

Pulse of ICRISAT

Celebrating the International
Year of Pulses

Annual Report
2016



INTERNATIONAL CROPS RESEARCH
INSTITUTE FOR THE SEMI-ARID TROPICS



ICRISAT is an International Research
Institute of the CGIAR



Message from the Board Chair

ICRISAT has tied its work to the SDGs and we have been able to use our research to help achieve the pathways towards lifting people out of poverty, aiming towards zero hunger, dealing with climate change and improving resilience in the dryland communities.

Chandra Madramootoo

Watch the video: annualreport2016.icrisat.org



Message from the Director General

The report connects you to stories of lives that have been changed through innovation; partnerships that have enabled us to scale impact; and how we have been engaging with policy makers to bring about equitable and sustainable solutions for smallholder farmers across sub-Saharan Africa and India.

David Bergvinson

Watch the video: annualreport2016.icrisat.org

Research Highlights

Impacts in Mission Areas

▶ Overcoming poverty and hunger

 **USD2679 net returns per ha** from dry season groundnut production in Nigeria

Yields in Tanzania

- Sorghum: Increased from **380** to **1200 kg/ha**
- Pearl millet: Increased from **500** to **1350 kg/ha**
- Pigeonpea: Increased from **500** to **1400 kg/ha**
- Groundnut: Increased from **650** to **1750 kg/ha**

> **USD150 million** annual social benefits due to pearl millet hybrids in India

10-50% increase in crop yields and incomes on **6 million ha** in two Indian states through integrated farm practices

Cereal-legume intercropping systems introduced in Vietnam, Laos, Myanmar, Nepal and India result in increased incomes

▶ Reducing malnutrition

 **Nutritious complementary food package** tested on children in Malawi and Tanzania with positive results

Smart Food campaign - Kenya

1700 trained	>8000 households reached	5400 children under 5 years reached
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Nutritionally dense cultivars

2 high-Fe pearl millet cultivars identified for West and Central Africa (WCA)

15 high-Fe and -Zn sorghum varieties identified for adaptation in Nigeria

100 promising finger millet varieties profiled for nutrient content

Nutritionally dense groundnut genotypes identified in WCA

Impacts in Crosscutting Areas

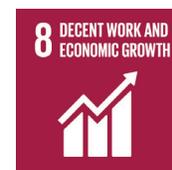
▶ Empowerment of women

 **10,770 women** gained access to land and increased their income when 241 ha of degraded land was converted into productive land in Niger

▶ Digital Agriculture

-  **30% more income** for farmers who followed sowing app advisories
- App for pest and disease recognition
- ICT-based agri-startups incubated by ICRISAT have initiated software development to support FPOs nationwide with their operations and management

Our work contributes towards the following SDGs



Read the full report: annualreport2016.icrisat.org



▶ Preventing environmental degradation



Watersheds

70,000 ha and **50,000 families** covered in 15 pilot watersheds in India

Impact: 50-100% increase in groundwater recharge	30-60% increase in cropping intensity	2x increase in crop yield
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8000 ha of land at Yewol watershed became a learning site visited by Government and community leaders from 23 districts

Impact: Increase in irrigable area: From **240** to **970 ha**
 Increase in crop yield: From **1.2** to **1.9 t/ha**
 New crops introduced: **5**
 Increase in area under chickpea cultivation: **100%**

35 ha of abandoned land was rehabilitated benefitting 360 members of 52 households in Chifra, Ethiopia

Wastewater treatment

27 locations piloted in 5 Indian states	30-92% reduction in pollutants
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▶ Coping with climate change



Climate mapping of Telangana state completed

Modeling tools: New improved modeling tools for dryland crops leading to robust **global foresight predictions**

▶ **Upgraded CRAFT** (CAAFS Regional Agricultural Forecasting Toolbox)

Research outputs contributing to ICRISAT's mission



Genetic gains

Ancestor genome of groundnut cracked:

Co-led sequencing and analysis

Draft genomes of pearl millet and finger millet assembled

Genebank

17,377 seed samples distributed in 24 countries

2551 unique germplasm accessions assembled from regional genebanks



Crop improvement

50 varieties released

Groundnut 6	Chickpea 6	Finger millet 3
Sorghum 28	Pigeonpea 5	Pearl millet 2



Seed production

23,509 tons of seed of ICRISAT mandate crops shared with farmer groups, NARS and NGOs

Breeder: 292 tons	Foundation: 1323 tons
Certified: 11,807 tons	Quality declared: 10,087 tons



Agribusiness and innovations

40 institutions mentored to support establishment of 75 farmer producer organizations (FPOs)

16 FPOs promoted in India	27 agribusiness incubators mentored in national agricultural research system (NARS) institutions
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Cost-effective groundnut sheller developed



Our work is accomplished with the support of our funders and the collaboration of smallholder farmers, national governments, international bodies, the national agricultural research system, advanced research institutes and universities and private sector.



