An Innovative Agri-start up

360 Engineering & Management Solutions

Pixel to Prosperity in the Pakistan's Agricultural Landscape

01 Background

Agri landscape around the world, Pakistan Agri's Landscape, Facts and Figures

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Background

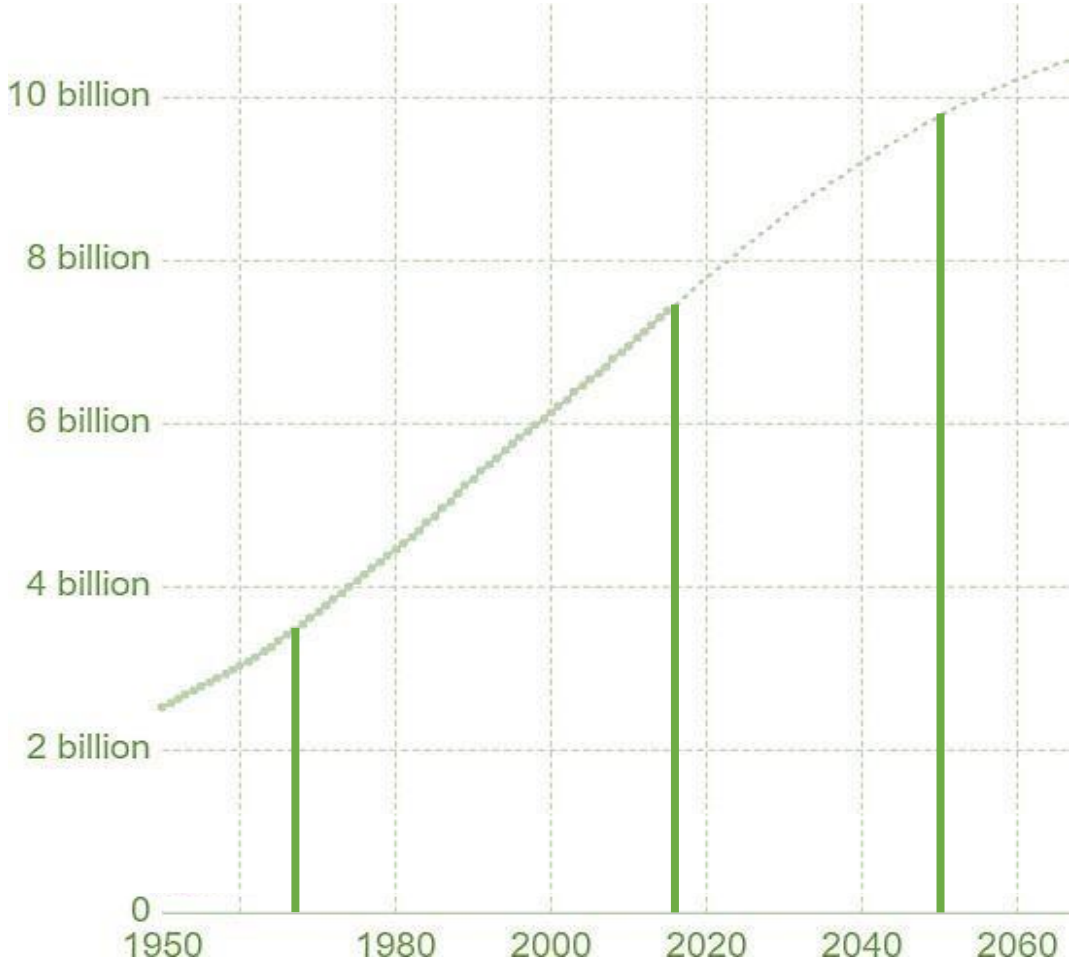
World's Agri-Landscape, Pakistan's Agri-Landscape, Facts and Figures

World's Agri-Landscape

Global agricultural production has tripled over the last 50 years, but today still:

