A training was conducted to enable groundnut seed value chain actors to establish functional innovation platforms (IPs) in Uganda. The training provided participants with an in-depth knowledge on the innovation systems approach, innovation platform, seed value chain mapping, steps to establish functional IPs, learning within IPs, roles and responsibilities of IP facilitators with emphasis on documentation of IP processes.

Through IPs, groundnut value chain actors have the opportunity to identify constraints and come up with solutions on how best to address context specific challenges, opportunities and help to scale up innovations.

In Uganda, groundnut is an important legume and ranks second after beans. The value chain for groundnuts consists of many different actors including input suppliers, seed dealers, producers, traders, processors, exporters and consumers. The value chain is dominated by smallholder farmers who sell their surplus produce to rural traders (sometimes through agents) in either unshelled or shelled form. Due to poor quality of seeds, only about 33% of the produce can be considered as marketable.

Intermediaries link producers and buyers. Most of the times these intermediaries are farmers or members of the farming community. They normally guide buyers who are not familiar with the location of different farmers. Transport of produce and delivering market information are the major services they provide in the value chain. At times they buy farmers’ produce and store it in urban trading centers which are easily accessed by buyers (typically urban wholesalers). As no large-scale groundnut processing units are present in Uganda, processing is done by traders and wholesalers based in urban areas as a means of adding value before selling.

In this context, IPs can be considered as a space for interaction and coordination between different stakeholders in the value chain to capitalize on opportunities, solve problems and take actions to innovate practices of all actors involved in the innovation process.

The objectives of the training were to support stakeholders to better understand the rationale behind the IP and to: (i) strengthen their capacity on key steps to establish functional IP (ii) share tools to facilitate IP (iii) develop their plan to have functional IP.
Emphasis was on implementing the groundnut seed roadmap in producing and delivering 267 tons of basic seed and 4000 tons of certified/quality declared groundnut seed in Uganda by 2019.

The training brought together 23 participants such as researchers, extension workers, seed companies, local seed business representatives, members of farmer seed producer organizations and individual seed producers, dealers, retailers, government seed program managers, and representatives from partner programs involved in groundnut seed sector development. The training was conducted on 12-14 January in Uganda.

**Strengthening seed business management**

A workshop was organized to share experiences on groundnut and common bean seed business. It included discussions on principles of seed production, processing, sampling, testing, marketing, resources required to run the seed business, and partnership development within the seed value chain. Participants were further introduced to: the use of Information and Communications Technology to expand seed business, different components of inclusive seed business, developing seed business plans, and tools to keep business records. Practical group work was organized to map local seed demand in their area. The group work also included developing an internal and external quality assurance system, mobilizing finance, equipment and human resources. This workshop took place on 16 – 19 January in Uganda and was attended by 34 participants.

Both workshops were facilitated by Dr Essegbemon Akpo, Scientist - Seed Systems Specialist, ICRISAT, Nairobi; Enock Maereka, Seed Business Development Specialist, International Center for Tropical Agriculture (CIAT), Lilongwe; Dr Jean-Claude Rubyogo, Seed Expert, CIAT-Arusha and Dr Monyo S Emmanuel, Consultant and groundnut breeder, ICRISAT, Nairobi.
Spectral matching techniques (SMTs) and automated cropland classification algorithms (ACCA) were used to map croplands of Australia using MODIS 250-m time-series data.

**Published:** 2017. In: International Journal of Digital Earth. DOI: 10.1080/17538947.2016.1267269

**Authors:** Teluguntla P, Thenkabail PS, Xiong J, Gumma MK, Congalton GR, Oliphant A, Poehnelt J, Yadav K, Rao M and Massey R.

**Abstract:** The overarching goal of this study was to generate and standard routine cropland products, year-after-year, over very large areas through the use of two novel methods: (a) quantitative spectral matching techniques (QSMTs) applied at continental level and (b) rule-based Automated Cropland Classification Algorithm (ACCA) with the ability to hind-cast, now-cast, and future-cast. Australia was chosen for the study given its extensive croplands, rich history of agriculture, and yet nonexistent routine yearly generated cropland products using multi-temporal remote sensing. This research produced three distinct cropland products using Moderate Resolution Imaging Spectroradiometer (MODIS) 250-m normalized difference vegetation index 16-day composite time-series data for 16 years: 2000 through 2015. The products consisted of: (1) cropland extent/areas versus cropland fallow areas, (2) irrigated versus rainfed croplands, and (3) cropping intensities: single, double, and continuous cropping. An accurate reference cropland product (RCP) for the year 2014 (RCP2014) produced using QSMT was used as a knowledge base to train and develop the ACCA algorithm that was then applied to the MODIS time-series data for the years 2000 – 2015. A comparison between the ACCA-derived cropland products is available at [http://oar.icrisat.org/9859/](http://oar.icrisat.org/9859/).

