Healthy Food Systems
The Foundation for a Better World

Soils
Water
Crop Nutrition
Value Chains
Production
Consumption
Science
Human Health

Annual Report 2018

ICRISAT
INTERNATIONAL CROPS RESEARCH INSTITUTE FOR THE SEMI-ARID TROPICS
ICRISAT is a member of the CGIAR System Organization
CGIAR

*Draft
Message from Board Chair

Health is one of the biggest concerns in this world today and is key in meeting the Sustainable Development Goals (SDGs). As part of a consortium that is the CGIAR System, we have to show how we are contributing to the SDGs.

This year we are referring to ‘Healthy Food Systems’ – the need of many people and focus of institutions across the world. This is a holistic approach which includes natural resource management, water, the environment, crop and animal health, and human health, of course.

It has been now decades that ICRISAT has focused its research programs on productivity and nutritional quality of our mandate crops and also on how those crops are reacting to climate change. A new initiative (Systems Biology) that the Board has approved is dealing with key questions such as: What is the impact of our mandate crops? What is the impact if we are using those crops in a compound diet? We are trying to link agriculture and health, and we are not alone. ICRISAT is doing this in partnerships and our science is contributing to address the big concern that is health.

Dr Paco Sereme

Message from Director General

I’m very pleased to present ICRISAT’s Annual Report 2018. This showcases our work on science and holistic development. We strongly believe in the potential of science to make a difference in lives of small and marginal farmers in semi-arid tropics and it has been our effort to reflect this for over 46 years. The need to take a holistic view of agriculture is visible in the five pillars of CGIAR’s plan for the next five years. Science has been delivering on better crop, improved practices and natural resource conservation and our scientists have been working hard. We need also to consolidate our work around holistic pillars of development towards achieving the Sustainable Development Goals. It is this holistic approach that marks the theme of ‘Healthy Food Systems’ in our Annual Report.

Healthy Food Systems encompasses the decades of work on natural resource management as well as enhancing the quality of life across Africa and Asia. This is also the first year that we have successfully reported on the CGIAR Research Program on Grain Legumes and Dryland Cereals that ICRISAT is leading. We cherish the many partnerships that we have formed in the period and look forward to more exciting science and impact in the year ahead.

Dr Peter S Carberry
**Message from Deputy Director General-Research**

In the complex farming systems of the semi-arid tropics where ICRISAT’S crops are grown, integrated solutions are needed to address the challenges of poverty, malnutrition and sustainability of natural resources. Considering the nutritional benefits of our crops and the urgent need for addressing food security and malnutrition in the agro-ecologies that ICRISAT works in, we have endeavoured to internalize nutrition at all levels from the Science of Discovery to the Science of Delivery.

ICRISAT’s nutrition-related research contributes to development outcomes through three primary impact pathways – Germplasm and technologies (Impact pathway 1) that is relevant for farmers and the food processing industry at any scale; Behaviour change of food system actors (Impact pathway 2) to promote improved technology adoption at scale and healthier food choices and dietary patterns; and Enabling food policies, markets and institutions (Impact pathway 3) for achieving sustainable food and nutrition security in the drylands that requires an enabling institutional and policy environment at local, national and regional levels. Of particular relevance are coordinated efforts to reduce chronic food insecurity and malnutrition in the regions that demand concrete and concerted action from diverse sectors.

ICRISAT’s research is directed at its dual mandate – crop improvement for six important and nutritious food crops including the three legumes (chickpea, pigeonpea, groundnut), and three cereals (sorghum, pearl millet and finger millet) delivered through access to its global genebank, upstream pre-breeding science, regionally-targeted breeding programs and support for local seed systems; and Systems research for the semi-arid tropical drylands characterized by resource-constrained, multi-objective, multi-function smallholder crop-tree-livestock farming systems that face high climate and market risks as well as natural resource degradation.

Our initiatives on the science of scaling up through the ICRISAT Development Center (IDC) and the Agribusiness and Innovation Platform (AIP) in partnership with public and private sectors should strengthen our engagements around the science of delivery. The overall vision of ICRISAT’s research strategy is to support transition to sustainable and nutritious food systems – sustainable in terms of production for the farmer and nutrition and health for the consumer. We are committed to contributing towards more resilient agri-food systems, food and nutritional security, poverty reduction and effective utilization of natural resources. Today’s research will guide tomorrow’s solutions, and hence the bottomline will be to react quickly to emerging problems through collaborative development of timely interventions and technologies.