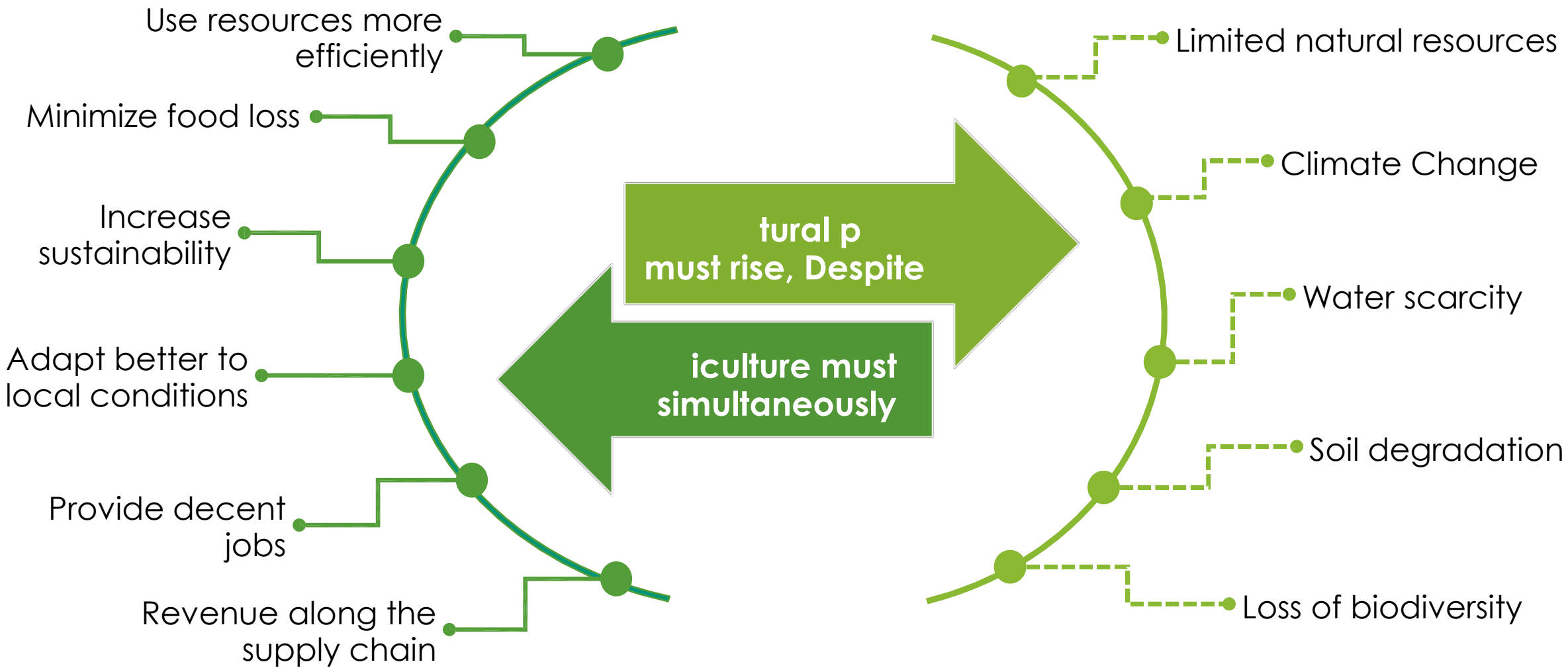
820 million suffer from hunger

25 billion suffer from malnutrition



https://ourworldindata.org/world-population-growth
https://www.gffa-berlin.de/en/deckblatt-communuque/

World's Agri-Landscape



Pakistan's Agri-Landscape

- Growth rate – 2.4%
- GDP growth rate – 3.4% in 2018/2019
- Agri-growth rate – 0.85% in 2018/2019
- Agri-GDP– 18.5% , 0.4% less than 2009

- ↑ Livestock – 60.5%(+4%)
- ↑ Fisheries – 2.1%(+0.79%)
- ↑ Maize – 2.6%(+6.9%)
- ↑ Wheat – 8.9%(0.5%)
- ↓ Cotton – 4.5%(-17.5%)
- ↓ Sugarcane – 2.9%(-19.4%)
- ↓ Rice – 3% (-3.3%)
- ↑ Forestry – 2.1%(+6.4%)

ICT for Farmers

Broadcasting Expertise sharing, advisory, community

Data Storage Precision Agriculture, Actionable knowledge

Sensor Network Realtime information, better data quality, decision making

Satellite Weather, Universal Accessibility, Remote Sensing

Internet Knowledge sharing, Social media, E-community, Banking, Trading etc.

Phone Advisory, sales, Banking, marketing

Telephone Interactive voice response

Computer & Websites Agriculture information and markets

ICT Footprints in Registered Farmers in Pakistan

Out of **25 Million** farmers in Pakistan

80% subscribers

20% subscribers

Approx. **13.6 Mn (54.4%)** are registered as farmer subscribers.

Out of registered users **16%** use smart phones and **84%** use basic phones.

30% of smart phone users use Apps

Approx. **8%** farmers are between age 15-26, **50%** are between 27-44 and around **40%** are over the age of 45

Geographic penetration: **Punjab 70%, Sind 17%, KPK 7%** and the rest of Pakistan **6%**

Conventional channels (CC) used are: SMS, VMS, IVR, and call center

Digital Channel (DC) used are: Android apps, Facebook and YouTube

The split between CC and DC is 90:10.

Fintech usage is gauged at 10%, however most of them are familiar with easy paisa, jazz cash etc.

360 EMS

A technological start-up

"We aim to provide innovative Agri-tech services & solutions using satellite and aerial imagery for monitoring crops, also offer precision aerial spraying solution to farmers to increase farm yield/acre"

ENGINEERING & MANAGEMENT
SOLUTIONS

360 EMS

Introduction, Services and Solutions

Our Profile

360 Engineering & Management Solutions

- 360 Engineering & Management Solutions (360EMS) concentrates on establishing higher scientific, engineering, and technological standards; developing innovative solutions; tackling challenging issues; and collaborating with public and private organizations through deeper and expanded engagement and transfer of specialized research, knowledge and expertise.

