FASAL: The Operational Programme for Crop Assessment in India

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Ministry of Agriculture & Farmers’ Welfare,
Government of India, New Delhi
Indian Agriculture

- Net Area Sown: 141.6 Mha (43%)
- Foodgrain production: 265 Mt
  - (Kharif: 129 Mt, Rabi: 136 Mt)
- Horticulture Production: 281 Mt
- Net Irrigated Area: 63.6 Mha (45%)
- Agrl. Share of GDP(%): 13.7
- Employment Opportunity: 54.6%
- Average Field size: 1.16 ha
Conventional Crop Estimation in India

Area Statistics

- “Land Record States” or temporarily settled states: 17 Major States, 4 UTs: 86% of reporting area, Timely Reporting Scheme (TRS), 20% villages are selected at random for complete area remuneration.
- States where area statistics are collected on the basis of sample surveys. Establishment of an Agency for Reporting of Agricultural Statistics (EARAS). 9% of reporting area. Sample surveys of 20% villages/ investigator zones.
- Hilly districts of Assam, rest of the states in NER, & other UTs. Area statistics based on impressionistic approach. 5% of the reporting area.

Yield Estimates

- Crop Cutting Experiments (CCE) under scientifically designed General Crop Estimation Surveys (GCES).
- Around 950 thousand CCEs.
- Stratified multi-stage random sampling: Tehsil / Taluk > Revenue Village> Survey Number / Field> Experimental Plot (Specified size / shape)
- 80-120 CCEs for a crop in a major district

Advance Estimates

- September (1st), January (2nd), March/April (3rd), June/July (4th), January (Final)
46 Years of use of Space Technology in Crop Forecasting

- **1969**: NASA-ISRO-MoA
- **1978**: JEP
- **1988**: CAPE
- **1997**: FASAL Pilot
- **2007**: FASAL
- **2012**: MNCFC

**Coconut Root Wilt study in Kerala**
**Experimental Studies on Crop Discrimination**
**Area & production Estimates of major crops at State level.**
**National Wheat, FASAL-Odisha**
**District-State-National forecasts using multiple approaches for multiple forecasts**
**Institutionalisation of Space Technologies developed by ISRO**
Forecasting Agricultural output using Space, Agrometeorology, and Land based observations

Source: SAC, ISRO
Crop Forecasting: Salient Features

- **Crops (8)**
  Rice (Kharif & Rabi), Jute, Cotton, Sugarcane, Wheat, Rapeseed & Mustard, Soghum (Rabi), Rabi Pulses,

- **Data**
  Multidate Microwave (RISAT-1 C band SAR) and Optical (Resourcesat-2 AWiFS & LISS III) Data

- **Approach**
  Ground truth using Smartphone, Acreage using satellite data, Yield using weather and remote sensing based models

- **States Covered**
  All those states, which together contribute >90% of the Crop’s area in the Country

- **Periodicity** (All forecasts are issued pre-harvest)
  Paddy, Wheat & Mustard – 3 Forecasts
  Sugarcane, Cotton – 2 Forecasts
  Jute, Sorghum & Pulses- 1 Forecast

- **Software**
  FASALSoft, developed by ISRO
Geospatial Technology for Field Data Collection

- Sampling plan based on RS data
- Smartphones/Tablets
- Android based App. by NRSC
- Bhuvan Geoportal
- State Agri. Dept. Officials

>12000 GT points, >1200 CCEs

Groundtruth

Crop Cutting Expt
## FASAL Forecasts: Schedule

<table>
<thead>
<tr>
<th>Estimates</th>
<th>Rice</th>
<th>Wheat</th>
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<tbody>
<tr>
<td>1(^{st})</td>
<td>Aug End</td>
<td>Sep End</td>
</tr>
<tr>
<td>2(^{nd})</td>
<td>Sep End</td>
<td>Feb 1(^{st}) Wk.</td>
</tr>
<tr>
<td>3(^{rd})</td>
<td>Jan End (Final)</td>
<td>April Last Wk.</td>
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<tr>
<td>4(^{th})</td>
<td>---</td>
<td>July Mid</td>
</tr>
<tr>
<td>Final</td>
<td>---</td>
<td>Feb 1(^{st}) Wk. (Next Yr)</td>
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National Agricultural Drought Assessment & Monitoring System (NADAMS)

Operational Drought assessment during Kharif using Remote Sensing (Methodology developed by ISRO)

Periodic District/Sub-District level drought assessment for 14 Agriculturally Dominant states of India (5 at Sub District level)

Satellite based indices, Rainfall data, Ground information on Sowing progression and Irrigation Statistics are used for drought assessment

Drought Warning (Normal, Watch & Alert) is given in June July & August, while Drought Declaration (Mild, Moderate & Severe) in September & October

Crop Condition of August, 2015
Drought Assessment: Inputs

1. Remote Sensing based indices:
   • Normalized Difference Vegetation Index (NDVI)
   • Normalized Difference Water Index (NDWI)
   • Vegetation Condition Index (VCI)

2. Area Favourable for Crop Sowing (using Satellite based Index and Soil Moisture Index)

3. District level Rainfall Deviation

4. Irrigation percentage

Source: DAC
Drought Assessment: August, 2015
Horticultural Crops

CHAMAN (Coordinated Horticulture Assessment & Management using geoinformatics) Project: Launched in September, 2014

- Area assessment and production forecasting of major horticultural crops

  - **Vegetables:** Potato, Onion & Tomato
  - **Fruits:** Mango, Citrus & Banana
  - **Spices:** Chilli

- Geospatial technologies will be used for generating horticultural development plans for
  1. Site Suitability
  2. Post-Harvest Infrastructure
  3. Crop Intensification
  4. Orchard Rejuvenation
  5. Aqua-horticulture
Impact of Disaster on Agriculture

- **Rice-Flooded Area Assessment, post-Phailin Cyclone in Odisha State, October, 2013**

- **Impact Assessment of Heavy Rainfall and Hailstorm in Northern India during Feb-Mar, 2015**
Space Technology for Crop Insurance

- Exploring the role of Remote Sensing technology to supplement the yield assessment through Crop Cutting Experiments (CCE)
- Launched in September, 2014 under National Crop Insurance Programme (NCIP)
- Current season remote sensing data based CCE Planning
- Smartphone use for CCE Data Collection & CCE database on Bhuvan Portal
- Multi-level yield modeling using Remote Sensing and Crop Simulation Model
- Proposed use of UAV/Drones
• Five One week Training Programmes on ‘Basics of Remote Sensing & GIS and Applications in Agriculture’ for the officials 15 state Agricultural Departments (~75 participants)


• Proposed (by FAO) Training Programme for Officials of Afghanistan
Thank You.

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