Dr Kiran K Sharma

**2018 Research Highlights**

- **331** germplasm/breeding lines/experimental hybrids entered in National Performance Trials for release as varieties/hybrids in 2018
- **162** Elite germplasm lines, **20** Elite breeding lines, **149** Hybrid lines
- **53.85%** increase over previous year for Elite germplasm lines
- **10.96%** increase over previous year for Elite breeding lines
- **52.04%** increase over previous year for Hybrid lines

**Number of varieties/hybrids released by national programs from germplasm/breeding materials supplied by ICRISAT in 2018:** 61

**From ICRISAT germplasm:**
- **18** hybrids, **200%** increase

**From ICRISAT breeding material:**
- **39** hybrids, **225%** increase

**Source:** ICRISAT MEASURE platform
Healthier Soils

Introduction
Soils are the foundation of a healthy food system. Decreasing availability of land for agriculture makes it important to ensure its optimum utilization. Continual land degradation needs to be halted and reversed with holistic integrated land management strategies for healthier crops and healthier foods.

Challenges
There’s need to rejuvenate soils for greater nutrition security and healthier production and consumption.

Approaches
- Creating sustainable soil conservation models for adoption
- Facilitating a movement among communities to sustain and generate greater impact
- Practicing in-situ and ex-situ soil conservation for greater sustainability
- Rehabilitating degraded lands through multi-pronged approaches

Impact
29,401 Ha
Direct area (estimated) under soil management

Acidic soils of eastern India
Soil health mapping of 37,500 samples from farmers’ fields across 30 districts of India’s state of Odisha found over 90% soils to be acidic and over 80% deficient in boron.

Redress: Over 4,000 soil test-based nutrient management demonstrations were conducted and crop-specific nutrient doses prescribed to build healthier soils.

Degraded lands in sub-Saharan Africa
Low clay and organic carbon combined with low exchange capacity impoverished soils across five regions of Burkina Faso and Niger.

Redress: Involved the local community, 300 women and 1,200 men in testing and scaling-up integrated land management involving bio-reclamation of degraded lands.

Game of slopes in Eastern Africa
Why does land fertility response to fertilizer input vary in any given area resulting in significant yield differences?

Redress: Studies revealed fertilizer response decreases with increasing slope due to decrease in soil organic carbon, clay and soil water content. Yield on foot slopes are up to three times higher than that on hillslopes.
Sustainable Solutions for Water Resources

Introduction

The dual objectives of environmental conservation and enhanced food security are centered around water. This is why water initiatives have been the core of ICRISAT’s approach for people in the semi-arid tropics.

Approaches

- Community-based watershed management
- Water-efficient innovations for conservation and cultivation
- Management of water and resources

Challenges

Shrinking water resources for agriculture, changes in rainfall patterns, and fragmented small and marginal farms make it a challenge for effective water management for agriculture.

Impact

Direct area (estimated) under watershed: 102,127 Ha

Indirect area (estimated spill-over) under watershed: 300,600 Ha

Key Successes

Tuning into heavy metal

There exists a need for cost-effective, energy-efficient and eco-friendly wastewater treatment technologies that can also remove heavy metals.

Redress: An algae-based treatment technology called PHYCOSORB was developed. It removes nitrate, phosphate and heavy metals from wastewater. This technology has the potential to produce biodiesel and biomolecules like bio-pesticides and bio-fertilizers. Trials have shown metal removal efficiency of 60 -70%.

Easing out erosion in West Africa

Water runoff leading to soil erosion is affecting fertility and yields in watershed villages of Mali.

Redress: Introduced farm-level practices like contour bunding with fast growing plant species to control runoff. Composting and irrigation through deep wells powered by solar energy improved production of sorghum and millet by 72% and 58%, respectively increasing farmer income by 20%.

Water not wasted

Water shortage during crucial crop growth phase is known to affect yields in Ballari of Karnataka state, India.

Redress: A treatment unit that can produce 18 m3 per day of treated wastewater was installed at the village level. The unit’s removal efficiencies for Chemical Oxygen Demand (COD), sulfate, phosphate, nitrogen, total suspended solids and total coliform were 64.7%, 57.0%, 32.0%, 62.1%, 96.2 and 89.2%, respectively. As on date, five farmers farming 2.8 hectares of land with meagre water resources are the beneficiaries and are reporting yield increase.