- Our aim is to bring revolution in the agricultural sector of Pakistan using engineering knowledge and other innovative ideas while committing deeply to increasing productivity, rural development, and enhancing the quality of life and safety of farmers.

ENGINEERING & MANAGEMENT
SOLUTIONS

Our Technical Partners

Pak Zar Zameen | Precision Agriculture Services

pakzarzameen.com.pk

Regional Integrated Multi-Hazard Early Warning System

RIMES

Indian Institute of Technology Bombay

ESSOM

ISO 9001

LEVANT

CONSULTANCY in

- Civil Engineering Planning, Design & Implementation
- Water Resources Engineering & Management
- Computer Modelling & Geo-Spatial Solutions

AGRITRONICS

CARTHAGO

consultancy

Our Services

Water Stress Model

Identification of water rich areas

N_2

Nitrogen Prescription

Divides the land into zones based on nitrogen content

Plant Health Analysis

Normalized vegetation index with 10m accuracy since August 2015

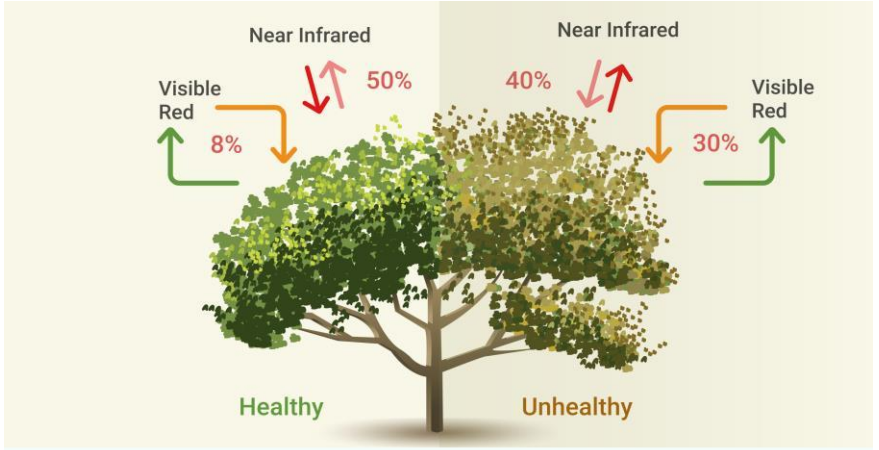
Weather Forecast

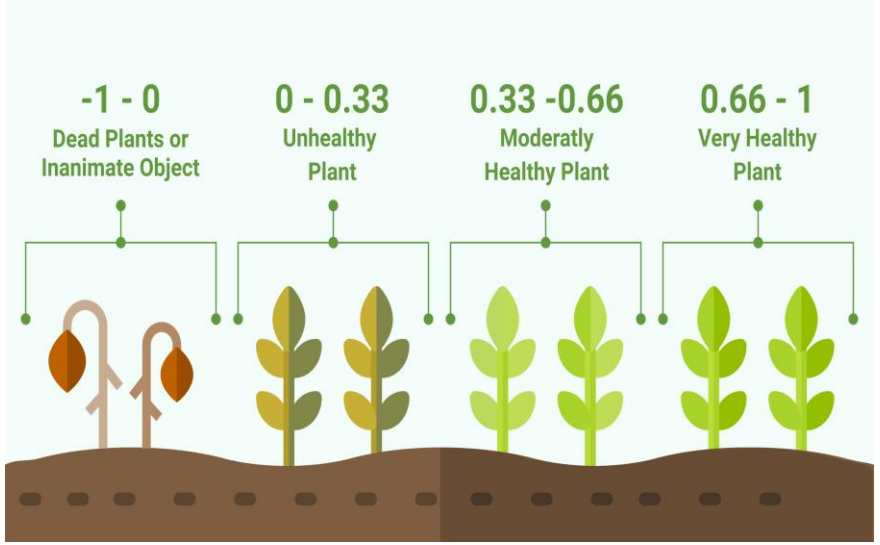
Using Dark-Weather API by which we can forecast weather with higher accuracy and gives hourly updates

Crop Health or Vegetation Index

- Normalized Difference Vegetation Index (NDVI) quantifies vegetation by measuring the difference between near-infrared (which vegetation strongly reflects) and red light (which vegetation absorbs)
- NDVI always ranges from -1 to +1
- Best value of NDVI range 0.3 to 0.8

$$NDVI = \frac{(NIR - Red)}{(NIR + Red)}$$



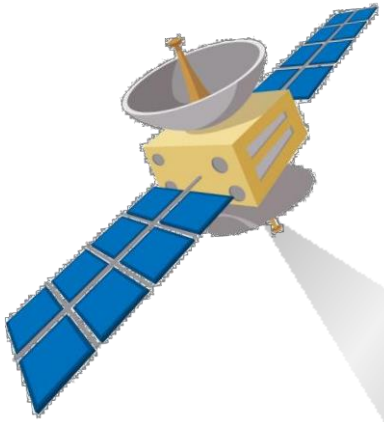


https://eos.com/blog/ndvi-faq-all-you-need-to-know-about-ndvi/

Sentinel 2

Launched on June 7, 2015

European Space Agency launched Sentinel 2 on **7th June 2015** for Earth observation mission.

