheme
- Implemented by
  - eLEAF - the Netherlands, and
  - HRC –Sudan
- ICT technology in Europe 1980's
- Smart ICT in Gash 2011/2013
- Gezira Scheme potentials



- Largest 2.1 million F /120,000 Farmers
- Uses 6- 8 Bm<sup>3</sup> annually
- Cash crops/ cereals
- Other schemes designed similar to it



## **Objective:**

To set up an advisory service for the Gezira Irrigation Scheme that conveys satellite based information on crops and irrigation to selected farmers via mobile phone text-messages.



# Technologies:

- ✓ Satellite images to measure
- ✓ SEBAL calculates 9 parameters

## Growth

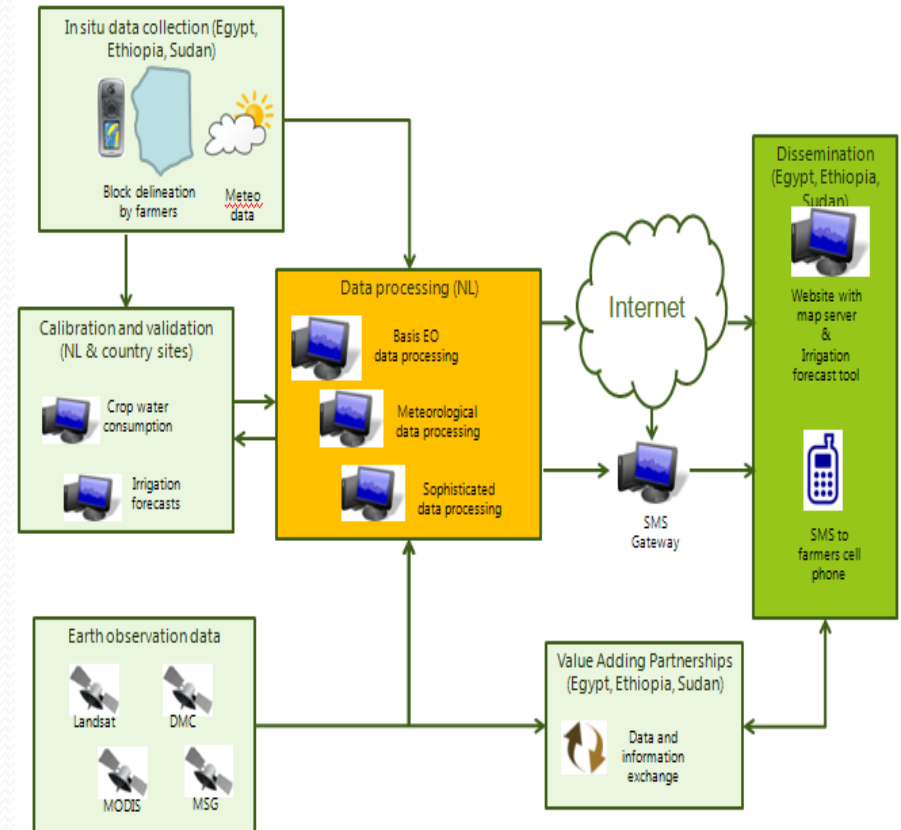
- biomass production
- leaf area index LAI
- vegetation index NDVI

## Moisture

- Actual evapotranspiration
- Evaporation deficit
- Crop factor
- Biomass water use efficiency

