Call to strengthen partnerships in drought hit Zimbabwe to benefit smallholder farmers

Increasing and expanding the production of small grains such as legumes and millets is critical to meet the challenges of the severe drought gripping Zimbabwe. This is one of the key messages that emerged from the 74th meeting of the ICRISAT Governing Board during 20 to 22 April at Bulawayo, Zimbabwe.

To cope with extreme climate events, there is a need for science backed solutions with stronger partnerships and a country strategy. The focus will be a triple win for Zimbabwe through adoption of improved crops such as sorghum, groundnut, chickpea and pigeonpea that are highly nutritious, climate smart and profitable to smallholder farmers.

ICRISAT, working with the Ministry of Agriculture, and other partners and donors in Zimbabwe, is pursuing new market opportunities for small grains for human nutrition and livestock feed, development and expansion of an integrated groundnut system, use of climate information to manage risk for increased long-term sustainability and resilience of crop-livestock systems.

“Demand-driven agricultural research is key to transforming productivity of the agricultural sector in Zimbabwe, particularly of smallholder farmers. The country strategy, which ICRISAT Zimbabwe developed in consultation with national partners, will take advantage of market opportunities and support food production systems that protect the environment and address the realities of climate change,” said Professor Chandra Madramootoo, Chair, ICRISAT Governing Board.

Mr Ringson Chitsiko, Permanent Secretary in the Ministry of Agriculture, welcomed the initiative. He said, “The development of the ICRISAT country strategy is overdue but never too late and I appreciate the process that values partner contribution. All partners need to take advantage
of the process and contribute what they want to see ICRISAT doing in the country. Such partner participation will ensure ownership of the strategy at a country level and strengthen the work so we can improve the lives of smallholder farmers. All partners need to take advantage of the process and contribute to the type of partnership and work program they would like to have with ICRISAT.”

“The strategy will guide agricultural investment decisions and innovations while being socially inclusive of youth, gender and matters arising from HIV/AIDS to address the challenges faced by smallholder farmers,” said Dr David Bergvinson, Director General, ICRISAT.

Zimbabwe and other parts of East and Southern Africa are suffering severe drought from El Niño and the effects of climate change, which has destroyed crops and killed livestock. The devastating situation is threatening the livelihoods of millions of smallholder farmers in Zimbabwe.

In an effort to fight the vagaries of climate change and other issues, ICRISAT is working in Zimbabwe with partners on projects like Building Farmers’ Resilience to Production Variability through Enhanced Climate Services and Improved Agricultural Technologies. “The main objective of the project is to help smallholder farmers achieve sustained improvements in food security through better access to climate information, and natural resource management strategies that can improve adaptation to poor seasons and enable them to exploit good years,” said Dr Kizito Mazvimavi, ICRISAT’s country representative in Zimbabwe and Head of Monitoring, Evaluation, Impact and Learning.

We have undertaken work with ICRISAT on goat production, which led to significant increases in income of the farmers. We are adopting the innovation systems approach in many districts. Goat dip tanks (for treating lice infestation) were introduced which took a while for communities to take on. We are very excited we can work with a partner like ICRISAT and use their excellent skills. We also work in the field of nutrition – how to increase nutrition absorption especially among pregnant women and lactating women.

Ms Mvuselelo Huni,
CEO, Organization of Rural Associations for Progress

A range of organizations joined the ICRISAT Board Program Committee meeting and spoke about their collaboration with ICRISAT in Zimbabwe and expressed their positive feeling about moving forward together, to realize prosperity in the dryer zones of Zimbabwe where drought has impacted farmers for two consecutive years. The partners present included, Mr D Nyoni, Provincial Agricultural Extension Officer, Department of Agritex; Mr Karsto Kwazira, Agronomist, Food and Agriculture Organization (FAO), Zimbabwe; Mr Dave Evans, Chief of Party, ENSURE Project, World Vision; Mr Andrew Mushita, Director, Community Technology Development Trust (CTDT); Ms Mvuselelo Huni, Chief Executive Officer, Organization of Rural Associations for Progress (ORAP) and Mr Shadreck Ncube, Head of Station, Matopos Research Institute, Department of Research and Specialist Services.

