Climate Information for Crop Risk Management in the SAT

AVR Kesava Rao
Sreenath Dixit
Anthony Whitbread
KPC Rao
Ram Kiran Dhulipala

Invited presentation at Annual Monsoon Workshop and Prof DR Sikka Memorial National Symposium on "Role of weather and climate observations and Forecasting on Increasing Agricultural Productivity and Risk management" at IITM Pune during 28-30 March 2019

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Major risks for smallholder farmers

- Cost of inputs, pests and diseases, storage and market risks

- New challenges on integration of value chains; Liberalization and globalization effects

- Barriers to learn new farming techniques

- Adaptation to climate variability and change; Crop insurance issues

- Women farmers face lack of access to resources as their male counterparts

Climate Risks becoming more pronounced

Coping with Climate Risk

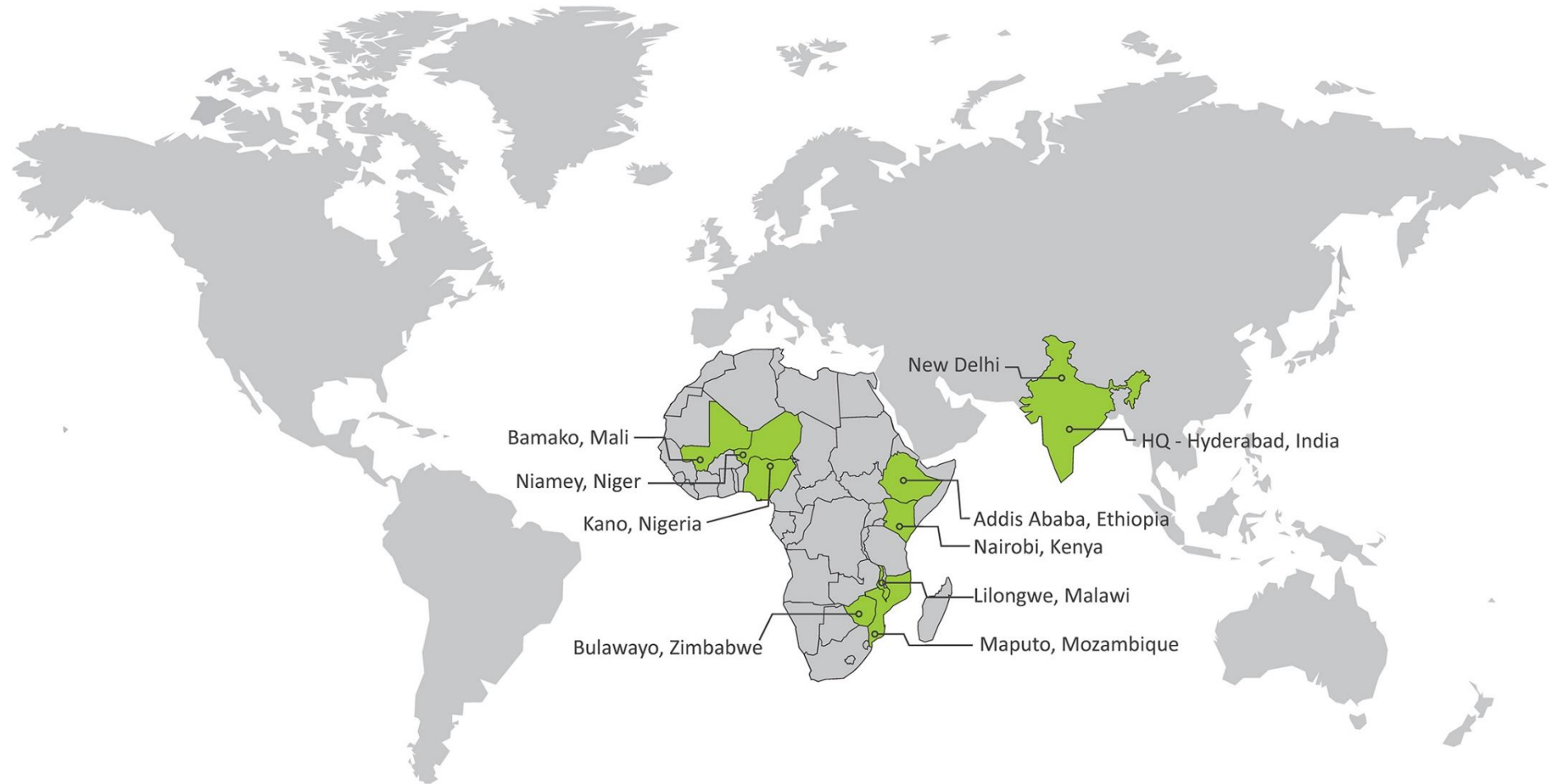| Tactical	Strategic
• Timing of planting	Re-designing farming systems
• Selection of crop types and varieties	• Historical and future climate analyses and modelled scenario analysis
• In-season adjustment of inputs	
• Crop insurance	• Co-design of the farm system (s) for resilience and market opportunities
• Forward selling, contracts	
	• Infrastructure and institutions to enhance adaptive capacity