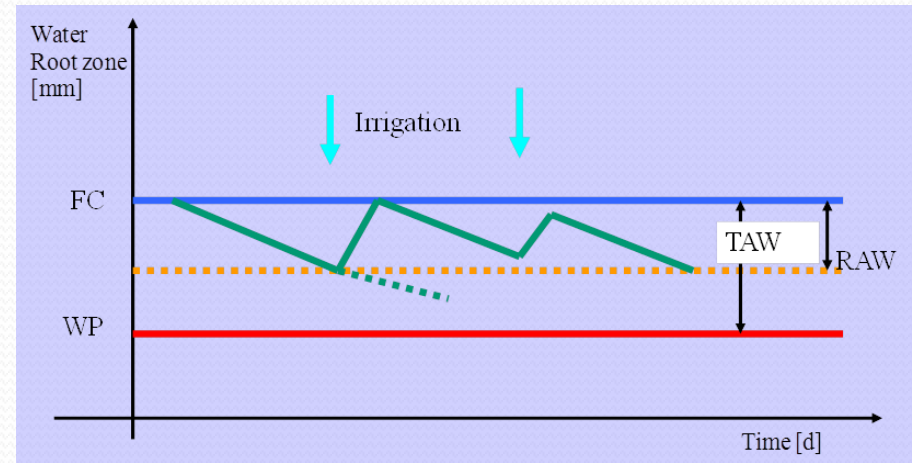
## Minerals

- Nitrogen content in the top leaf layer
- Nitrogen content in all leaves



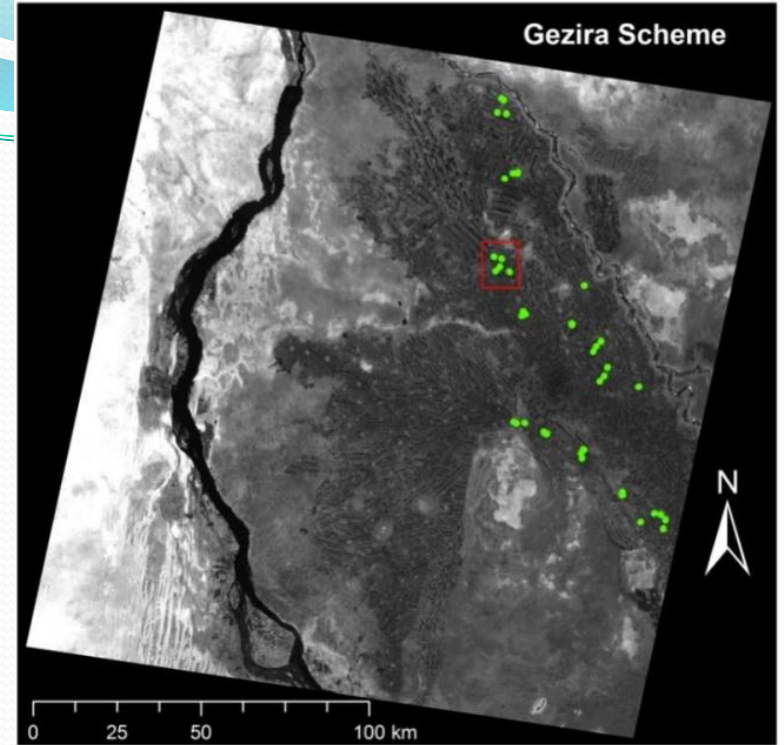
## ✓ICT technology

- ❑ mobile SMS & web portal
- ❑ Irrigation planner software
  - Run twice a week which
  - Advises farmers on the date of irrigation in advance
- Actual crop condition
- Last irrigation date
- Soil type
- Forecasted 5 days weather



## Activities:

- ✓ Selection of farmers
- ✓ User Needs Assessment (UNA)
- ✓ Fix farms locations with GPS/link with mobile number
- ✓ Develop service tools
- ✓ Weekly info. SMS



## Activities cont...

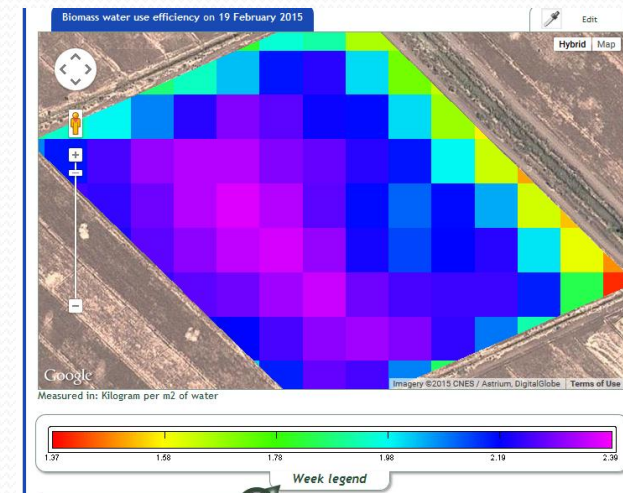
- ✓ Follow up and Training
  - Daily telephone calls
  - Weekly field visits
  - 3 training workshops
  - Stakeholders meetings