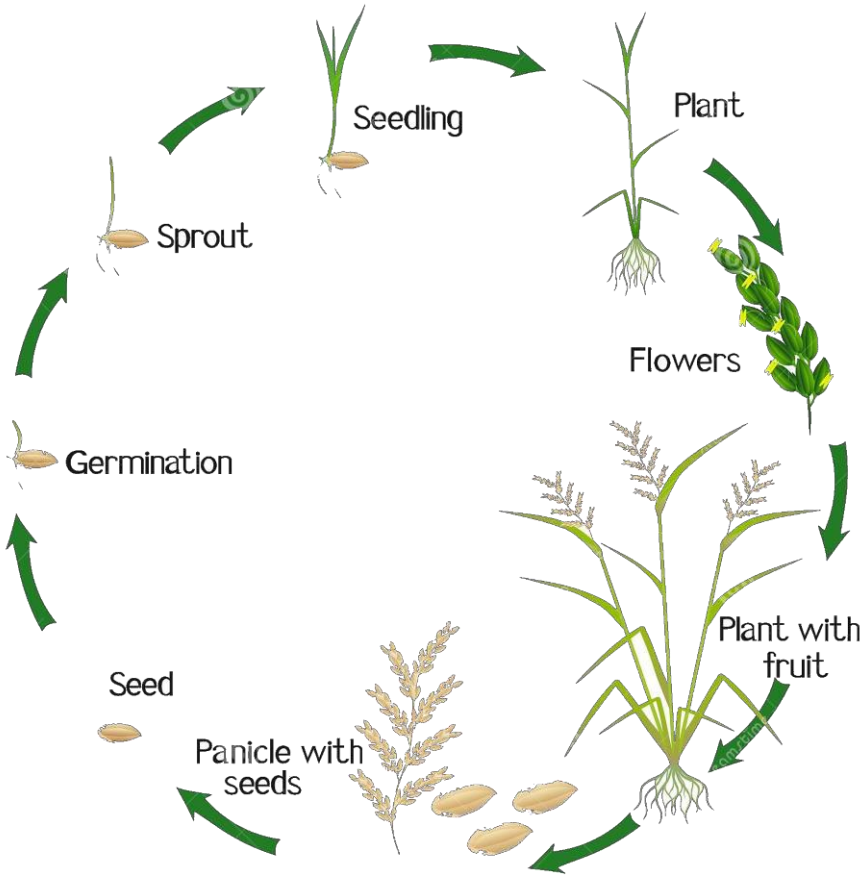


Each tile have a pixel resolution of **10 meter^2** each

Sentinel 2 gathers data with 13 bands in the visible, near infrared, and short-wave infrared part of the spectrum

Example – Rice Crop

Average Life Cycle of Rice crop is 120 days



From day 50 to day 90, value is from 0.75 to 0.82

Plant health value of Rice crop till 50days is from 0.35 to 0.4

After 90 days, value starts to decrease as plant has been fully grown and value is from 0.3 to 0.35

Example – Rice Crop

July

- Nursery Trans Plating 2018-07-07
- 2018-07-12 pesticide for weeds control
- First time application of fertilizer 2018-07-30 Days DAP 1 bag

Aug

- 2nd time application of fertilizer of urea after 2018-08-10
- 1st time application of cartap 2018-08-20 for control chewing and sucking insects