Dr. Birhanu Zemadim

Senior Scientist - Land and Water Management

West and Central Africa Program

All of this work was made possible through government, non-profit and corporate partnerships. Please scan the QR Codes for a full list of partners and full stories on the web.
Enhanced Nutrition of Crops

Introduction
Decades of crop improvement programs have focused on crops in semi-arid, rainfed systems to achieve multiple goals of productivity, profitability and better nutrition.

Challenges
To make crops viable, enhanced nutrition traits alone are not enough. Market traits and profitability need to be achieved as well.

Approaches
- Crop improvement through modern breeding approaches for enhanced nutrition traits
- Identifying wild and indigenous varieties for nutritional properties
- Working with the national system and government to release and facilitate adoption

Improving genetics to enhance crop nutritional quality holds the key to meet food industry and market demand, and to drive nutrition-sensitive agriculture. One of the key challenges in improving crop nutrition quality is combining nutritional quality traits with high yield potential and adaptation traits in a single cultivar. Notwithstanding the challenge, multi-institutional crop improvement teams commercialized biofortified sorghum and pearl millet cultivars, and more recently ‘High Oleic’ groundnut cultivars were identified for release for the first time in India.

Dr. Janila Pasupuleti
Principal Scientist - Groundnut Breeding
Crop Improvement
ICRISAT-Asia Program

Native foods for better nutrition
Locally grown and developed food products from indigenous crops could help combat malnutrition and hidden hunger.

Redress: ICRISAT’s Agribusiness and Innovation Platform (AIP) is studying the nutraceutical properties of dryland cereals and legumes to develop food products.

Heralding the high-oleic groundnut
Groundnut varieties with higher oleic acid content have longer shelf lives, making them more attractive to the market.

Redress: Fast-track approach primes 16 groundnut breeding line-s with over 80% oleic acid content as against 50-60% in the regular variety. As part of the All India Coordinated Research Project (AICRP), India, final testing is complete and ready for release.

Africa’s first fortified pearl millet
The prevalence of malnutrition, especially in West and Central Africa, needs urgent attention along with better farm practices.

Redress: The launch of Chakti, pearl millet with enhanced iron content, could be part of a solution to Africa’s challenges in farming and nutrition. Also launched ICMV 167001, with 50 parts per million (ppm) iron, 45 ppm zinc and yielding 1.6 tons per hectare. Its bold white grains are preferred by food processors.

Way ahead: Push for greater adoption by farmers.

Key Successes

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Way ahead: Push for greater adoption by farmers.

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We designed and implemented a variety of social and behavior change interventions that aimed at improving feeding practices in rural communities. The nutrition initiative, being part of a larger project that took on a whole value chain approach, ensured that communities not only had the appropriate nutrition information and skills in food preparation, but due to efforts by our crops team, they also had access to food.

Ms Christine Wangari
Communications and Projects Specialist
Eastern and Southern Africa Program

South India’s entrepreneurial farmers

Dryland farmers need more profitable avenues through value chains and expertise.

Redress: The Agribusiness and Innovation Platform of ICRISAT established processing units in villages in partnership with a global corporate’s model to create opportunities for 6,000 dryland farmers. Also created entrepreneurial opportunities for and enhanced nutrition of women and youth.

Baskets for better: Nutri-Food reaches out to tribal Telangana

Women and children in tribal households were found to be affected by malnutrition, a concern that is high on the priority of development agenda.

Redress: The Agribusiness and Innovation Platform introduced a Nutri-Food Basket to 5,000 tribal households in Adilabad, Komaram Bheem-Afisabad and Mancherial, especially for pregnant and lactating women and children under five years. The basket’s components were prepared from local ingredients to provide energy, protein, fat and micronutrients. After 9 months, tests showed a 73% decline in wasting (severe underweight) in the children.

Driving demand in untapped African and Asian urban markets

Building large markets for farmers can be achieved by growing urban demand. Modern convenience products are typically required and finding ways these are also healthy and tasty is important.