**Modelling cereal crops to assess future climate risk for family food self-sufficiency in southern Mali.**

**Published:** 2017. In: Field Crops Research, 201:133-145. ISSN 03784290

**Authors:** Traore B, Descheemaeker K, van Wijk M T, Corbeels M, Supit I and Giller K E

**Abstract:** Using three years of experimental data on maize and millet from an area in southern Mali representing the Sudano-Sahelian zone of West Africa we calibrated and validated APSIM model predictions of five Global Circulation Models (GCMs) for the 4.5 Wm−2 and 8.5 Wm−2 radiative forcing scenario respectively. APSIM model predictions indicated that the use of mineral fertilizer at recommended rates cannot fully offset the impact of climate change but can buffer the losses in maize yield up to 46% and 51% of the baseline yield. Millet yield losses were predicted to be less severe under current farmer’s fertilizer practices by mid-century i.e. 7% and 12% in the rcp4.5 and rcp8.5 scenario respectively.

The “efficient boundaries” of international agricultural research: A conceptual framework with empirical illustrations.

**Published:** 2017. In: Agricultural Systems, 150:78-85. ISSN 0308521X

**Authors:** Kamanda J, Birner R and Bantilan C

**Abstract:** The international agricultural research centers known as CGIAR have played an important role with regard to global food security. Yet, their mandate remains debated: Should they concentrate on producing global public goods, for which they arguably have a comparative advantage, or should they engage in “downstream” activities of the research-development continuum and promote technology adoption on the ground, so as to increase their impact? This paper contributes to resolving this debate by developing a new conceptual framework, which is based on transaction costs economics and makes it possible to identify a range of factors that determine the comparative advantage of international versus national organizations. The different transactions involved in the development and uptake of products from international agricultural research are illustrated by an empirical case study of the legume improvement program of the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). Data collection involved a participatory mapping technique (Net-Map) as well as key informant interviews. The paper draws attention to the governance problems involved in downstream activities, which influence the comparative advantage of international versus national organizations in the research-development continuum. Policy implications are derived for the ongoing reform of the CGIAR and for future research on this topic.

**Incorporation of satellite remote sensing pan-sharpened imagery into digital soil prediction and mapping models to characterize soil property variability in small agricultural fields.**

**Published:** 2017. In: ISPRS Journal of Photogrammetry and Remote Sensing, 123:1-19. ISSN 09242716

**Authors:** Xu Y, Smith SE, Grunwald S, Abd-Elrahman A and Wani SP

**Abstract:** This research fused the panchromatic band and multispectral (MS) bands of WorldView-2, GeoEye-1, and Landsat 8 images in a village in Southern India by Brovey, Gram-Schmidt and Intensity-Hue-Saturation methods. Random Forest was utilized to develop soil total nitrogen (TN) and soil exchangeable potassium (Kex) prediction models by incorporating multiple spectral indices from the
PAN and MS images. Overall, our results showed that PAN remote sensing spectral indices have similar spectral characteristics with soil TN and Kex as MS remote sensing spectral indices. There is no soil prediction model incorporating the specific type of pan-sharpened spectral indices always had the strongest prediction capability of soil TN and Kex. The incorporation of pan-sharpened remote sensing spectral data not only increased the spatial resolution of the soil prediction maps, but also enhanced the prediction accuracy of soil prediction models. Small farms with limited footprint, fragmented ownership and diverse crop cycle should benefit greatly from the pan-sharpened high spatial resolution imagery for soil property mapping. Our results show that multiple high and medium resolution images can be used to map soil properties suggesting the possibility of an improvement in the maps’ update frequency. Additionally, the results should benefit the large agricultural community through the reduction of routine soil sampling cost and improved prediction accuracy.

http://oar.icrisat.org/9813/

Assessing crop model improvements through comparison of sorghum (sorghum bicolor L. moench) simulation models: A case study of West African varieties.

Published: 2017. In: Field Crops Research, 201:19-31. ISSN 0378-4290

Author: Akinseye A, Adam M, Agale SO, Hoffmann MP, Traore PCS and Whitbread AM

Abstract: In this study, we compared the performance of three process-based crop models (APSIM, DSSAT and Samara) for prediction of diverse sorghum germplasm having widely varying photoperiod sensitivity (PPS) using detailed growth and development observations from field trials conducted in West Africa semi-arid region. Our results confirmed the capability of each selected model to reproduce growth and development for varieties of diverse sensitivities to photoperiod. Simulated phenology and morphology organs during calibration and validation were within the closest range of measured values with the evaluation of model error statistics (RMSE and R²). With the exception of highly sensitive variety (IS15401), APSIM and Samara estimates indicate the lowest value of RMSE (<7 days) against the observed values for phenology events (flowering and maturity) compared to DSSAT model. Across the varieties, there was over-estimation for simulated leaf area index (LAI) while total leaf number (TLN) fitted well with the observed values. Samara estimates were found to be the closest with the lowest RMSE values (<3 leaves for TLN and <1.0 m²/m² for LAI) followed by DSSAT and APSIM respectively.

http://oar.icrisat.org/9818/

Population Dynamics of Lobster Moth, Neostauropus alternus Walker on Pigeonpea in Relation to Abiotic Factors of Pantnagar Region.