Awards and Recognition

Dr Jana Kholova, Scientist, Cereals Physiology, Dryland Cereals, Asia is the recipient of the Promising Young Scientist Award for 2015 and made a presentation to the ICRISAT Board during the Program Committee meeting. Dr Kholova’s seminar reflected on her research and the contribution of crop physiology and modelling to ICRISAT’s breeding programs.

The ICRISAT Crop Physiology team led by Dr Vincent Vadez, Team Leader-Systems Analysis for Climate Smart Agriculture (SACSA) was presented the 2015 Doreen Margaret Mashler Award by the Board Chair. The award was received by Dr Kholova, who is a key member of the team. On behalf of Dr Vadez, Dr Kholova made a presentation on the research and working environment of this high-performing team at ICRISAT.

Over the year the team has made major breakthrough in development of integrated, inter-disciplinary research to apply principles of precision agriculture to enhance production, both in quantity and quality in semi-arid agroecologies. The team conducts both applied-oriented and basic research on various aspects of plant water acquisition pathways to elucidate underlying processes of plant adaptations to water-limited environments.

Institut d’Economie Rurale (IER), Mali, received the Outstanding Partnership Award for 2015. Improved groundnut production technologies have been developed and disseminated as a result of the strong collaboration. IER has conducted more than 35 demonstrations of improved technologies, trained more than 2,200 farmers and 25 extension technicians in the project target regions. IER is expected to directly reach more than 20,000 small farmer households with improved technologies and contribute to awareness creation for 350,000 households through various communication tools including community radio, TV, print media and production guides. IER is also the focal institute for the implementation of Tropical Legumes III project, which is led by ICRISAT.

The award acknowledges the partnership over the years and ICRISAT’s intention to strengthen the relation between the two institutes for improving the livelihood of smallholder farmers in Mali.
Updates on the extensive ongoing research work in pigeonpea improvement, demand for the new sorghum varieties introduced, potential for pearl millet promotion and the several new finger millet varieties released in Eastern and Southern Africa were shared with Dr Nigel Kerby, Incoming Board Chair, ICRISAT, while on a visit to the region.

Eastern and Southern Africa (ESA) is the secondary center of diversity for pigeonpea and breeding programs based in Kenya through three agro-ecologically representative locations namely Kabete (high altitude), Kiboko (low-mid altitude) and Kampi Ya Mawe (dry areas). Dr Kerby visited all the three breeding sites.

Pigeonpea improvement in ESA started in 1992 using native germplasm with region specific breeding priorities such as high grain yield, inter-cropping compatibility, photo-period insensitivity, grain quality, resistance/tolerance to Fusarium wilt, Helicoverpa pod borer and resilience to climate change. A total 33 high yielding varieties were released since then and ICRISAT bred varieties were widely adopted in the region. The region exports 290,000 tons of pigeonpea grain/year to India, worth US$200 million.

During his visit, Dr Kerby saw the potential breeding material such as insect and drought tolerant, red podded and large cream seeded genotypes that are in advanced stages of breeding cycle. He interacted with researchers from partnering organizations for feedback on ICRISAT’s work. Mr Bernard Towett, Legumes Researcher from Egerton University said that it was the first time he was seeing excellent pigeonpea breeding material in pipeline during his 25 years of working experience. Mr Kennedy Kanenga, Legumes Coordinator, Zambia Agricultural Research Institute said that ICRISAT assisted them in capacity enhancement and germplasm sharing including better conduct of breeding trials.

Other issues discussed during the visit included –

- The demand for ICRISAT bred varieties of sorghum for multiple uses as food, fodder and fish feed.
- Several new varieties of finger millet that were released in the region as it is recognized by the locals as a crop with high nutritional value. The snapping trait and emasculation technique in finger millet were discussed.
- Growing potential of pearl millet in extreme dry conditions.
- ICRISAT’s breeding strategy for hybrids, pests and diseases of pigeonpea, sorghum and pearl millet.

The current infrastructure facilities at research locations and the need to upgrade them were also discussed.

Dr Kerby and the pigeonpea researchers look at the high yielding, large seeded pigeonpea at the Kabete experimental station.
74th Governing Board Meeting in pictures

Members interacting during the Board Program Committee meeting.

Dr Paco Sereme signing the ICRISAT value statement.

Dr Mazvimavi, Dr Madramootoo and Dr Bergvinson interviewed by the Zim National TV station and newspaper.