Redress: Processed millet, sorghum and pigeonpea products were tested in urban markets in Tanzania and Myanmar, and showed positive market response. In Myanmar, focus group testing of a wide range of processed foods revealed acceptance across age groups, with more than 60% of the consumers saying they would buy Smart Foods. In Tanzania, product options were demonstrated with processors. One processor was selected to design a final product and test the market acceptance through actual sales. In just one week, she generated an additional US$ 2,672 in revenue, creating a market demand of almost 1,000 kg of grain per week. This work was undertaken by Smart Food and SOMNI project funded by the Australian government and IFAD. Scaling out these Smart Foods in urban markets can bring benefits to processors and farmers alike.
Communities make Healthier Production Choices

Introduction
Adoption of improved varieties, uptake of new technologies and sustainable on-farm practices are some of the choices that improve the health of crops, livestock and people. While research may help develop these, it is the farmers who make these improved choices for healthier production.

Challenges
Adopting changes in some age-old farming practices is not just about greater awareness and proven research. It also needs motivation from within the community and from influencers, to push for a positive change.

Approaches
Increasing efficiency of smallholder farmers with tools and technologies
Greater adoption of varieties with relevance to climate change and nutritional traits
Involving in interventions that make a positive impact on livestock and human health

Impact
4,821,152 Ha
Total farmers reached through digital initiatives

Key Successes

Spreading seeds: Growing demand for biofortified pearl millet
Small and marginal farmers find it difficult to access seeds of improved varieties such as biofortified pearl millet.

Redress: High-yielding pearl millet hybrids ICMH-1202 (AHB-1200) and ICMH-1203 (HHB-209) biofortified with iron and zinc were notified for all-India cultivation. Breeder seed of Dhanashakti was supplied nationally, while hybrids GHB-1203 and GHB-1229 were identified for Gujarat state. Additionally, 36 biofortified inbreds (70-115 ppm Fe; 36-60 ppm Zn) were shared with partners.

Tech for tribal farmers of Telangana, India
Smallholder farmers in remote areas often do not have exposure to technology.

Redress: Over 500 tribal farmers from across Telangana were trained in new technologies in agriculture, horticulture, floriculture, vegetable cultivation, fisheries and dairy farming. Training included field and industry visits.

Cutting down aflatoxin contamination in Africa
The huge concern of aflatoxin in Africa could be managed with better practices.

Redress: Integrated crop management technologies were demonstrated in West Africa leading to effective adoption by farmers. This resulted in significant reduction of aflatoxin contamination in groundnut, higher crop value and improved health and nutritional security.

Improved tech, enhanced crop production
Better farm practices, including latest agritech technologies and training, can help struggling farmers raise their productivity and incomes.

Redress: Better technology demonstration for productivity and profitability of millets and sorghum in Mali through the Africa RISING’s Large-scale Diffusion of Technologies for Sorghum and Millet Systems (ARDT_SMS) project. Trained 40,835 farmers on various improved technologies; over 32,028 farmers applied them in their own farms.

Results: Yields increased by up to 60%.
Communities make Healthier Consumption Choices

Introduction
Driving the demand for healthier foods through greater momentum for healthier crops and dietary diversity is key to a healthier food system. As part of this process, a consumer buzz is being created around the nutrition and ecological aspects of crops in the semi-arid tropics.

Challenges
Creation of new markets needs promotion with consumer-friendly new approaches and products that often have to be created from scratch. Awareness is a multi-pronged exercise that needs high involvement and investment.

Approaches
- Awareness around concerns such as aflatoxin for ensuring healthier consumption
- Working with influencers and policy makers to create greater momentum for millets, sorghum and legumes
- Promoting consumption of value-added products with improved health benefits
- Introducing Smart Food to new consumer groups to widen the consumer segment

Enhancing the consumption of dryland crops can play a catalyzing role in creating economic opportunities for rural communities, entrepreneurs and youth. The challenge lies in making available appropriate and affordable processing technologies to deliver nutritious and scientifically validated value-added food products to consumers to ensure sustainable business enterprises and demand for dryland crops. Providing an “ecosystem” by setting up agribusiness incubators to foster innovation and entrepreneurship is key to ensuring the sustainability of entrepreneurs, more so among rural communities.

Dr Saikat Datta Mazumdar
Chief Operating Officer - NutriPlus Knowledge Program
Agribusiness & Innovation Platform
Innovation Systems for the Drylands Program

Key Successes

Aware and attentive to aflatoxin
Awareness about aflatoxin can reduce contamination that damages crops and decreases incomes.

Redress: Over 35,000 stakeholders, 46 schools and 127 women groups in Mali were sensitized about aflatoxin’s effect on nutrition and health, through training sessions and media campaigns. This resulted in higher awareness and better preparedness in the general population.

