Remote sensing with drone technology in Mali

Practical field exercises using drone technology were organized in an off-season, irrigated trial conducted by STARS (Spurring a Transformation for Agriculture through Remote Sensing) on the ICRISAT-Mali station in Samanko.

This trial aims to develop calibration curves for leaf area index (LAI) estimation from measurements of the fraction of photosynthetically active radiation (fPAR), and relate these to various vegetation indices derived from drone (UAV-Unmanned Aerial Vehicles) imagery for major smallholder crops of West Africa.

This was undertaken as part of a training on coordinated field and drone measurement campaigns and data processing which was organized at the ICRISAT-Mali campus from 20-30 April.

The objective was to train:
- Field operators in recording agronomic and field-level information
- Scientific officers and research technicians in UAV operations (flight planning, flight execution, equipment maintenance, etc)
- Back-office operators in the securement and post-processing of field and remote sensing data using CAN-EYE and cloud point processing software.

The workshop provided teams with time to advance their 2015 campaign planning, with planting season just around the corner. It also allowed for refinement of custom data collection and processing procedures, including the use of Manobi’s new JotBi mobile platform. Particular attention was put on organizing the complex data streams, which transfer around 150GB of imagery data from the field in Sukumba, Mali and Kofa, Nigeria to ICRISAT-Mali and to partners the Universite Catholique de Louvain (UCL) the Universite de Sherbrooke (UdeS) and Wageningen University and Research Centre and stream back simple image analyses to over 150 farmers through mobile networks.

Remote sensing technology can be used to provide advice to farmers on the ground to help them make informed decisions. Source: www.stars-project.org
Improving legume seed system in Indian state of Odisha

To boost the supply of quality seeds and bridge the seed demand-supply gap for pulses and oilseeds in Odisha, India, the Odisha State Seeds Corporation Limited, the State Directorate of Agriculture and Food Production and ICRISAT have joined hands.

The objective of the four-year partnership is to meet the State’s requirement of quality seeds of chickpea, pigeonpea and groundnut. The partners will collaboratively work on:

- Promotion of improved chickpea varieties in rice-based cropping systems of smallholder farmers of Odisha
- Introduction and expansion of improved pigeonpea production technology in rainfed upland ecosystems of Odisha - Phase 2
- Scaling-up of improved groundnut varieties through established seed system in various cropping systems of smallholder farmers in Odisha

“Supply of quality seed plays a vital role in improving the economy of a predominantly agrarian state like Odisha where 70 percent of the people depend on agriculture,” said Mr Pradeep Maharathy, Minister, Agriculture, Fisheries & Animal Resources Development, Government of Odisha at the MoU signing. He added that the agreement aims to bridge the current demand-supply gap for seeds of pulses and oilseeds in Odisha. The signing was followed by the inauguration of the Odisha Seeds Portal by the Minister.

The three projects have been sanctioned through the Rashtriya Krishi Vikas Yojana sub-scheme which focuses on seed production and delivery system and improved production technology.

The MoU was signed by Dr Pramod Kumar Meherda, Commissioner-cum-Director, Agriculture and Food Production; Mr Aparti Sethi, Managing Director of the Odisha State Seed Corp. Ltd; and Dr Myer G Mula, Senior Scientist - Seed System and Project Investigator, ICRISAT.

Mr Rajesh Verma, Principal Secretary, Department of Agriculture, and Mr Hariballav Mishra, Chairman, Odisha State Seeds Corporation were also present.

Investor: Department of Agriculture, Government of Odisha
CGIAR Research Program: Grain Legumes

Achievements of Phase I of ‘Introduction and Expansion of Improved Pigeonpea (Arhar) Production Technology in Rainfed Upland Ecosystems of Odisha’

- Total 315 sites of farmer preferred varietal selection trials (FPVST) established.
- Farmer preferred varieties covered 21,714 ha benefitting 38,011 smallholder farmers including 3,520 women farmers.
- Introduced 14 cultivars of high-yielding disease resistant varieties and hybrids. Among this, hybrid ICPH 3762 released as ‘Parbati’ in 2015 is the first pigeonpea hybrid released in the State.
- Strengthening and institutionalizing the informal seed production system in the districts of Kalahandi, Nuapada, Bolangir and Rayagada. Total 1,941 tons of seeds of various classes of farmer preferred varieties and hybrids were produced covering 4,080 hectares benefitting 5,343 smallholder farmers including 256 women farmers.
- Provided nine dal mills to NGOs and SHGs and constructed two 25 MT warehouses in Rayagada and Nuapada, and one 100 MT warehouse in Kalahandi.
- Total 64,636 stakeholders including 9,747 women (farmers, DA Officers and Technicians, NGOs, and ICRISAT staff members) attended various awareness meetings, seminar-workshops and trainings.
Cash crops drive change in dryland farming

Dryland farmers in India’s semi-arid regions are moving away from traditional crops towards cash crops such as cotton, soybean and chickpea to boost profits.

“In the 1970s and 80s cropping patterns were relatively stable, but in the last ten years changes have been much more visible,” said Dr Uttam Deb, Principal Economist, Market, Institutions and Policies, ICRISAT. He tracks enterprise and cropping pattern changes through the VDSA’s village-level surveys in 42 villages in India and Bangladesh.

“In India the rapid changes in cropping patterns in the 2000s were driven by the availability of irrigation in the rabi (postrainy) season, BT cotton technology and mechanization,” said Dr Deb. “Other influencers have been seed subsidies, lower crop labor requirement, and fluctuating cotton prices.”