Testing of food made with sorghum and millets in Zimbabwe.

Board members and ICRISAT team members at the 74th Governing Board Meeting in Zimbabwe.
Dr Paco Sereme, Board Member sampling sorghum salad.

Mr Sibanda, a farmer, shows the rainfall record maintained.

Dr Pauline Chivenge and Dr Ramadjita Tabo interact during the field visit.

ICRISAT members briefed by the District Chief, councilors and farmers on sorghum and millet initiatives.

Farmers display processed sorghum and pearl millet bags and share their experience.

Ms Sissel Rogne, ICRISAT Board Member sampling millet cookies.

Dr Murairo Madzvamuse, Laboratory Technician, explains the sorghum and millets processing equipment.

Farmer Mr Sibanda in his sorghum field with Ms Zimhlophe Ndlovu Daeo, District Agricultural Extension Officer, Agritex and Ramadjita Tabo, Director, West and Central Africa, ICRISAT-Mali.
Participants witness the huge impact of improved agri-technologies on farmers and stakeholders along Ethiopian legume value chain

A field trip organized for the participants of the CGIAR Science Forum 2016 provided them an overview of how the legume commodity value chain operates in Ethiopia and how partner institutions and ICRISAT work together to link smallholder farmers with marketing channels so that even the small and marginalized participants benefit.

The visitors got an opportunity to see for themselves the positive transformation in the lives of the beneficiaries of the Tropical Legumes projects and the work that is being done in partnership with the private and public sector. The trip included visits to the farm of a successful farmer whose livelihood has drastically changed with the adoption of improved technologies; a leading pulse exporter who created a share for Ethiopian smallholder farmers in the global pulse market through value enhancement; a farmer’s union that has demonstrated how collective farming can make agriculture more profitable with better access to required inputs and collective marketing to achieve economies of scale in legume systems; a small seed company that stepped in to fill the supply gap of legume seed; and a research organization that in collaboration with the CGIAR centers and other institutions produces varieties and management practices that are relevant to local conditions.

The visit started with the farm of Mr Haile Wako, a successful legume farmer from East Showa Zone, Oromiya Regional State, Ethiopia, who turned around his small farm into a viable commercial enterprise. He started by engaging in participatory varietal selection (PVS) trials and varietal demonstrations and gained further skills through various trainings on quality seed production trainings. Using improved varieties and agronomic practices, his seed production increased and he constructed a 500 ton capacity warehouse. Currently Mr Wako owns a pickup vehicle, a truck and a tractor which he uses for his farm operations. He sells more than 200 tons of quality seed each year. The progress he made has been to a large extent due to technical backstopping and other support through various projects and programs including Tropical Legumes (I, II, III) projects, Pan-Africa Bean Research Alliance (PABRA) and CRP-Grain Legumes.

Next on the itinerary was a visit to a private sector partner, Agricultural Commodity Supplies (ACOS), which has a sophisticated grain-processing factory for cleaning, grading and packing legume seeds for export. The factory, operating at full capacity since 2006, is equipped with an X-ray machine to detect all kinds of foreign material, a high-tech optical selector for color selection, conveyor belts for handpicking and six steel silos of 1,000 tons capacity for long-term storage. The company processes a wide range of dry pulses including navy pea beans (white pea beans), small red beans, dark red kidney beans, creamy beans, chickpeas and sesame grains.

The next stop was the Lume Adama Farmers’ Cooperative Union, which was formed to improve the bargaining power of members, to procure inputs and services at a lower cost and to enable members’ produce get better market access by value addition (cleaning, grading, packing, etc). The Union has a membership of 32 cooperatives and 22,896 farmers and a working capital of more than ETB 24 million (US$1,113,949). Besides other activities, the union cleans and packs legume seeds and grains using both machine and human labor to add value to members’ products. Most members have improved the productivity of their farmlands and improved their livelihoods. Increased employment on farm labor, increased demand for farmland and credit, point to positive multipliers in the local economy from agricultural commercialization.