# Project Output:

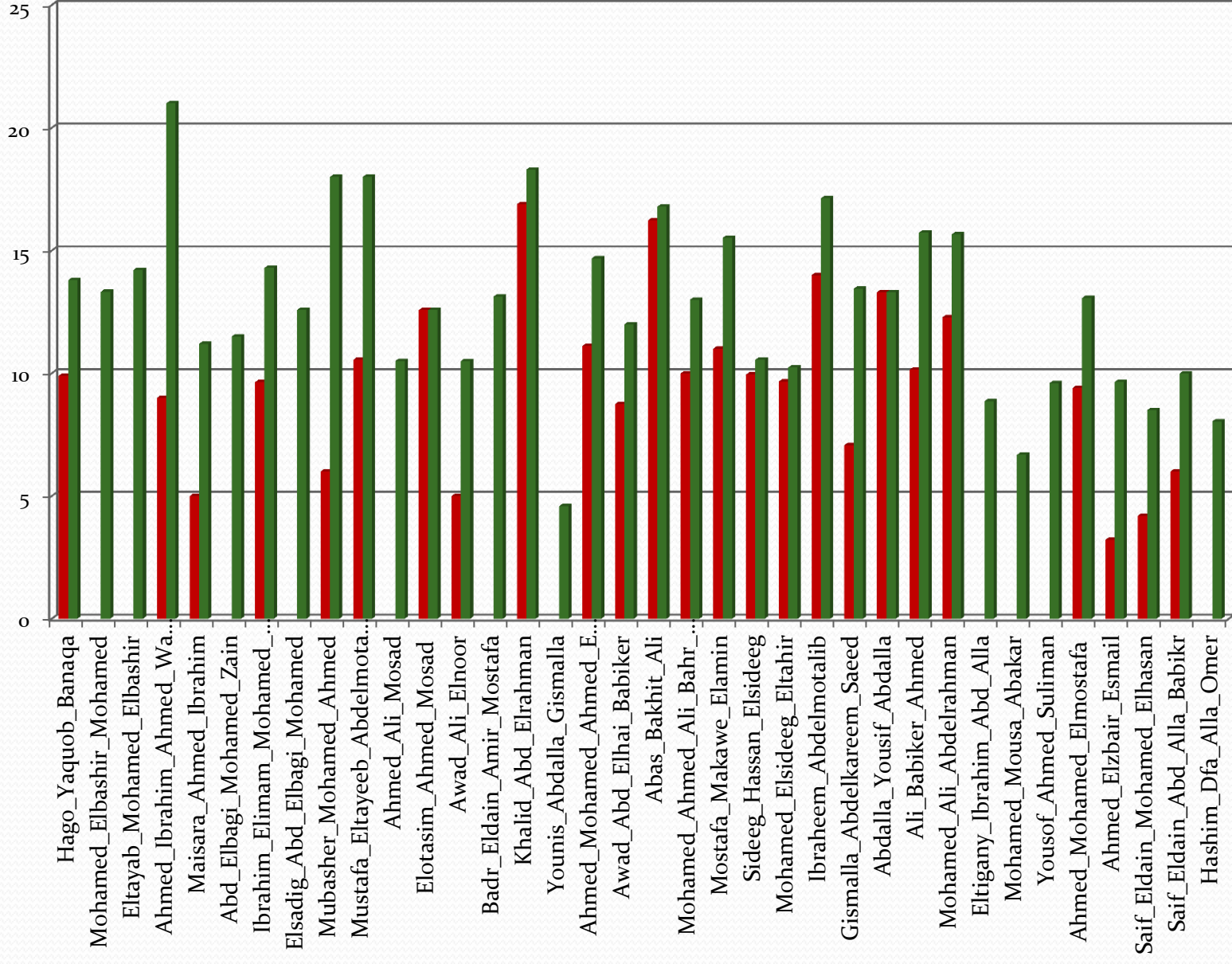
## Irrigation Water Use Efficiency:

- Shorter irrigation interval (8-17) days compared to (15-20) days
- Irrigated more frequently (7-9) irrigations per season compared to (5-7)
- Used less water per irrigation
- Increased Water Use Efficiency