Sep

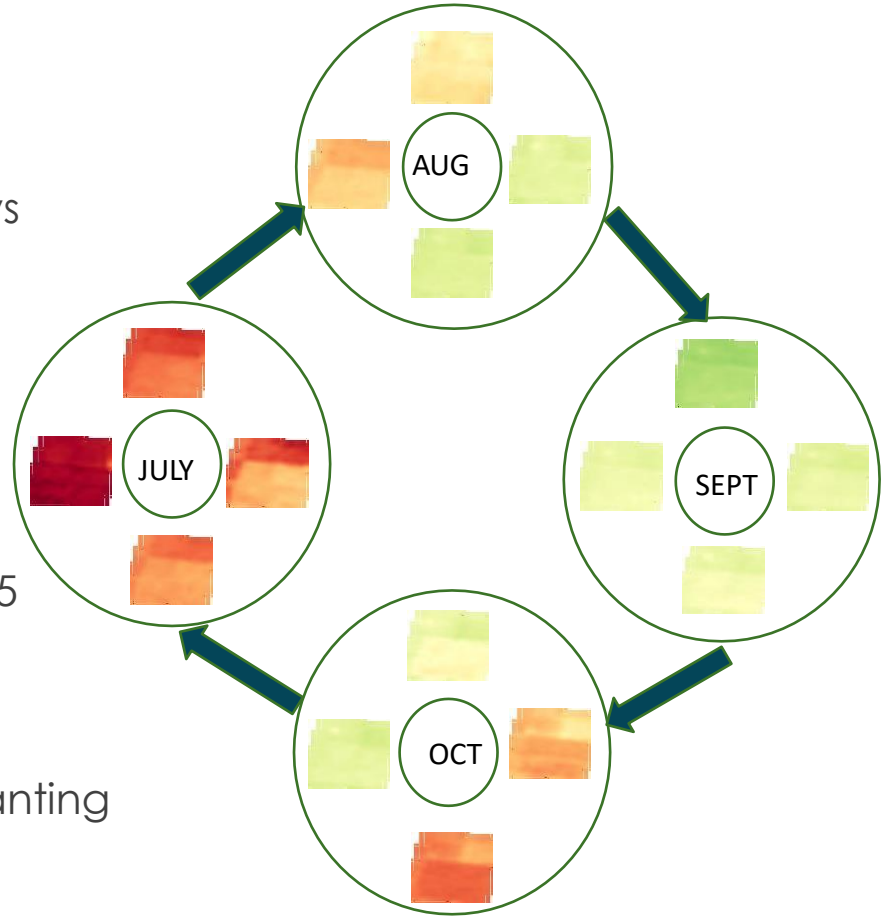
- 3rd time application of fertilizer urea 2018-09-05
- 2nd time application of cartap 2018-09-20 for control chewing and sucking insects

Oct

- Spraying for insects after 2018-10-08 of transplanting when rice at flowering stage
- Harvesting of rice crop after 2018-10-30

Yield

51.5 mann/Acre



Example – Rice Crop

July
- Nursery Trans Plating 2019-07-17
- 2019-07-22 pesticide for weeds control
- First time application of fertilizer 2019-08-07 Days DAP 1 bag

Aug
- 2nd time application of fertilizer of urea after 2019-08-17
- 3rd time application of fertilizer urea 2019-08-27

Sep
- 1st time application of cartap 2019-09-10 for control chewing and sucking insects
- 2nd time application of cartap 2019-09-30 for control chewing and sucking insects

Oct

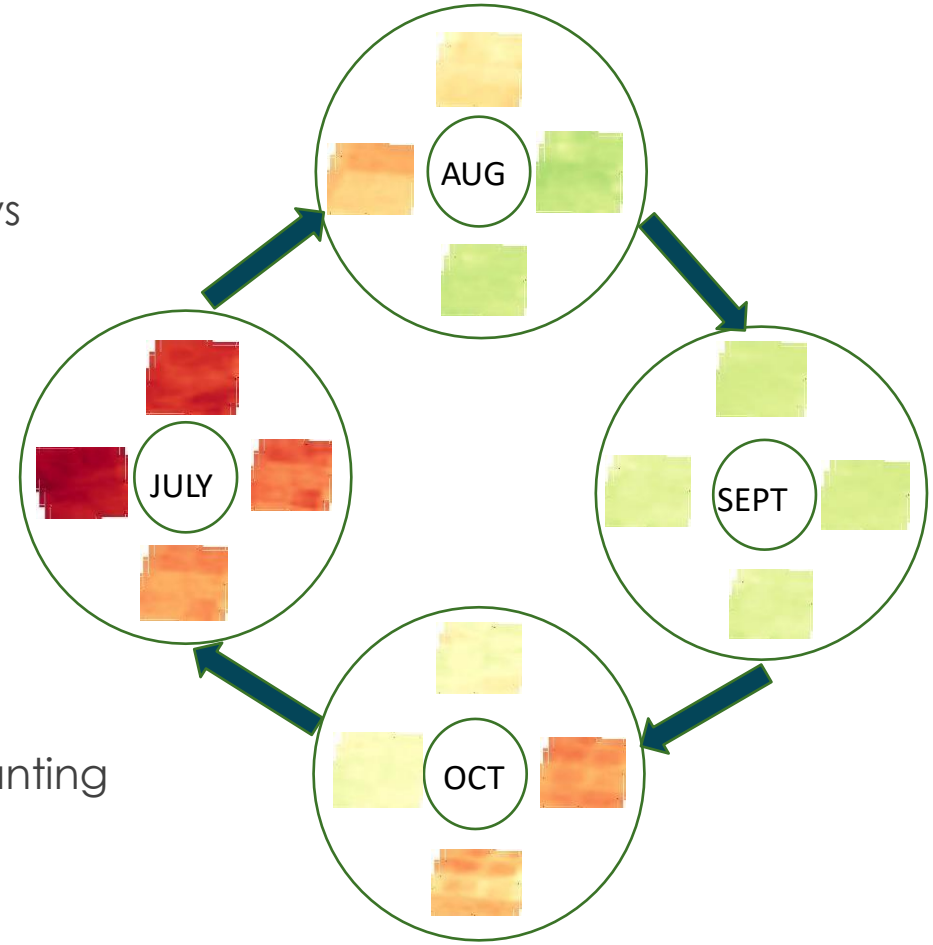
Spraying for insects after 2019-10-08 of transplanting when rice at flowering stage