More risks in Semi-Arid Tropics (SAT)

Semi-Arid Tropics

Covers **6.5 million** sq. km.

Across **55** countries

with **2 billion** people

of which **644 million**
are the poorest of the poor

High levels of **poverty, malnutrition** and **environmental degradation**

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ICRISAT Locations

World map showing ICRISAT locations:
- Bamako, Mali
- Niamey, Niger
- Kano, Nigeria
- New Delhi
- HQ - Hyderabad, India
- Addis Ababa, Ethiopia
- Nairobi, Kenya
- Lilongwe, Malawi
- Maputo, Mozambique
- Bulawayo, Zimbabwe

Specialization in crops suitable for the **drylands**

Sorghum

Pearl millet & Finger millet

Groundnut

Chickpea

Pigeonpea

Good for you
Good for the planet
Good for smallholder farmers

Climate Smart Crop Cultivars: Super Early Chickpeas

Super early
ICC 96029, 75-80 days

Early maturing
KAK 2, 90-95 days

Extra-early
ICCV 2, 85-90 days

Effects of high temperatures on pod set in chickpea

Sensitive

Tolerant

Pigeonpea hybrids with high yield potential

On-farm demonstration of hybrid pigeonpea ICPH 2740					
Year	State	No. of Farmers	Mean yield (Kg/ha)		% Gain
			ICPH 2740	Control	
2009	Maharashtra	22	1791	1494	20
2010	Maharashtra	55	1380	1167	18
2011	Maharashtra	102	2144	1651	30
2009	Madhya Pradesh	13	1814	1217	49
2011	Andhra Pradesh	47	1999	1439	39
2011	Gujarat	40	1633	1209	35
Total/Mean		279	1794	1362	32

ICPH 2740, Raver, Jalgaon, Maharashtra

➢ **Extra Early Pigeonpea:**
   ICPL 88039: 110-130 days maturity

➢ **Super Early Determinate (DT) Pigeonpea:**
   ICPL 11255, ICPL 20338: 90-100 days maturity

Super Early Variety ICPL 11255

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Farmer-centric Watershed as an Entry Point for Sustainable Livelihood Improvement

- Integrated Genetic and Natural Resources Management

- Science-based consortium approach

- Profitability and sustainability

- Empowerment and knowledge sharing

- Social inclusion (equity, gender and youth)

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Intelligent Agricultural Systems Advisory Tool (ISAT)

- Developed a pre-season decision tree to inform crop planning

- Developed a weekly decision tree **integrating** forecasts, crop and soil scenarios and systems information – messages sent via SMS