# Crop Yield:

Sacks/Feddan



## Field Management:

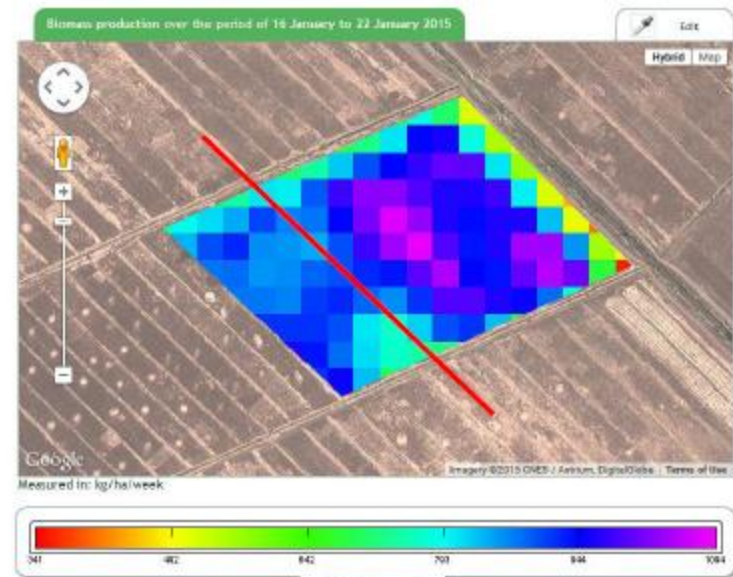
- Frequent irrigation advice via SMS
- Confirmed accuracy of received info.
- Can access portal at any time
- Neighbor farmers applying same SMS irrigation advice





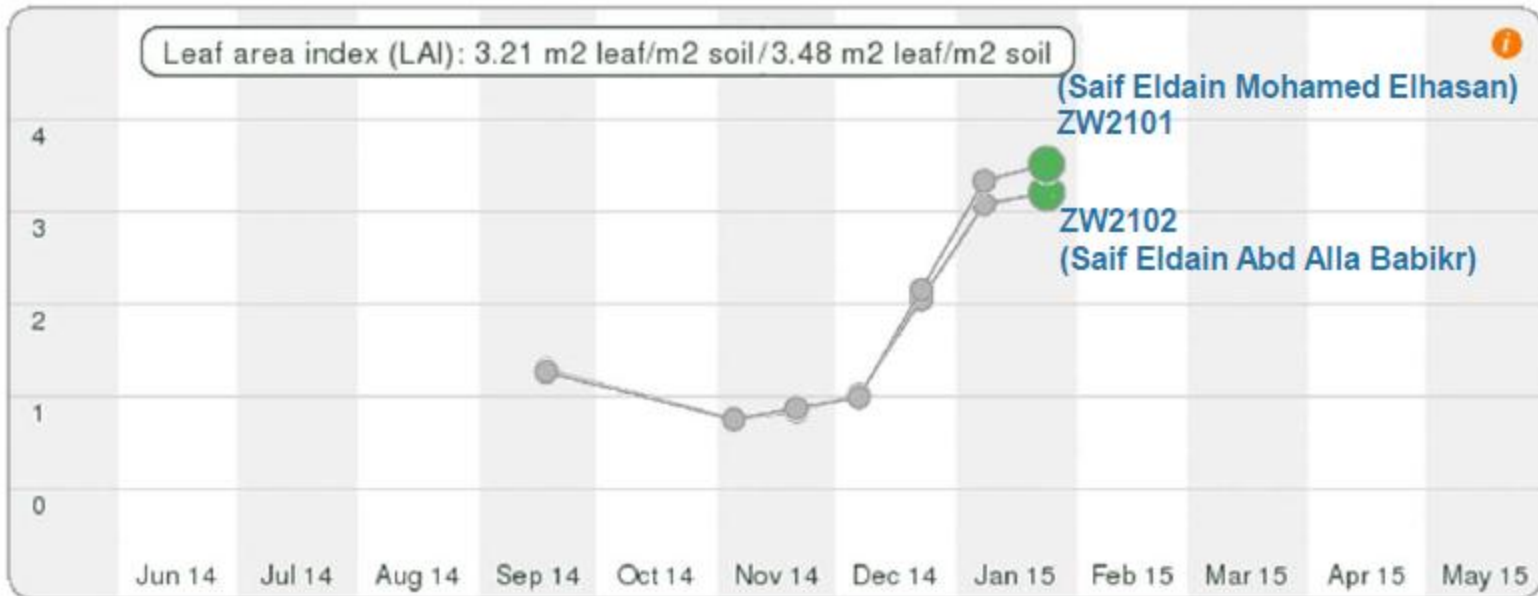
## Example 5

- Wheat at sandy silty clay
- ZW2101 (Saif Eldain Mohamed Elhasan) / ZW2102 (Saif Eldain Abd Alla Babikr)