Nov

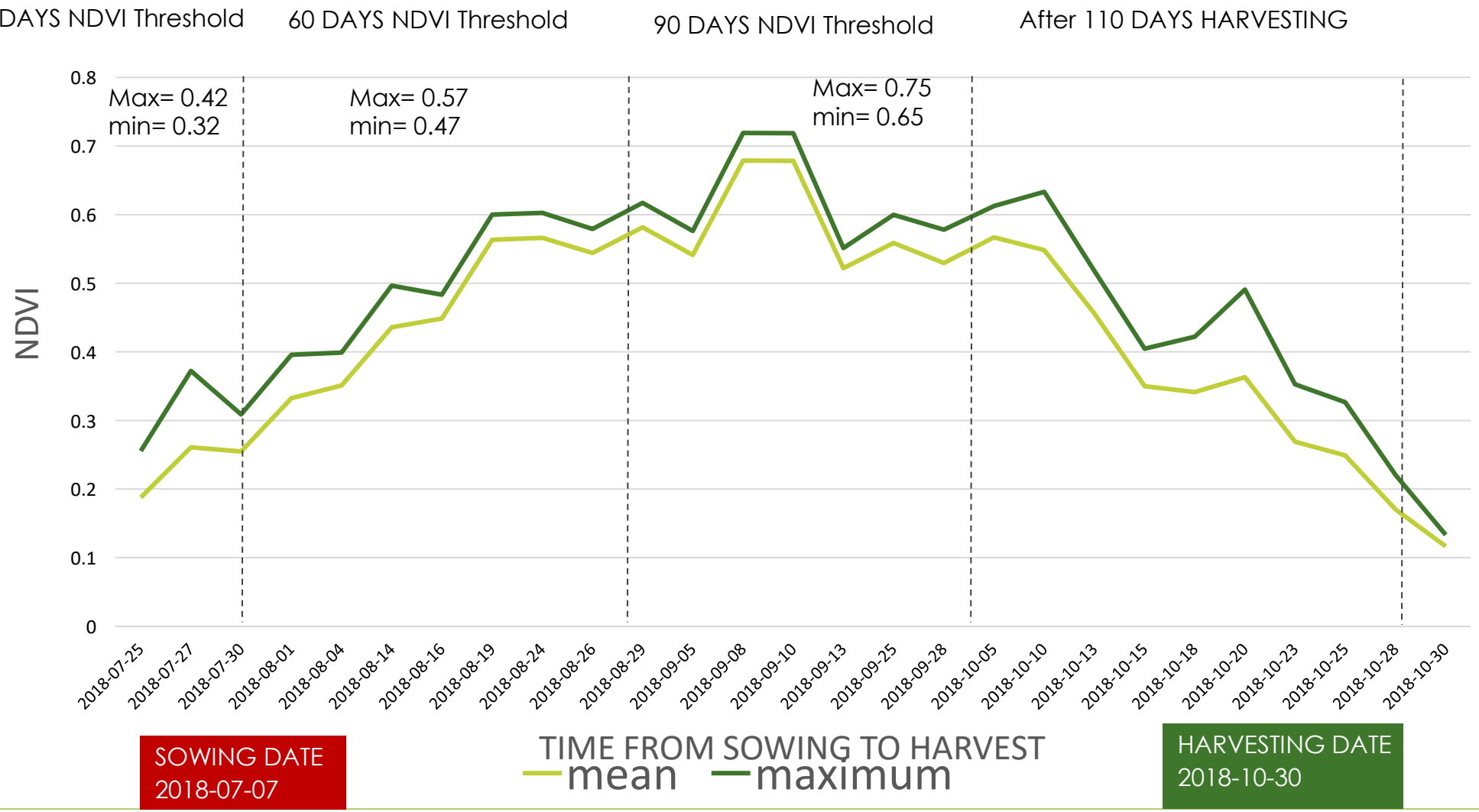
Harvesting of rice crop after 2019-11-04