- Piloted with 700 farmers in Anantapur in 2017
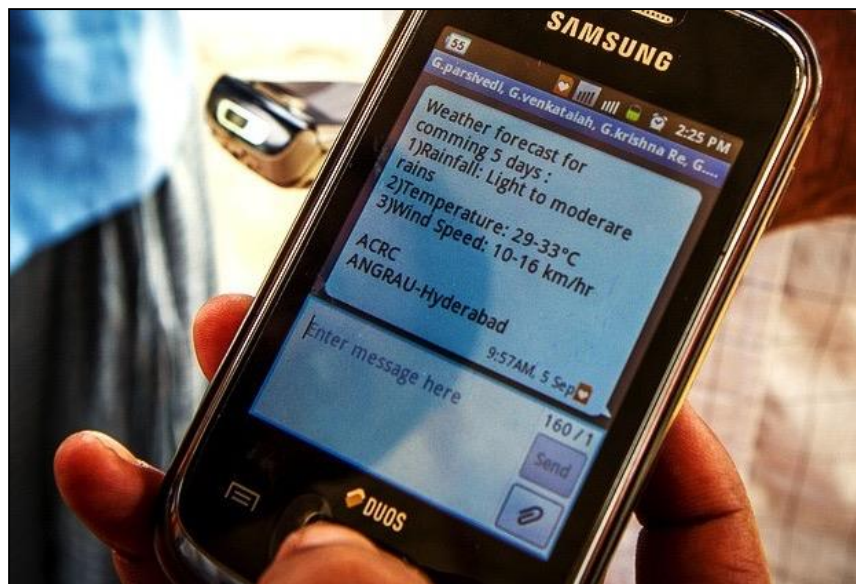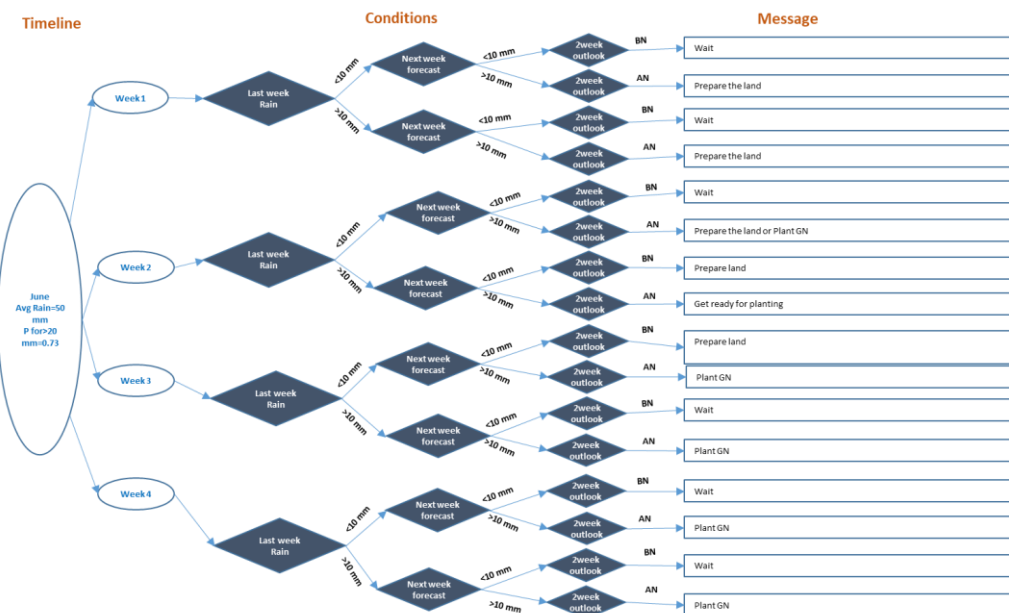
Groundnut Crop Sowing Advisories

Devanakonda
Mandal,
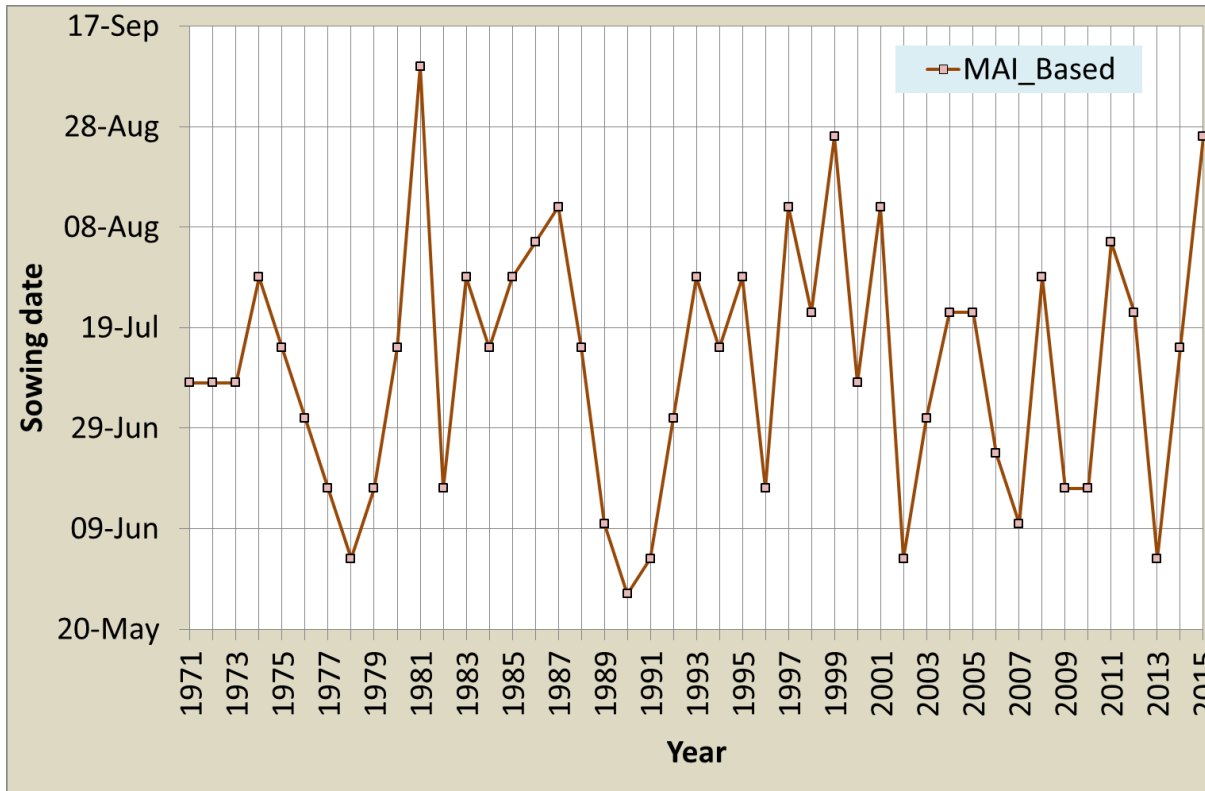Kurnool District
Andhra Pradesh
Kharif 2016