“For example, in a century-old cotton-growing village in Akola district of Maharashtra, farmers have switched from cotton to soybean. Farmers in Aurepalle in Mahbubnagar district, Telangana, who traditionally grew castor, sorghum, millet and other cereal crops, switched to BT cotton because of higher profits. We have also seen farmers in some flood-affected villages of Bangladesh who traditionally grew paddy switch to rearing fish,” said Dr Deb.

The large number of farmers who switched to growing soybean in villages of Akola district, Maharashtra, (Figure 1) made an average return per hectare (2011-13) of ₹24,417 (US$407) for soybean grown in kharif (rainy) season, ₹52,261 (US$871) by following soybean with chickpea in rabi (postrainy season), or ₹47,263 (US$788) by following with wheat. Farmers growing cotton as a single crop for the year received ₹22,501 (US$375) per hectare. Sorghum growers got a return of ₹8,260 (US$138) and had the opportunity to also grow chickpea, wheat or other rabi crops.

The huge growth in area under cotton in Aurepalle village, Telangana, is shown in Figure 2. In 2011-13 farmers made average returns per hectare of ₹29,607 (US$493) for BT cotton, ₹18,647 (US$311) for sorghum and ₹12,563 (US$209) for castor. Paddy cultivation provided the highest returns per hectare of ₹37,602 (US$627), but farmers were constrained by lack of irrigation water.
Welcome

Dr Sarita K Pandey, an Indian national, joined as Special Project Scientist, Integrated Breeding Platform (IBP) Technical Support Coordinator-Dryland Cereals, ICRISAT-India, on 1 May. She has a PhD in Genetics and Plant Breeding. Prior to joining ICRISAT, she worked as Assistant Professor in School of Agriculture, Lovely Professional University, Jalandhar, India. We welcome Dr Pandey to Team ICRISAT and wish her all success.

New project

Project title: Identification of Micronutrients-Dense Sorghums for Better Health in Western and Central Africa (WCA) and India.
Principal Investigator: Dr A Ashok Kumar
Investor: HarvestPlus Program (Phase II)
Aims: The development of high-yielding and micronutrient-dense sorghum cultivars adapted to various agro-climatic conditions is ongoing. A large pipeline of breeding materials, maintainer lines in conversion to male-sterile lines and hybrid parents using elite sorghum lines and high Fe and Zn donors as part of the crossing program were developed. Identification of QTLs controlling grain Fe and Zn is underway to hasten the breeding process towards development and commercialization of biofortified sorghum cultivars.

Remote sensing with drone technology... from page 1

All operations conducted by the Imagery for Smallholders: Activating Business Entry points and Leveraging Agriculture (ISABELA) team led by STARS followed standardized protocols, building on learnings from measurement campaigns deployed in Sukumba in 2014.

Field instrumentation utilized in STARS-ISABELA campaigns to develop remote sensing libraries and algorithms for crop specific management support include fPAR sensors, chlorophyll meters, soil moisture probes, vertical cameras, and smartphones with custom open data kit and proprietary data collection forms. UAVs flown over field teams include SenseFly eBees with 3-band NIR cameras, and a GeoKonzept GEO-X8000 octocopter with a 5-band Tetracam miniMCA camera.

New publication

Seed Systems for Rainfed Agriculture: Village Based Seed Enterprise for Seed Production and Dissemination of Improved Varieties of Chickpea and Pigeonpea in India. Information Bulletin No. 96
Authors: Ravinder Reddy Ch, Sujathamma P, Vishnuvardhan Reddy D, Ranga Rao GV and Srinivas A.

Congratulations

Dr Vikas Kumar Singh, Special Project Scientist- Applied Genomics is appointed as Special Project Scientist, Integrated Breeding Platform (IBP) Technical Support Coordinator-Grain Legumes, ICRISAT-India, effective 15 April.
Team ICRISAT congratulates Dr Singh and wishes him all success.

Farewell

Mr Richard P Burgos, Chief of Staff - DG’s Office, concluded his assignment with ICRISAT on 15 May. We value his three years of service to ICRISAT and its mission, especially serving the needs of our Board. We wish him all success in his future endeavors.

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At ICRISAT -Mali, Backcross nested association mapping populations developed with 20 diverse parents from WCA region are being genotyped and phenotyped for line development, and identification of candidate genes for Fe and Zn concentrations in agronomically elite backgrounds. The work will be carried forward to validate the performance of biofortified cultivars and commercialize them; to develop a strong pipeline of materials for continuous delivery of improved products and to have a grip on these traits (Fe and Zn) to manipulate genetically and transfer them to elite sorghum cultivars. Initiation of biofortification work at ICRISAT-Nigeria is proposed.

Alongside ICRISAT-Mali and ICRISAT-Nigeria staff, training participants came from the main STARS-ISABELA collaborators, including Nigeria’s National Space Research and Development Agency; the Center for Dryland Agriculture at Bayero University, Kano; UdeS, Canada; UCL, Belgium; Mali’s Institut d’Economie Rurale and Association Malienne d’Eveil au Developpement Durable, as well as private partner Manobi, Senegal.

STARS is a research project exploring ways to use remote sensing technology to improve agricultural practices in sub-Saharan Africa and South Asia.

Investor: University of Twente (Bill & Melinda Gates Foundation funded)

CGIAR Research Program: Dryland Systems.