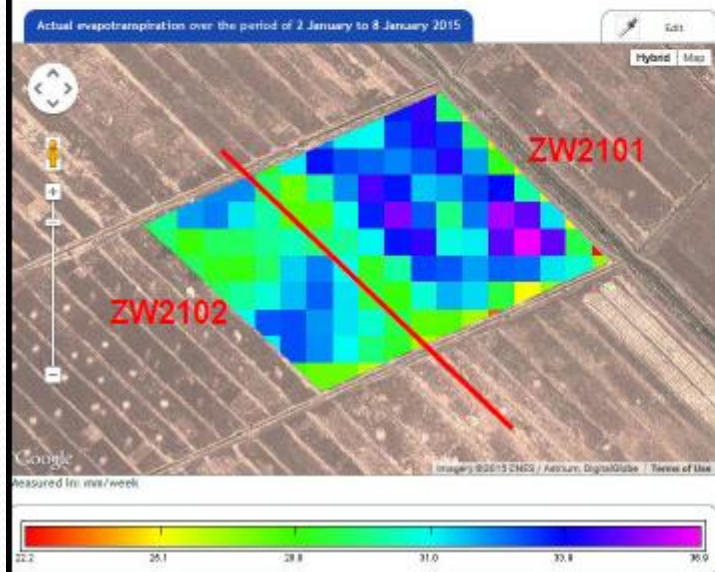
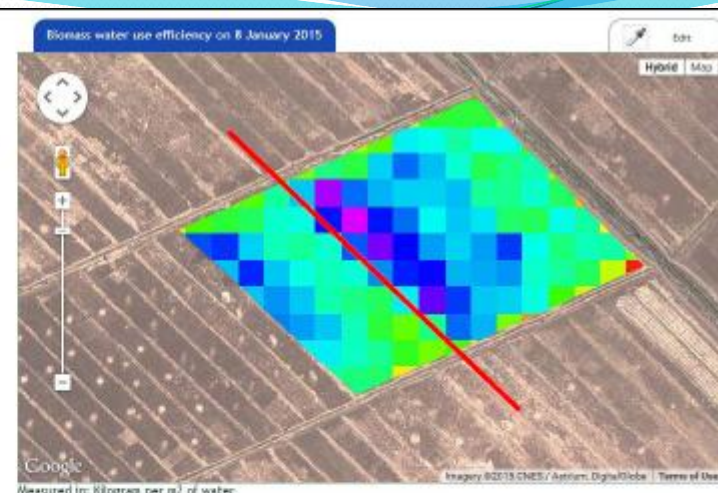
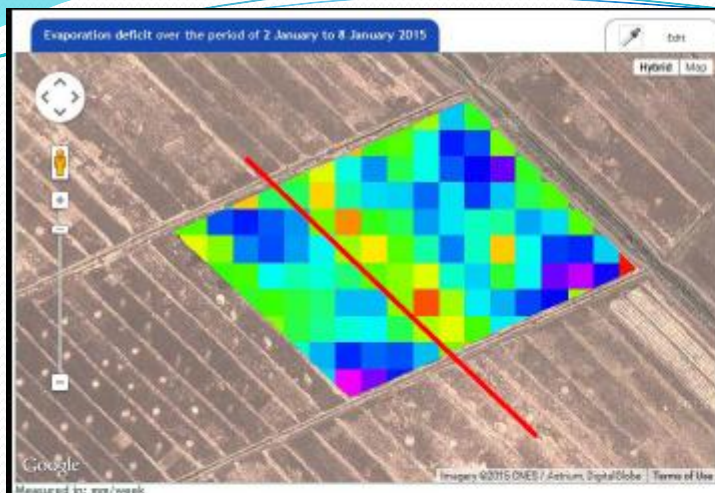
- Sowing: 25 Nov / **12 Nov** <sup>?</sup>
- Emergence: 30 Nov / 29 Nov
- Irrigation: 25 Nov, 8 Dec, 23 Dec, 1 Jan, 14 Jan /  
23 Nov, 9 Dec, 24 Dec, 1 Jan, 14 Jan





One field grows faster than the other field





ZW2101 (Saif Eldain Mohamed Elhasan) /  
ZW2102 (Saif Eldain Abd Alla Babikr)

Clear difference between two fields:

- Higher ET, biomass production and bioWUE in ZW 2101
- Etedficits are similar



Present nitrogen in upper leaf layer on 24 January 2015

Edit



Measured in: kg/ha



Week legend

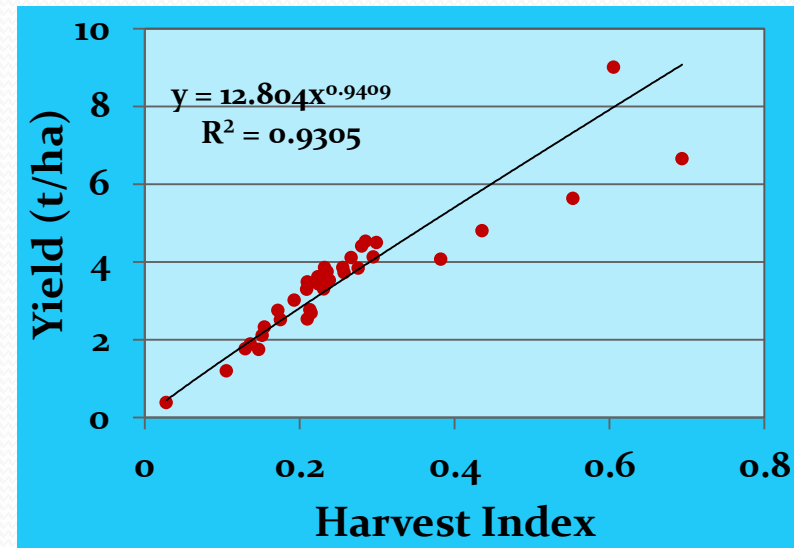
Choose your season legend



Season legend

## Other benefits:

- Neighbor farmers applying the same SI received by the pilot farmers
- A database of Information
- Research institutions/universities can use database.
- Study irri. efficiency at field level
- Early estimation of crop production (DSS)



HI / Yield for wheat in Gezira

## Challenges

### ❑ Financing Up scaling

- Former Minister of Agriculture
- Minister of WRI&E

### ❑ Nationalize the technology/ sustainability

### ❑ Follow up

The Global Forum For Innovations in  
Agricultures GFIA –Africa

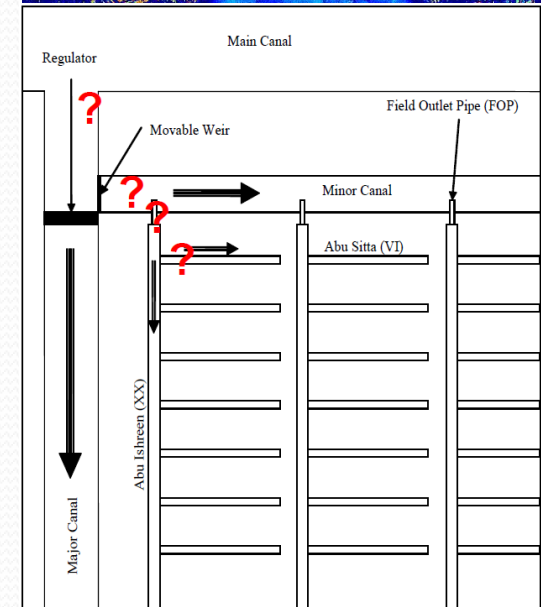
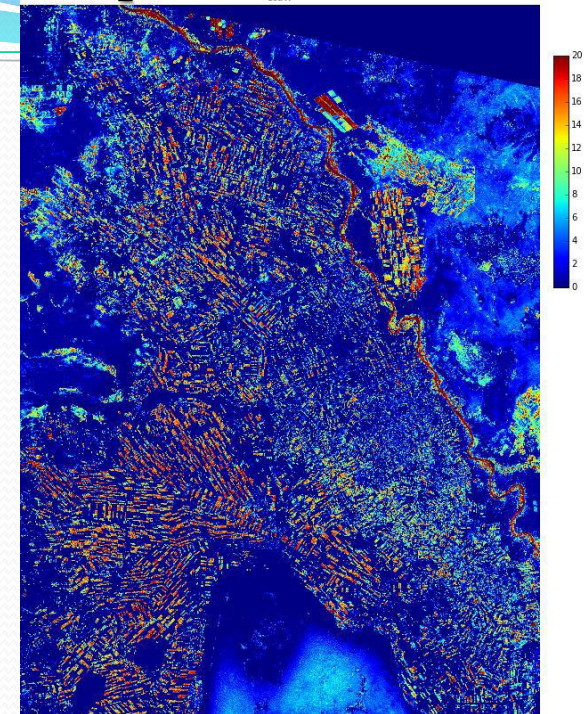
1-2 Dec. 2015

Durban -South Africa



## The way forward

- Replicate in 1 Block (GS 22 B)
  - (i) Water supply /distribution
  - (ii) Water consumption ICT
  - (iii) Institutional aspects (policies, institutions, resources)
  - (iv) Capacity building





**THANK YOU**