ICRISAT, Microsoft, Government, NGOs and Farmers

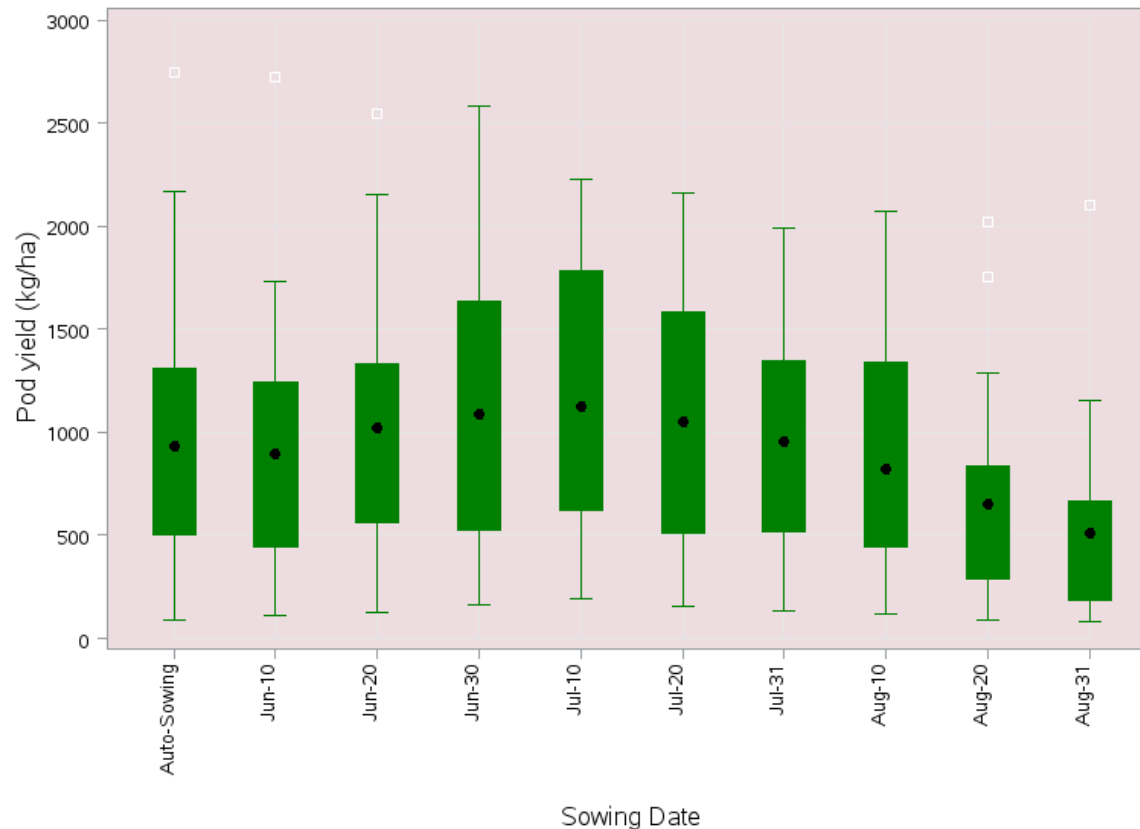# Sowing period variability at Devanakonda