Participants also visited Amwari Seed Company started by Mr Ameha Abraham, a farmer from Adaa woreda in central Ethiopia. Mr Abraham started by selling seeds individually to seed producers’ associations before
New project

Fast-Tracking Release of ‘High Oleic’ Peanut Varieties in India

Principal investigator: P Janila
Period: 2016 – 2017
Investor: Mars Chocolate North America
Synopsis: ICRISAT in partnership with Indian Council of Agricultural Research-Directorate of Groundnut Research (ICAR-DGR) and State Agricultural Universities (SAUs) has for the first time developed ‘high oleic’ peanut varieties in Spanish and Virginia backgrounds, suitable for cultivation in India. Given the scope for expansion of peanut industry in India to meet domestic and export demands, it is envisaged to fast-track release of ‘high oleic’ peanut varieties. Evaluation trials are underway at ICRISAT of selected ‘high oleic’ lines from last three seasons and in the trials during 2014/15 and 2015, 90 ‘high oleic’ peanut lines with >75% oleic acid content were evaluated in replicated trial at ICRISAT to select 65 superior lines based on agronomic performance, oleic acid content, morphological features, and pod and kernel features. The 65 selected ‘high oleic’ lines are now under seed increase for multi-location testing (MLT) to identify superior performing lines suitable to different agro-ecologies in five states, Gujarat, Rajasthan, Tamil Nadu, Andhra Pradesh and Telangana. Data on extended shelf-life of ‘high oleic’ lines and flavor attributes will be generated that will be useful to recommend ‘high oleic’ trials in national testing system. Recommendation of ‘high oleic’ peanut varieties for national testing under All India Coordinated Research Project on Groundnut (AICRP-G), and data on shelf-life and flavor attributes will enable fast-tracking their release for cultivation.

The proposed project is envisaged to complement the ongoing work to fast-track release of ‘high oleic’ peanut varieties following (a) multi-location testing for agronomic traits and (b) generate data on shelf-life and flavor attributes. The agronomic data and quality data will enable constitution of specialty trials under AICRP-G for the first time to test ‘high oleic’ peanut varieties in India. The project will be implemented by ICRISAT in partnership with ICAR-DGR during 2016-17. Besides, MLTs and quality attributes, by end of season 2, we plan to partner with processing industry to assess shelling ease and blanchability and also develop a producer-processor model for ‘high oleic’ peanut value chain.

Participants witness the huge impact... from page 6

Joining hands with other farmers to form a seed growers’ association in 2009 with the support of TL II project, then moving on to set up a private seed company. The initial funding of ETB 100,000 (US$5000) was in the form of share capital of ETB 10,000 (US$500) each from 10 founding members. The company has since diversified from chickpea and in 2014 it produced teff seed on 57 ha, wheat on 50 ha and chickpea on 31 ha. The average chickpea productivity of the company is 3.5 to 4.5 t/ha, much higher than the national average of 1.9 t/ha. The company sells seeds to the Ethiopian Seed Enterprise (which is the national seed procurement agency), research centers and buyers from other areas.

The last stop was at Debre Zeit Agricultural Research Center (DZARC), the center mandated with the improvement of chickpea and lentils among other crops. The center took national leadership in the release of 24 improved varieties (17 national and 7 regional) with traits such as large seed (64 g/100 seed weight), disease resistance (Ascochyta blight/Fusarium wilt), drought tolerance, early maturing, and high yield.

The average yield gain due to these varieties is 2-3 fold over landrace varieties. Projects such as TL II and III have aggressively supported variety development, release, and dissemination through integrated seed systems. Integration of the formal and informal seed production and distribution system has enhanced availability. With the uptake of these varieties and associated production packages, the national productivity has been on steady increase.

Apart from the field trip that was held on the concluding day, ICRISAT displayed its scientific publications, books and seeds of improved varieties at the forum venue. As part of an exhibition session organized by the CGIAR centers hosted at the International Livestock Research Institute - Ethiopia, ICRISAT scientists presented 21 posters spread across the themes including value chain development, market linkages, gender, capacity development, public-private partnerships, sustainable natural resources, improved nutrition, biosciences, impact assessment, participatory research – partnering with farmers, policy support, climate change and resilience.

The science forum was organized by the Independent Science and Partnership Council (ISPC) of the CGIAR from 12-15 April in Addis Ababa Ethiopia with the theme – “Agricultural research for rural prosperity: rethinking the pathways” to focus on the contribution of agriculture to reducing poverty.