Yield

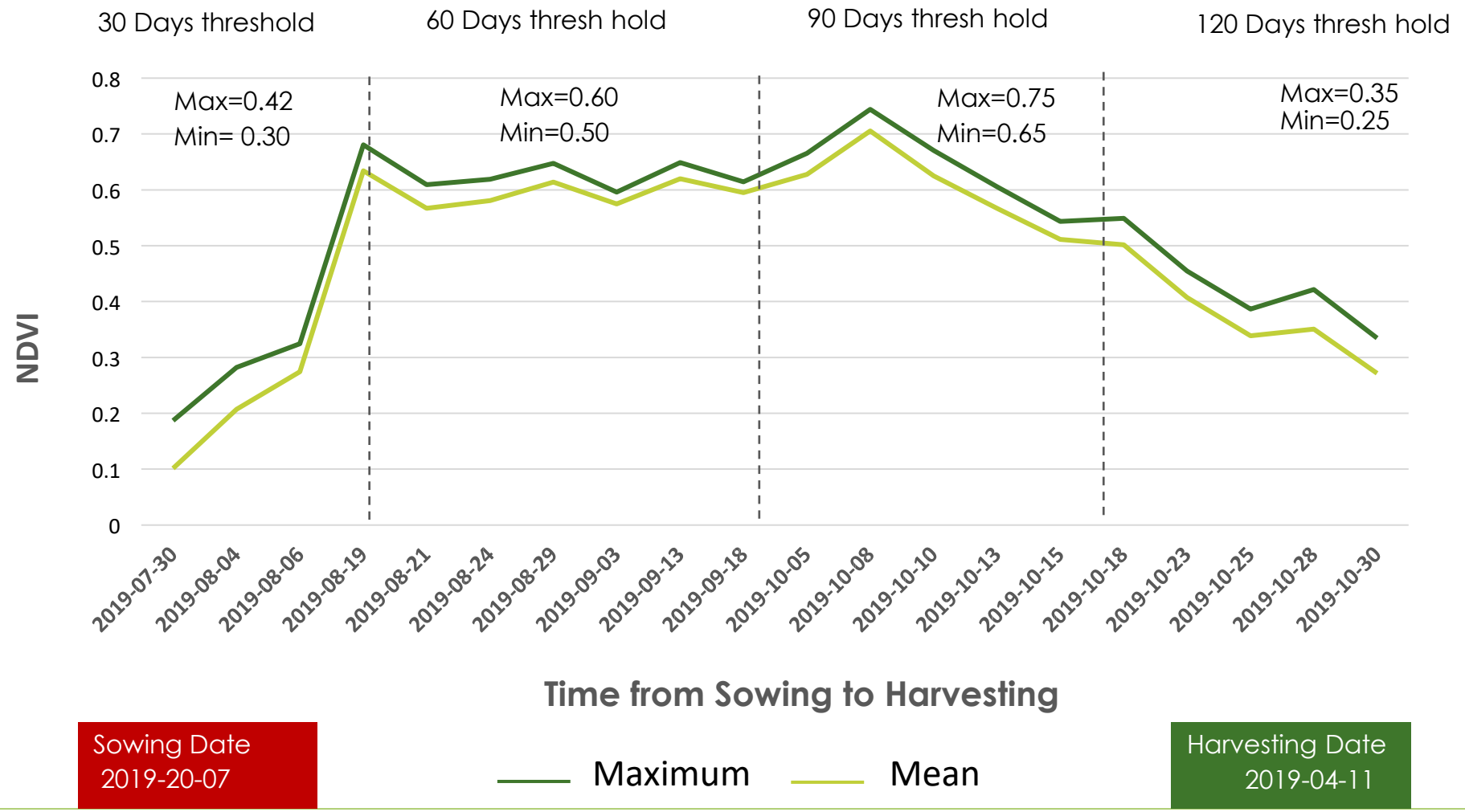
48 mann/acre



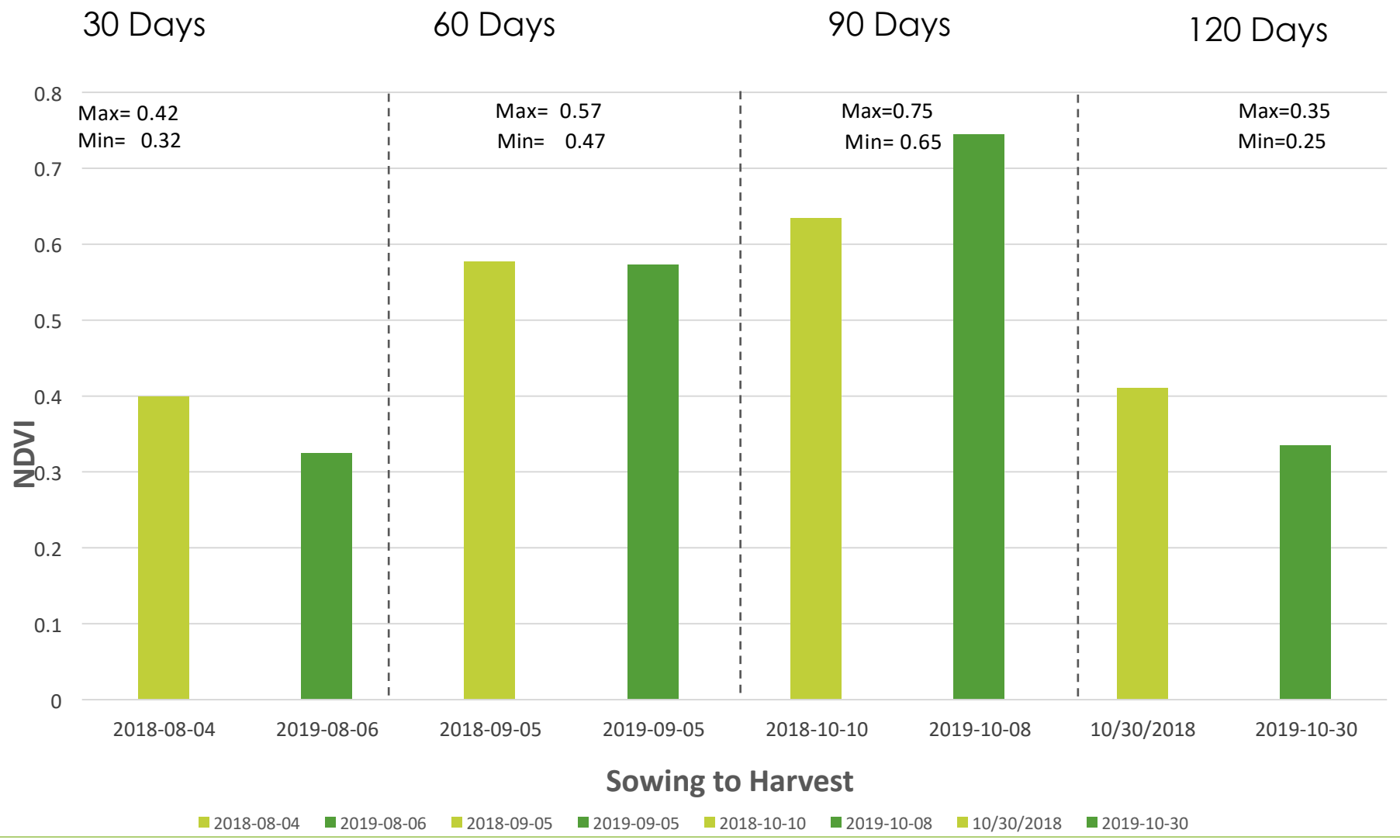
Time Series Data of Rice Crop 2018



Time Series Data of Rice Crop 2019



Comparison 2018 & 2019



Satellite and Aerial Based Mapping

Satellite Based Maps

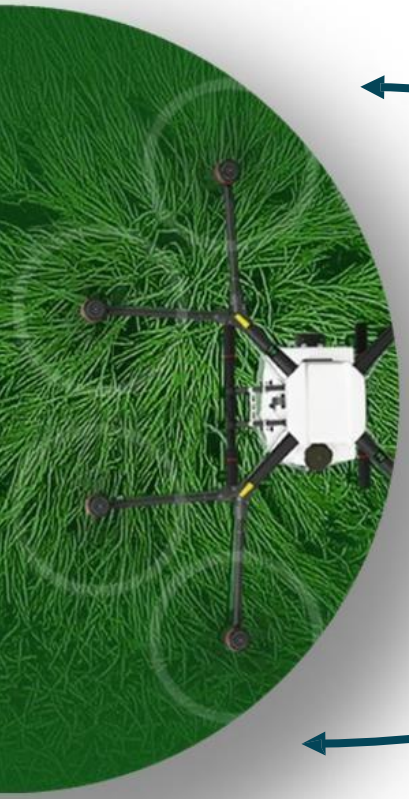
- Up to 3M resolution
- Can produce maps of larger areas
- Historical data is available (5years)
- Low cost service
- Update every 3rd day
- Monitoring effects of a specific task (fertilization, treatment, irrigation, etc.) on crop health

Drone Based Maps

- 10cm resolution
- Larger areas require more flying
- Once in a month (cost /visit is high)
- High cost 450 per visit
- Monitoring effects of a specific task (fertilization, treatment, irrigation, etc.) on crop health

Agricultural drones for Agropreneurs & Farmers for Sindh Province

Spraying Drone Benefits



2 acres per charge

6 acre per hour

40 acre per day

10 Liters tank

Save Water
80%

Save Pesticide