Delivering nutrition messages through Smart Food community ambassadors
Parents of over 60,000 children below age 5 were reached with Smart Food nutrition messages. In just one year, women and children’s behavior changed significantly towards a more micronutrient-rich diet with:
- 20% increase in diet diversity for women
- Almost 100% increase in diet diversity for the children.

Schooling pigeonpea and finger millet in Tanzania
Behavior change is at the core of building markets

Redress: Pigeonpea and finger millet were introduced in school meals to over 2,000 children in four schools in central Tanzania. This was possible after working with school chefs to design menus and also conducting fun information sessions with students. Feedback showed that 87% of children changed their negative perception about these crops; 91% and 98% of the children wanted to include pigeonpea and finger millet respectively in school meals.

Signing up Smart Food brand ambassadors
Engaging ambassadors to reach more people

Redress: Niger’s First Lady, Dr Lalla Malika Issoufou, pledged her support to Smart Food and led Niger’s first national millet festival. Three celebrity African chefs based in Paris and London became Smart Food Ambassadors, spreading the word through media. Chef Aissatou M’Baye, the Senegalese culinary blogger based in Paris, developed and shared millet and legume recipes through her social media, reaching nearly 500,00 people with 876,437 comments (impressions).

All of this work was made possible through government, non-profit and corporate partnerships. Please scan the QR Codes for a full list of partners and full stories on the web.
Science for Healthier Farming

Introduction
Scientific research is the base of our work in the semi-arid tropics. From innovations to building capacity of researchers to partnering institutions for better impact, the science base provides opportunities for improving livelihoods and building healthier communities.

Approaches
- Genomics to fast-track improvement of crops with healthier traits
- Tested practices for improved outcomes in smallholder agriculture
- Gene bank repository of millets and legumes in the world for biodiversity conservation
- Gender-responsive research for men and women farmers' equitable participation

Challenges
The pathway to a scientifically proven solution that also is effective on the field, is often time-consuming. Finding policy and funding support for research is a challenge to be overcome.

Key Successes

Integrated approaches, improved incomes in south India
Low yields, inefficient water use and low income are deterrents to agriculture.

Redress: Through an integrated approach in some districts of Karnataka state, interventions including improved cultivars, mechanization, crop intensification and diversification, fodder development, water management and pest and nutrient management led to 15–20% increase in water use efficiency, 15–40% yield increase and income rise of over US$ 120–150 per hectare in four districts of the state.

Endgame for aflatoxin in peanut
Aflatoxins produced by fungi, mainly Aspergillus, are a health hazard in Asia and sub-Saharan Africa where the fungi thrive. Aflatoxin is associated with carcinogenesis in humans and animals. Until recently, controlling fungal infection in peanuts before harvest was a major challenge given the complexity of peanut-aspergillus pathosystem.

Redress: Two lines of peanut were developed, one with over-expression of certain plant defense proteins (defensins) and the other that can silence a few genes in the invading fungus. These showed that aflatoxins can be kept at bay and how the two methods, Overexpressing Defensins and Host-induced Gene Silencing, could together make peanuts nearly immune to aflatoxin. The publication of these results showed very high impact.

Agronomy in Africa gets a boost
Improvements in agriculture to be conveyed to farmers across the region for increasing productivity.

Redress: Training in agronomy resulted in improved post-harvest handling by farmers and extension agents. Use of new technologies contributed to grain yield increases of 30% to 64% (improved varieties), 27% to 38% (seed dressing) and 20% to 55% (tilage practices).

Breaking the pigeonpea yield barrier in India
Pigeonpea productivity remains one of the concerns for major pulse producers like India.

Redress: Participatory management practices were demonstrated across 7,500 hectares in 15 districts of five Indian states. Farmers were shown seed treatment, in-situ soil and moisture conservation techniques, nipping and line sowing. Demonstrations with ICPH 2740, a pigeonpea hybrid, resulted in yields averaging around 1.5 tons per hectare. The highest recorded yield was 3.8 tons per hectare in Osmanabad, Maharashtra state.

Gender-responsive agriculture for sub-Saharan Africa
Gender-responsive research is essential for improved outcomes in smallholder farms in sub-Saharan Africa. How can agriculture be gender-responsive?

Redress: Through trainings organized by Gender-responsive Researchers Equipped for Agricultural Transformation (GREAT), agricultural researchers learnt the theory and practice of gender-responsive research for equitable participation in research activities for the benefit of women farmers, entrepreneurs and farm organizations across SSA.
Research for Human Health

Introduction
Underpinning much of our scientific research in enhanced crop, value chains or consumption is the objective of better human health. The rural communities of food producers as well as those impacted by the consuming practices are tackled simultaneously through food.