Project: Tropical Legumes III
Investor: Bill & Melinda Gates Foundation
Partners: Ethiopian Institute of Agricultural Research, Amhara Regional Agricultural Research Institute, Oromo Regional Research Institute, Tigray Regional Research Institute, Southern Regional Research Institute
CGIAR Research Program: Grain Legumes
Exploring strategies and collaborations to increase participation of women throughout the chickpea value chain in Ethiopia

Potential areas of collaboration with various partners to help Ethiopian women overcome restricting cultural norms and enhance their participation in agronomic activities, were discussed at a feedback session of an ongoing gender study.

The qualitative study designed by the gender team investigated the factors responsible for women not attending the training programs. A major challenge faced by the chickpea breeding team in Ethiopia has been the low participation of women in the Participatory Varietal Selection (PVS) process. When farmers are invited to participate in agronomic training activities, women farmers do not attend the meetings and therefore get excluded from the subsequent steps of training in the PVS process. Even when the men are invited to attend the training with their wives, women don’t show up for the trainings. The main reason for this being the cultural norms and practices that restricted women’s activities outside the home.

This study is a major research milestone for ICRISAT’s gender work in Ethiopia and was carried out in collaboration with the Debre-Zeit Agricultural Research Center (DZARC). Qualitative data was collected in November-December 2015. The feedback session with stakeholders in Ethiopia was held on 13 April to share the study methodology and the results. The discussion covered the following main areas of the study as well as future direction.

- Whether results obtained from the study were rigorous, if the methodology followed was satisfactory and if they represented the real situation of the Ethiopian women’s engagement with agricultural training agents;
- What other data/studies would complement the current study;
- Possible transformational gender interventions/models that can be designed and tested to enhance women’s participation in the chickpea value chain in Ethiopia;
- Initiate discussions on the potential collaborative works with a Government University (University of Haramaya) for implementing future gender research activities in Ethiopia.

Participants included partners from National Agricultural Research Systems (NARS), the DZARC team, working on chickpea; representative from the University of Haramaya, independent qualitative researchers working with the team as well as the management and researchers from ICRISAT-Ethiopia.

Project: Tropical Legumes III  
Investor: Bill & Melinda Gates Foundation  
Partners: Ethiopian Institute of Agricultural Research, Amhara Regional Agricultural Research Institute, Oromo Regional Research Institute, Tigray Regional Research Institute, Southern Regional Research Institute  
CGIAR Research Program: Grain Legumes
Inheritance of protein content and its relationships with seed size, grain yield and other traits in chickpea

Authors: Gaur PM, Singh MK, Samineni S, Sajja S, Jukanti AK, Kamatam S and Varshney RK

Published: 2016. Euphytica. 01-08. ISSN 1573-5060

Abstract: This study was aimed at understanding the genetic control of protein content and its association with other traits so that suitable breeding strategies can be prepared for development of high protein content cultivars. A high protein (29.2%) desi chickpea line ICC 5912 with pea-shaped small seed, grey seed coat and blue flower was crossed with a low protein (20.5%) kabuli line ICC 17109 with owl’s head shaped large seed, beige seed coat, and white flower. The F₁ population was evaluated under field conditions and observations were recorded on protein content and other traits on individual plants. The protein content of F₂ segregants showed continuous distribution suggesting that it is a quantitative trait controlled by multiple genes. The blue flowered segregants had pea shaped seed with grey seed coat, while the white flowered segregants had owl’s head shaped seed with beige seed coat indicating pleiotropic effects of gene(s) on these traits. On an average, blue flowered segregants had smaller seed, lower grain yield per plant and higher protein content than the pink flowered and the white flowered segregants. The protein content was negatively correlated with seed size (r = -0.40) and grain yield per plant (r = -0.18). Thus, an increment in protein content is expected to have a negative effect on seed size and grain yield. However, careful selection of transgressive segregants with high protein content along with moderate seed size and utilizing diverse sources of high protein content will be useful in developing chickpea cultivars with high protein content and high grain yield.

http://oar.icrisat.org/9399/

QTL mapping of pearl millet rust resistance using an integrated DArT- and SSR-based linkage map

Authors: Ambawat S, Senthivel S, Hash CT, Nepolean T, Rajaram V, Eshwar K, Sharma R, Thakur RP, Rao VP, Yadav RC and Srivastava RK