Great year-to-year variability exists, making rainfed cultivation,
a challenge

Water Balance approach (MAI) and simulation models along with 5-day rain forecasts helped in identifying successful sowing window
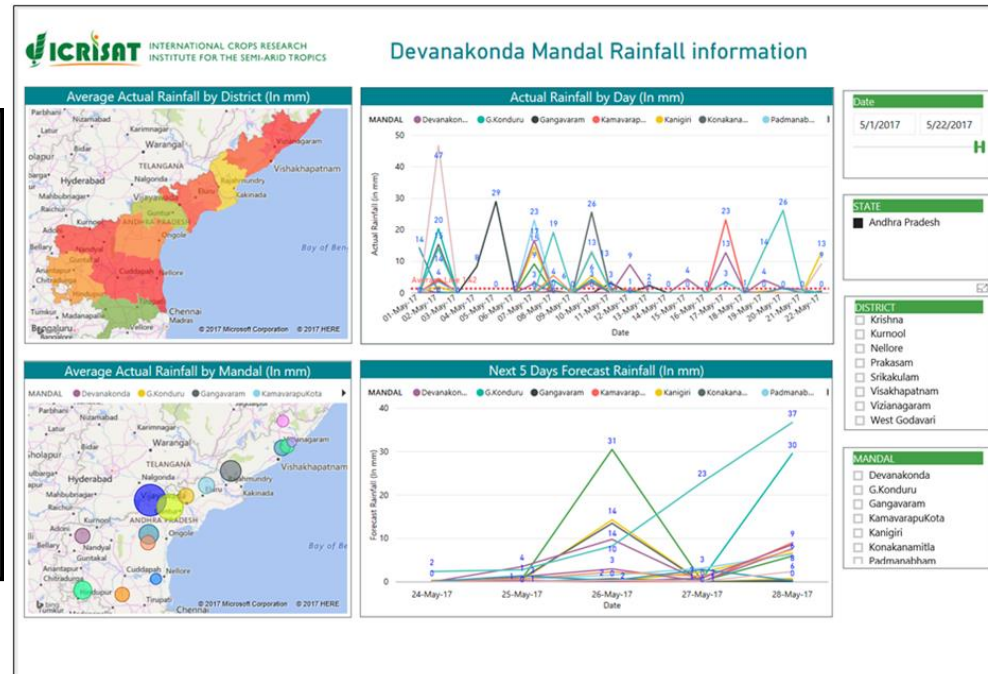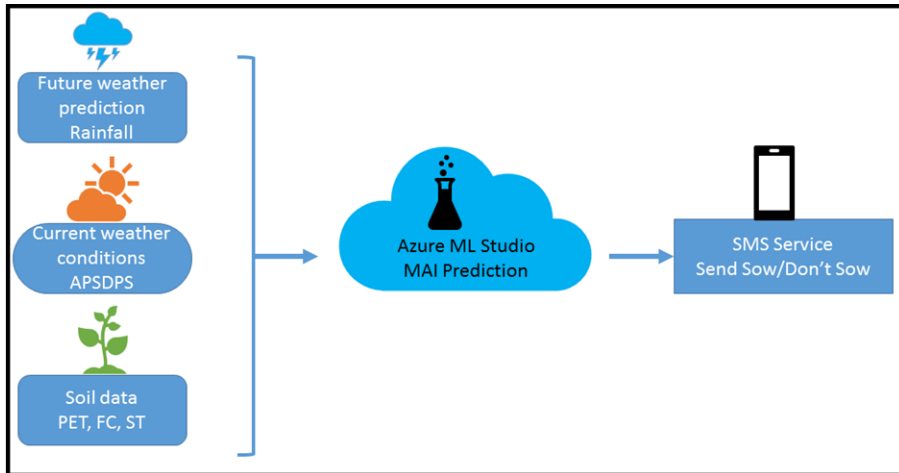
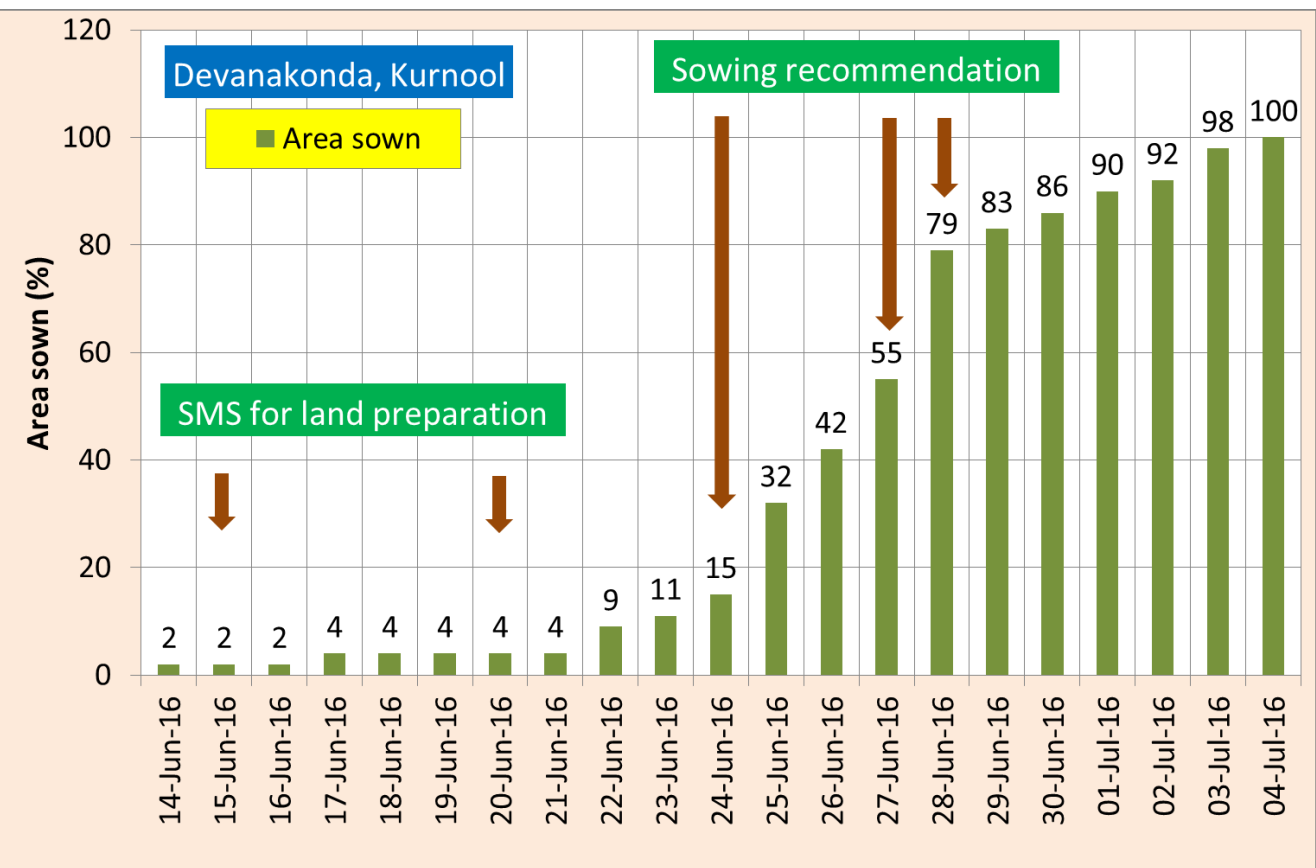# Groundnut yield simulations at Devanakonda