Nutrition awareness in South India’s tribal pockets
A Nutri-food Basket survey revealed high prevalence of stunting among adolescents in tribal pockets of Telangana, who were also underweight.

Redress: Multiple stakeholders have joined hands to promote nutrition literacy and help tribal communities adopt medium and highly diverse diets.

Challenges
Scientific research around human health has multiple ethical and human considerations. Therefore, ICRISAT’s focus is across the value chain for health outcomes, and indirectly with people.

Nutrition level in small farm households is often low. Lack of dietary diversity is one of the reasons.

Redress: Two studies in 2,815 and 986 households revealed that promoting nutrition education, crop diversification with pulses and livestock diversification, and improving access to markets improved dietary diversity of farm households.

Nutrition awareness in South India’s tribal pockets

Approaches

When talking about health with rural women and in rural communities, I realize that the biggest challenge is their understanding of “health”. They relate health to disease. Women, most of the time, relate health to their children’s or family health and not their own health.

As a researcher, I first make them understand the difference between health and disease. Then follows the more detailed conversation about their health, children’s health and how it is linked to food, nutrition, wellbeing and happiness.

Dr Padmaja Ravula
Senior Scientist - Gender Research
Markets, Institutions, Nutrition & Diversity
Innovation Systems for the Drylands Program

When talking about health

Working to identify the health and nutrition needs of the community

Provide solutions towards addressing these concerns through the pathway of sustainable food production and consumption

Study impact in contributions to human health

Pulse: PS Rao, ICRISAT

Key Successes

Addressing anemia among mothers and children
Existing data and a baseline survey in parts of Telangana’s Asifabad, Jayashankar Bhupalpally and Bhadradi Kothugudem districts suggested nutritional deficiencies, including anemia, among lactating mothers and children aged under 6.

Redress: Nutritional support through diverse foods as supplements is being provided to 12,000 lactating mothers and children at Anganwadi and nutrition rehabilitation centers.

Battling sickle cell anemia and thalassemia
In Telangana’s Asifabad, Jayashankar Bhupalpally and Bhadradi Kothugudem districts 2,130 children in Ashram schools were identified with sickle cell anemia and thalassemia.

Redress: The children are being provided nutritious multigrain food supplements made from sorghum, millets and pulses in the form of cookies, energy bars, breakfast meals and snacks for a year.

Managing malnutrition in Bangladesh
High rate of malnutrition prevailing in some parts of northern Bangladesh.

Redress: Foods made from peanut, an important crop grown in the region, were formulated for promotion. These included energy bars, spreads and cookies. Acceptability studies were conducted to select products.

Nutrition awareness in South India’s tribal pockets
A Nutri-food Basket survey revealed high prevalence of stunting among adolescents in tribal pockets of Telangana, who were also underweight.

Redress: Multiple stakeholders have joined hands to promote nutrition literacy and help tribal communities adopt medium and highly diverse diets.

Drive for dietary diversity in Zimbabwe
Nutrition level in small farm households is often low. Lack of dietary diversity is one of the reasons.

Redress: Two studies in 2,815 and 986 households revealed that promoting nutrition education, crop diversification with pulses and livestock diversification, and improving access to markets improved dietary diversity of farm households.

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Financial Summary

Top ten donors for 2018 (in US$ thousands)

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<td>USA</td>
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Contribution to grant revenue by project size (in US$ thousands)

- 5% Small (<100)
- 15% Medium (100-500)
- 80% Large (>500)

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<th>Project Size</th>
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<tbody>
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<td>Small</td>
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<tr>
<td>Medium</td>
<td>15%</td>
</tr>
<tr>
<td>Large</td>
<td>80%</td>
</tr>
</tbody>
</table>

Staff

29 Nationalities
- 10 USA, Europe and Australia
- 9 West and Central Africa
- 8 Asia and Southeast Asia
- 2 Africa

Gender

- Female: 22%
- Male: 78%

Age

- Upto 30 years: 16%
- 31-40 years: 40%
- 41-50 years: 21%
- 51+ years: 23%

Communication Highlights

Global media footprint

Increased global media coverage with a footprint of over 110 media exposures.

How to Eat as if the Planet Mattered

- Yes!