Published: 2016. Euphytica. 01-16. ISSN 1573-5060

Abstract: Rust, caused by the fungus Puccinia striiformis var. indica, is one of the most important production constraints of pearl millet worldwide, leading to grain yield losses of up to 76% as well as major losses in fodder yield and quality. Here, we report the development of a linkage map integrating Diversity Arrays Technology (DArT) markers and simple sequence repeat (SSR) markers, using this to identify quantitative trait loci (QTLs) for pearl millet rust resistance. Genotyping data from 256 DArT and 70 SSR markers on 168 F₂, recombinant inbred lines from cross 81B-P6 9 ICMP 451-P8 were used to construct a linkage map comprised of 286 loci (229 DArT and 57 SSR markers) spanning a total length of 740.3 cM (Haldane) with an average adjacent marker distance of 2.7 cM. Linkage group 7 (LG7) (153.5 cM) was the longest and LG6 the shortest (45.0 cM). The map was used to identify a major QTL for rust resistance with an LOD score of 27 on LG1, which explained 58% of the observed phenotypic variation. In addition, two putative modifiers of small effect were detected, one each on LG4 and LG7. The novel rust resistance QTL identified on LG1 is thought to confer a durable slow-rusting phenotype, which is still effective in India more than 20 years after it was first deployed in the previously popular single-cross hybrid MH 179 (ICMH 451). The flanking markers reported here provide a framework for marker-assisted selection and possible future map-based cloning of this resistance gene.

http://oar.icrisat.org/9400/

Genome-Wide Scans for Delineation of Candidate Genes Regulating Seed-Protein Content in Chickpea

Authors: Upadhyaya HD, Bajaj D, Narnoliya L, Das S, Kumar V, Gowda CLL, Sharma S, Tyagi AK and Parida SK


Abstract: Identification of potential genes/alleles governing complex seed-protein content (SPC) is essential in marker-assisted breeding for quality trait improvement of chickpea. Hence, the present study utilized an integrated genomics-assisted breeding strategy encompassing trait association analysis, selective genotyping in traditional bi-parental mapping population and differential expression profiling for the first-time to understand the complex genetic architecture of quantitative SPC trait in chickpea. For GWAS (genome-wide association study), high-throughput genotyping information of 16376 genome-based SNPs (single nucleotide polymorphism) discovered from a structured population of 336 sequenced desi and kabuli accessions [with 150–200 kb LD (linkage disequilibrium) decay] was utilized. This led to identification of seven most effective genomic loci (genes) associated [10–20% with 41% combined PVE (phenotypic variation explained)] with SPC trait in chickpea. Regardless of the diverse desi and kabuli genetic backgrounds, a comparable level of association potential of the identified seven genomic loci with SPC trait was observed. Five SPC-associated genes were validated successfully in parental accessions and homozygous individuals of an intra-specific desi RIL (recombinant inbred line) mapping population (ICC 12299 _ ICC 4958) by selective genotyping. The seed-specific expression, including differential up-regulation (>four fold) of six SPC-associated genes particularly in accessions, parents and homozygous individuals of the aforementioned mapping population with a high level of contrasting SPC (21–22%) was evident. Collectively, the integrated genomic approach delineated diverse naturally occurring novel functional SNP allelic variants in six potential candidate genes regulating SPC trait in chickpea. Of these, a non-synonymous SNP allele-
New publications... from page 9

carrying zinc finger transcription factor gene exhibiting strong association with SPC trait was found to be the most promising in chickpea. The informative functionally relevant molecular tags scaled-down essentially have potential to accelerate marker-assisted genetic improvement by developing nutritionally rich chickpea cultivars with enhanced SPC.

http://oar.icrisat.org/9401/

Satellite imagery and household survey for tracking chickpea adoption in Andhra Pradesh, India

Authors: Gumma MK, Kumara Charyulu D, Mohammed I, Varshney RK, Gaur P and Whitbread AM


Abstract: The objective of this study was to map the temporal changes in chickpea cropped area over the last decade in Andhra Pradesh using remote-sensing imagery. Moderate Resolution Imaging Spectroradiometer (MODIS) data composited for every 16 days were used to map the spatial distribution of seasonal crop extent in Andhra Pradesh. MODIS derived 16 day normalized difference vegetation index (NDVI) and maximum value composite (MVC) with seasonal ground survey information for the years 2005–2006 and 2012–2013 were used. A subset of ground survey information was also used to assess the pixel-based accuracies of the MODIS-derived major cropland extent.