DSSAT Crop-growth simulations based on past 30 years' climate data indicated optimum sowing window as the period between 20 June to 20 July
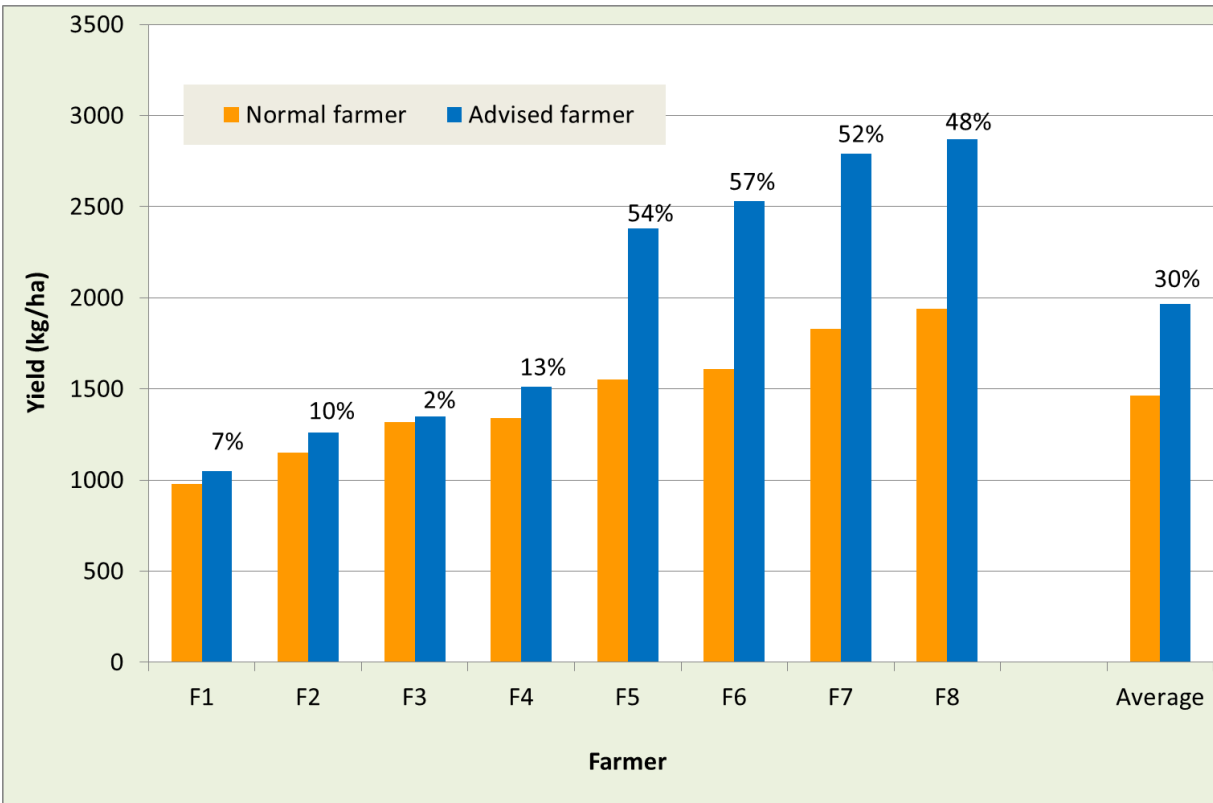
Power BI dashboard for weather information