Extended partnership to deliver high-yielding, disease-resistant finger millet to farmers

119 Organizations Shaking Up the Food System in 2019

- As Asians get rich and healthy, ‘smart crops’ replace rice on future menus

Communicating science

50 videos created to share messages.

Over 147 original stories written for the web and newsletter.

Revival of ICRISAT Happenings as a weekly internal newsletter and as a monthly for external readers.

Website

- % New Visits: 58.48%
- % Increase smart devices: 27.45%

Social media

- Reach (monthly avg.): 52,646
- Impressions (monthly avg.): 147,575
- Reach/Impressions (per month avg.): 31,613
- Reach/Impressions (per month avg.): 100,000

Read the full report: annualreport2018.icrisat.org
This is the first year that ICRISAT is reporting on the CRP-GLDC, a CRP that we are gratified to lead along with our valuable partners. This CRP aims to increase the productivity, profitability, resilience and marketability of nine grain legumes and cereals through priority setting.

Key Results
- Expansion of multilocational and national testing sites resulted in commercialization of 73 cultivars of the GLDC crop commodities in 16 target countries of Africa and Asia.
- An ex-ante poverty impact evaluation conducted by the CRP-GLDC showed that early-maturing and drought-tolerant grain legumes and dryland cereals varieties and hybrids with resistance to pests and diseases are the priority research and technology options.
- The role of gender norms and social change in technology adoption and distribution of benefits from adoption was established.
- Modelling frameworks are being considered to evaluate the trade-offs and co-design farming systems, besides looking at portfolios of household activities, enterprises and management practices that enhance livelihoods.
- Breeding for heat tolerance in chickpea and pearl millet and for low nutrient adaptation in cowpea and groundnut were mainstreamed.
- Machine-harvestable chickpea and lentil to promote youth and women entrepreneurship, high oleic groundnut for nutrition and grain sorghum suitable for brewing were market traits of industrial importance that were focused on.
- Modernized breeding efforts and pre-breeding for prioritized traits together with genomics, transgenics, phenomics and breeding tools were undertaken.

Progress towards the CGIAR’s Strategy and Results Framework
- 361,000 ha: Chickpea in Myanmar under improved cultivars, released through a partnership between Department of Agricultural Research (DAR) and ICRISAT
- 1.845 million ha: HPRC pearl millet hybrids that gave an additional income of US$ 74 per ha, equivalent to US$ 133 million per year in India
- Yields double from 660 kg/ha (1998) to 1400 kg/ha (2017): Adopting of new chickpea varieties
- Adoption of biofortified pearl millet cultivar Dhanashakti in India; 35,000 farmers >65,000 ha
- New biofortified cultivars released contributing to improved diets:
  - India: Sorghum (Parbhani Shakti)
  - Bangladesh: Lentil (Balimashur 9)
  - Nepal: Lentil (Khajuro Masuro 4)
  - Kenya: Pearl millet (EUFM 403)

Innovations
- Multi-model systems analysis used to identify Low Emissions Development Pathways – exploring synergies and trade-offs in south India
- The Crop Network Group (CNG) as a platform for crop Product design, development, testing advancement and delivery in Africa
- Introggression of high oleic trait in groundnut.

Capacity development

<table>
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<th>Female</th>
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Full list of capacity development activities: https://mel.cgiar.org/reporting/download/report_file_id/14269

2017–2018

Peer-reviewed publications: 252

Open Access: 159

St: 156

Full list of publications: https://mel.cgiar.org/reporting/download/report_file_id/14269

About ICRISAT

Vision
A prosperous, food-secure and resilient dryland tropics

Mission
To reduce poverty, hunger, malnutrition and environmental degradation in the dryland tropics

Approach
Inclusive Market-Oriented Development (IMOD)

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ICRISAT leads

CGIAR Research Program on Grain Legumes and Dryland Cereals

A Research for Development investment of US$413 million over five years

Commenced 1 January 2018

Builds on the work done by three CGIAR Research Programs from 2012 to 2016

Grain Legumes / Dryland Cereals / Dryland Systems

ICRISAT is a partner in

ICRISAT Research Program on Grain Legumes and Dryland Cereals

- A Research for Development investment of US$413 million over five years
- Commenced 1 January 2018
- Builds on the work done by three CGIAR Research Programs from 2012 to 2016

Grain Legumes / Dryland Cereals / Dryland Systems

Partners

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