Chickpea-growing areas were identified and mapped based on their characteristic growing periods during the post-rainy season. Significant growth in the chickpea-growing areas was observed in the four districts of Andhra Pradesh between 2001 and 2012. The area cropped to chickpea almost tripled from 0.22 million ha during 2000–2001 to 0.6 million ha by 2012–2013. Furthermore, survey data were also used to assess the accuracy of the MODIS estimates of chickpea growing areas. When compared with ground survey, the 10 land-use and land-cover classes derived from the MODIS temporal imagery resulted in overall accuracies of 86% of actual. The accuracy of areas identified as cropped to chickpea was 94%.

To complement this remote-sensing study, a state-level representative primary household survey was conducted to elicit information on the socio-economic characteristics of chickpea-growing farmers, the extent of adoption of improved cultivars, costs and returns from chickpea cultivation, competitiveness of chickpea with other post-rainy crops, etc. during 2012–13. The findings revealed that nearly 98% of the chickpea cropped area is now under improved cultivars, with an average increase in yield of 37% over yields achieved with unimproved varieties. The average annual per capita incomes have increased to US$ 1.89 day−1 with this silent chickpea revolution across the rain-fed areas of Andhra Pradesh.

http://oar.icrisat.org/9424/

Utilization of actinomycetes having broad-spectrum of plant growth promoting and biocontrol traits in chickpea, sorghum and rice

Authors: Sathya A, Srinivas V and Gopalakrishnan S

Published: 2016. Pages 64-76. in Recent Trends in PGPR Research for Sustainable Crop Productivity. Scientific Publishers (India), Jodhpur, India. ISBN 978-81-7233-990-6

Abstract: Plant pathogens such as Sclerotium rolfsii (causes collar rot), Fusarium oxysporum (causes wilt) and Macrophomina phaseolina (causes charcoal rot/dry root rot) have a broad host range, affecting several agriculturally important crops including chickpea, pigeon pea, groundnut and sorghum, which are grown under rainfed conditions, leading to significant yield losses. Due to the broad host range of these fungal pathogens, it has become very difficult for the farmers to grow these crops profitably. Hence, there is a need to have broad-spectrum plant growth-promoting (PGP) and biocontrol organisms for use in different cropping systems for the control of multiple diseases in a single crop and there by the crop productivity can be enhanced in the dry-land agriculture. The main objective of the present study was to identify and evaluate broad spectrum PGP and biocontrol agents and their metabolites with multiple actions against different pathogens so that one biological treatment controls more than one problem apart from promotion of plant growth in chickpea, sorghum and rice.

http://oar.icrisat.org/9405/

Downy Mildew of Pearl Millet and its Management

Authors: Shetty HS, Raj SN, Kini KR, Bishnoi HR, Sharma R, Rajpurohit BS, Mahala RS, Yadav HP, Gupta SK and Yadav OP

Published: 2016. All India Coordinated Research Project on Pearl Millet (ICAR), Jodhpur. 53 pp.

Abstract: Pearl millet (Pennisetum glaucum [L.] R. Br.) is the third most important rainfed cereal crop of India grown over 9 million hectares with an annual production of 9.5 million tons. Pearl millet, being a C4 plant, has a very high photosynthetic efficiency and dry matter production capacity. Downy mildew is the most devastating disease of pearl millet particularly on susceptible and genetically uniform hybrids. Its biology, epidemiology and management aspects are complex as compared to the other major pathogens infecting pearl millet. Typical downy mildew symptoms include sporulation on the abaxial leaf surface, chlorosis, stunted growth, and malformation of the earheads. Downy mildew management will continue to be major priority in pearl millet research. Therefore, additional sources of genetic resistance and effective disease management aspects need to be explored on regular basis.

http://oar.icrisat.org/9411/
Climate change adaptation and mitigation in smallholder crop–livestock systems in sub-Saharan Africa: a call for integrated impact assessments

Authors: Descheemaeker D, Oosting SJ, Homann-Kee Tui S, Masikati P, Falconnier GN and Giller KE