Weather-based sowing advisory for groundnut

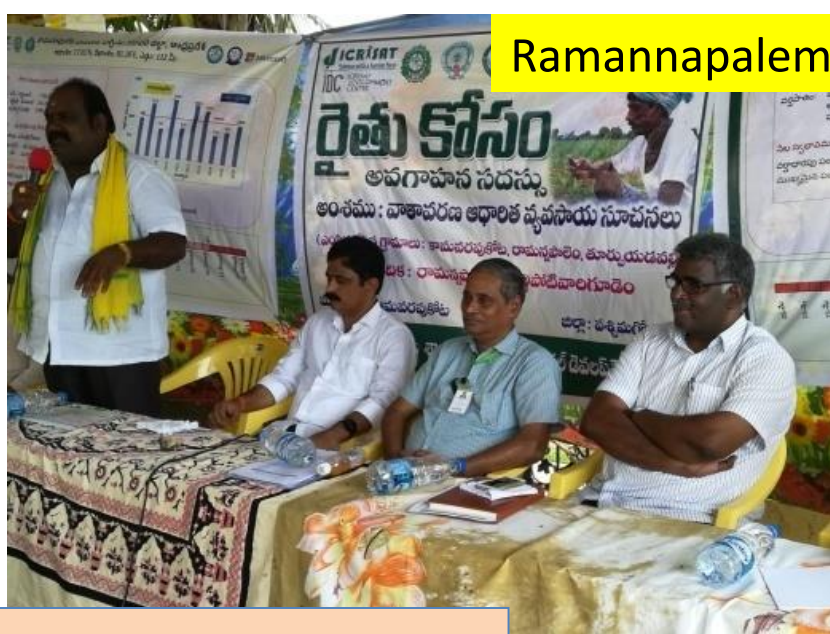**Devanakonda, Kurnool district: Groundnut yields in Kharif 2016**