Authors: Chakravarty S, Bera T, Agnihotri M and Jagdish J

Abstract: Field experiments were carried out to study the population dynamics of Lobster moth (Neostauropus alternus Walker) on pigeonpea and its relation with different weather variables during kharif season of 2013-14 and 2014-15 under unprotected conditions at Pantnagar, Uttarakhand, India. The results revealed that the incidence of this insect commenced from the 34th standard week and it remained active up to 41st standard week of both the years. The insect showed one peak of its population during both the years. The maximum number of N. alternus was recorded on 37th standard week (5.6 larvae per plant) in 2013-14 while in 2014-15, population of N. alternus was highest in 38th standard week (4.8 larvae per plant). Correlation studies indicated that larval population of N. alternus exhibited a significant positive correlation with temperature whereas a significant negative correlation was established with relative humidity. Other abiotic factors had no significant effect on this insect pest population.

http://oar.icrisat.org/9617/

Root traits confer grain yield advantages under terminal drought in chickpea (Cicer arietinum L.)

Published: 2017. In: Field Crops Research, 201:146-161. ISSN 03784290

Authors: Purushothaman R, Krishnamurthy L, Upadhyaya HD, Vadez V and Varshney RK

Abstract: To understand precisely the root traits contribution towards yield, 12 chickpea genotypes with well-known drought response were field evaluated under drought and optimal irrigation. Root traits, such as root length density (RLD), total root dry weight (RDW), deep root dry weight (deep RDW) and root:shoot ratio (RSR), were measured periodically by soil coring up to 1.2 m soil depth across drought treatments. Large variations were observed for RLD, RDW, deep RDW and RSR in both the drought treatments. DS increased RLD below 30 cm soil depth, deep RDW, RSR but decreased the root diameter. DS increased the genetic variation in RDW more at the penultimate soil depths. Genetic variation under drought was the widest for RLD ∼50 DAS, for deep RDW ∼50–75 DAS and for RSR at 35 DAS. Genotypes ICC 4958, ICC 8261, Annigeri, ICC 14799, ICC 283 and ICC 867 at vegetative stage and genotypes ICC 14778, ICCV 10, ICC 3325, ICC 14799 and ICC 1882 at the reproductive phase produced greater RLD. Path- and correlation coefficients revealed strong positive contributions of RLD after 45 DAS, deep RDW at vicinity of maturity and RSR at early podfill stages to yield under drought. Breeding for the best combination of profuse RLD at surface soil depths, and RDW at deeper soil layers, was proposed to be the best selection strategy, for an efficient water use and an enhanced terminal drought tolerance in chickpea.

http://oar.icrisat.org/9803/
Reader’s comments

Surely sub-Saharan Africa cannot feed itself with conventional crop production practices. The new technologies will certainly assist in improving crop production. Africa is certainly grateful for the combined therapy, while we congratulate ICRISAT on the 45th anniversary. I am also involved in the Groundnut Upscaling project in Nigeria, and wish to further inform you that our groundnut farmers had really benefitted from the intervention not only with respect to increased oil content but also improvement in grain production in the country.

I look forward to receiving the next issue of Happenings while I also continue to expect to hear the development on our smart village proposal for north-western Nigeria.

Dr Lawali Abubakar

Thank you for this newsletter, with emphasis on community ownership and empowerment of market chain participation. The comment in one posting that the way the message is delivered is equally important as the technology itself, rings very true. The role of ICRISAT as a catalyst is critical for dissemination and adoption of innovations - with implications for engaging counterpart organizations and individual researchers as equals in project design, operation, and management. I commend ICRISAT for taking these approaches.

On irrigation I refer to the Report on Wheat Production and Marketing in Nigeria (1979) in which self-sufficiency for wheat seemed out of reach, and even more so now with population more than doubled, drastic contraction of lake Chad, and northern rivers in Nigeria under threat from climate change.

Dr Bob Redden

The DG’s video message concluding 2016 and looking forward to 2017 is very meaningful and focused. The write-up on making SSA self-sufficient in food grains is thought provoking. I think ICRISAT’s Watershed research and development in India highlights a sustainable integrated production system, which merits adoption and up-scaling with local adaptations in SSA.

It has all the essential components of natural and community management system. It matches available natural resources to an efficient production system integrating animal components, community participation and market orientation. It is an all-inclusive sustainable system merits consideration and further debate.

Thanks for sharing ICRISAT news, with best wishes and warm regards,

Mr DS Bisht