Published: 2016, Regional Environmental Change. 01-13. ISSN 1436-378X

Abstract: African mixed crop–livestock systems are vulnerable to climate change and need to adapt in order to improve productivity and sustain people’s livelihoods. These smallholder systems are characterized by high greenhouse gas emission rates, but could play a role in their mitigation. Although the impact of climate change is projected to be large, many uncertainties persist, in particular with respect to impacts on livestock and grazing components, whole-farm dynamics and heterogeneous farm populations. We summarize the current understanding on impacts and vulnerability and highlight key knowledge gaps for the separate system components and the mixed farming systems as a whole. Numerous adaptation and mitigation options exist for crop–livestock systems. We provide an overview by distinguishing risk management, diversification and sustainable intensification strategies, and by focusing on the contribution to the three pillars of climate-smart agriculture. Despite the potential solutions, smallholders face major constraints at various scales, including small farm sizes, the lack of response to the proposed measures and the multi-functionality of the livestock herd. Major institutional barriers include poor access to markets and relevant knowledge, land tenure insecurity and the common property status of most grazing resources. These limit the adoption potential and hence the potential impact on resilience and mitigation. In order to effectively inform decision-making, we therefore call for integrated, system-oriented impact assessments and a realistic consideration of the adoption constraints in smallholder systems. Building on agricultural system model development, integrated impact assessments and scenario analyses can inform the co-design and implementation of adaptation and mitigation strategies.

http://oar.icrisat.org/9423/

ICRISAT wins 4 Communicator Awards

The Communicator Awards is a leading international awards program recognizing big ideas in marketing and communications and receives over 6,000 entries from companies and agencies of all sizes, making it one of the largest awards of its kind in the world. The awards are sanctioned and judged by the Academy of Interactive & Visual Arts, an invitation-only group consisting of top-tier professionals from acclaimed media, communications, advertising, creative and marketing firms.

The ICRISAT- Annual Report 2014 won the Award of Excellence for featuring an interactive section on how gender can be integrated at every stage of the value chain, in the Print (Annual Report - Non-profit) category.

The International Year of Pulses calendar and booklet with pulse stereograms and a range of facts and figures and stories, in the Print (Marketing/Promotion – Calendar) category.

Big Ideas for CSR partnership in sustainable development concept and folder with options for companies to engage ICRISAT to implement their CSR, in the Print (Brochure – Business to Business) category.

Video highlights of science seminars series: Interviews with each presenter to capture the key messages and promote the longer seminar, in the Online Video (Science) category.

http://annualreport.icrisat.org/
http://www.icrisat.org/csr/
http://www.icrisat.org/take-2-highlights-of-science-seminar/
Farewell

The following staff members are retiring on 30 April 2016:

Mr A Yadaiah, Senior Field Helper II, Asia Program – Farm Services, served the Institute for over 42 years.

Mr C Laxminarayana, Scientific Associate, IS (AIP), served the Institute for over 33 years.

Mr M Jagdishwer, Transport Associate, Transport Services, served the Institute for over 21 years.

We wish them all success in their future endeavors.

Reader’s Comment

I am very heartened to read of these new initiatives in Africa.

Integrated collaboration with host countries, parallel CGIAR programs, pan-African and complementary agencies in weather forecasting etc, has much to offer, placing the next round of Green Revolution strategies to address poverty and climate change as a mega-team with shared aims, and practical realistic mechanisms for achieving the necessary local transformations for vertical integration.

All, from farmers, agribusiness and marketing, to aid agencies bring their respective strengths to bear, and have ownership, and participation in planning and implementing capacity development.

There are worrying signs that the unpredictability of climate change is upon us.

Wheat imports to Africa have risen from the time I was an IITA wheat specialist in Nigeria (my reports are in the CIMMYT library).

The drying of lake Chad is a major concern for future of irrigated wheat production in Nigeria, Cameroon and Chad, and there are risks to continued flows of northern rivers in the region if conditions become drier, with consequences for irrigation.

The new developments are wonderful, and from the Center Commissioned External Review meetings in Niger I know that food self-sufficiency is a major strategy for national stability.

Dr Robert John Redden, Plant Breeding and Genetics, RJR Agriculture Consultants, Australia

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