Figures above blue bars indicate percentage increase in yield

Settipalle

Ramannapalem

Interactive meetings at pilot villages in AP

Gummiredlapalle

Ranasthalam

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THE HINDU

Published: September 14, 2016 00:00 IST | Updated: September 14, 2016 06:04 IST PATANCHERU (MEDAK DISTRICT), September 14, 2016

AP's 'Rythu Kosam' ropes in ICRISAT

R. Avadhani

The effort by the ICRISAT in association with Microsoft and aWhere was to reduce expenditure by farmers

HELP AT FINGER TIPS

ICRISAT Agro-meteorology Scientist A.V.R. Keshava Rao explaining SMS-based service it introduced for Kurnool farmers on a pilot basis in Andhra Pradesh. — PHOTO: MOHD. ARIF

Villages in Devanakonda madnal of Kurnool: Bhiravanikonda, Kukatikonda; K Venkatapuram; Nelathalamani and Singapuram	Villages in Sambepalle mandal: Dewapalle, Guttapalli and Settipalli
	175 farmers of Devanakonda and 200 from Sambepalle have been receiving advisories.

ICRISAT, Microsoft and aWhere join hands for Rytu Kosam programme taken up by Andhra Pradesh Primary Sector Mission (APPSM) on pilot basis

Media Coverage

Coverage on 01 Oct 2016

BBC WORLD NEWS Click Sign in

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New App Promises to Tell Indian Farmers When to Sow Crops

Farmers in Andhra Pradesh can sign up for an app that shows them the weather and prime planting days

By Vibhuti Agarwal
Jun 17, 2016 5:00 pm IST

Monsoon season in India has just begun, but farmers in Andhra Pradesh, a southeastern coastal state of India, won't need to look to the skies to know when to sow their crops. A new mobile application launch earlier this month and developed by a local agricultural

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Weather advisories via SMS are nothing new

Integration to

- Delivery in real-time

- Context specific advice

- Based on ground reality and need

- Digital Strategy

are the essential ingredients

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ICRISAT's digital agriculture innovation platform

Agri-entrepreneurship can :

- Attract youth to agriculture
- Foster entrepreneurial spirit and accelerate increases in rural incomes
- Our Innovation - Incubation and research in Digital Agriculture

IDEATE

INNOVATE

IMPACT

A creative platform for innovations that change the lives of farmers

ICRISAT ihub launched on February 13, 2017 to accelerate opportunities for Agri-entrepreneurs in India and beyond

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Outreach and engagement

- Keynote address in CII regional events (2) and invited speakers/panelists at GFIA, ICPP, IRC, GDI (Univ of Manchester), GBC, ICT4D

- Knowledge partners (Ag track co-lead) of the annual ICT4D conference

- Nurtured strong partnerships with Microsoft, Cyient, Source Trace, aWhere, CRS, CGIAR BDP, CG centers, NABARD, State Governments

  - **3 training programs in 2018/19 on IOTs in agriculture for senior officers of NABARD**

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A few concerns of small holder farmers

- Rainfall forecasts are not specific to their locations

- Crop management recommendations are mostly generalized for all soils and seasons

- Several players offering advisories with conflicting content

- Contingency planning recommendations do not consider market information

Points for consideration

- Need to address the Challenge of Scaling – requirement for context specific information

- Capacity enhancement of stakeholders on probabilistic nature of weather forecasts

- Climate analysis results - integral part of decision support system for preparing advisories

- Knowledge of the farming systems

- Crop-growth simulation models for monitoring, yield prediction and fine tuning advisories

- Enhancing skill for seasonal forecasts to help make better decisions on crop acreage, availability of seeds and inputs

- Climate-Smart Agriculture Practices

Climate-Smart Agriculture

1. Sustainably increase agricultural productivity and incomes in order to meet national food security and development goals

2. Build resilience and the capacity of agricultural and food systems to adapt to climate change

3. Seek opportunities to mitigate emissions of greenhouse gases and increase carbon sequestration

These three conditions (food security, adaptation and mitigation) are referred to as the **"triple win"** of climate-smart agriculture

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Monsoon Mission Project 2018-21

Enhancing Groundnut Productivity in AP and Karnataka through
Farmer Acceptable Climate Smart Strategies and
Weather Based Crop Management Advisories

Generating
crop genetic coefficients
for up-coming new
groundnut cultivars

Climate-Smart Village Approach

Brings together
      farmers
      extension personnel
      scientists
      local NGOs and
      policy makers

to work on a portfolio of practices to adapt agriculture to both climate variability and climate change

Thank You

k.rao@cigar.org