10%

Save Time
75%

Yield Increase
20%

Spraying Drone - Example

Volume = 60 liter
Speed = 0.70 m/sec
Distance =675 meter
Time = 16 minute

Volume = 10 liter
Speed = 4 m/sec
Distance =1012 meter
Time = 4.3 minute

Spraying Drone - Comparison

Data Provided for Cotton by Agriculture Department's Adaptive research Farm 101, Rahim Yar Khan

Sr no.	Place of Spray	Name of insects	Before spray (Average on 100 p)	After Spray (Average on 100 p)	Efficiency %
1	Chowk Jamal	White Fly	35.11	14.54	58.58%
2	Kacha Khuh	White Fly	10.61	2.99	71.82%
3	Jandiali	White Fly	18.19	6.44	64.60%
4	Pipli Adda	White Fly	28.80	10.56	63.33%

By : Aerial Spray
Efficiency:64.58%

Sr no.	Place of Spray	Name of insects	Before spray (Average on 100 p)	After Spray (Average on 100 p)	Efficiency %
1	Chowk Jamal	White Fly	33.45	19.54	41.58%
2	Kacha Khuh	White Fly	12.75	6.65	47.84%
3	Jandiali	White Fly	18.19	10.66	41.40%
4	Pipli Adda	White Fly	26.80	15.80	41.04%

BY: Knapsack
Efficiency: 42.96%

Thank You