2016

**INTERNATIONAL
YEAR OF PULSES**

Glimpses of ICRISAT's research work on pulses over 45 years in Asia and Africa

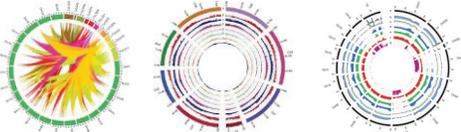
Machine-harvestable variety

NBeG 47 is the first machine-harvestable chickpea variety released in Andhra Pradesh, India, suitable for the state's variable climate

Genomic resources

Genome sequences

Published in Nature Biotechnology



[Pigeonpea 2011](#) [Chickpea 2012](#) [Fusarium oxysporum 2016](#)

Resequencing of **3000** chickpea lines

Accessions shared (as of 2016)

16,996 chickpea accessions and **12,596** pigeonpea accessions were deposited at the Svalbard Global Seed Vault over the last 8 years

Variety/hybrid releases (as of 2016)

(from breeding material supplied by ICRISAT)

India

160 chickpea varieties in 26 countries

91 pigeonpea varieties/hybrids in 19 countries

Africa

41 chickpea varieties in 4 countries

32 pigeonpea varieties/hybrids in 8 countries

Machine harvestable chickpea

2016

Towards
SDGs

Pigeonpea and chickpea draft genome sequences

2012

Accessions deposited at Svalbard Global Seed Vault

2009

World's first commercial pigeonpea hybrid

2008

Pu
of IC

Expansion of varieties based on ICRISAT-origin material

Impacts

Africa

Increase in...	Chickpea	Pigeonpea
Cultivated area:	24%	96%
Production:	130%	175%
Productivity:	39%	50%

India

- **Chickpea:** Accounts for **48%** of the demand for breeder seed
- **Pigeonpea:** Accounts for **37%** of the pigeonpea area

Myanmar

- ICRISAT-origin varieties cover **96%** of chickpea area



1972: Our journey begins

Genebank established at ICRISAT-India

Genetic resources

Germplasm collection (as of 2016)

India	Africa
20,602 chickpea accessions from 59 countries	1200 chickpea accessions from 6 countries
13,778 pigeonpea accessions from 74 countries	1500 pigeonpea accessions from 14 countries

Seed samples distributed (as of 2016)

Chickpea	Pigeonpea
153,193 samples to 88 countries	75,335 samples to 113 countries

1979

1989

World's shortest duration chickpea ICCV 2 (85-90 days)

Crop improvement (as of 2016)

Chickpea	Pigeonpea
Yield potential: 2.5-3.0 t/ha (120 varieties)	2-2.5 t/ha (varieties) 3-3.5 t/ha (hybrids)
Short-duration: <100 days to maturity	<100 days to maturity
Varieties developed: 40: Drought tolerance 10: Heat tolerance 100: Fusarium wilt 60: Ascochyta blight	Disease resistant: >20 varieties/hybrids developed for Fusarium wilt and Sterility mosaic disease

Ise
RISAT

1991

World's first pigeonpea hybrid ICPH8

Subsets collection (as of 2016)

Chickpea	Pigeonpea
3000 Composite	1000 Composite
1956 Core	1290 Core
211 Mini core	146 Mini core
300 Reference sets	300 Reference sets

1999

Start of core and mini core germplasm collection

Seed Systems

Africa	Chickpea	Pigeonpea
Certified seed production :	125,640 t	4250 t
Coverage :	1.25 million ha	> 0.5 million ha
Additional benefits :	USD300 million	USD130 million

Linking farmers to markets

Africa	Chickpea	Pigeonpea
Producer price:	30-50%	25-40%
Annual exports:	USD46.6 million	USD203 million



GOOD FOR YOU - THE PLANET - THE FARMER

PULSES

Some of the **biggest global issues** are:

Poor diets

malnutrition to obesity

Environmental issues

climate change, water scarcity and environmental degradation

Poverty

Smart Food is one of the **solutions** that contributes to addressing all these issues in **unison**.

Smart Food is food that **fulfills all the criteria** of being:

GOOD FOR YOU

GOOD FOR THE PLANET

GOOD FOR THE FARMER

Know more about Smart Food www.smartfood.org

for you



NUTRI-DENSE

- High protein
- High fiber
- Zero cholesterol
- Rich in vitamins and minerals



HEALTHY CHOICE

Helps manage

- Obesity
- Diabetes
- Celiac disease
- Gluten sensitivity



BALANCED DIET

The UN World Food Programme includes 60gm of pulses in its typical food basket





ARE GOOD...



for the *planet*

for the *farmer*



LOW CARBON FOOTPRINT

Reduces nonrenewable energy in the entire crop rotation by 22-24%



LOW WATER FOOTPRINT

- 4055 liters for 1kg pulses
- 15,415 liters for 1kg beef

IMPROVES SOIL HEALTH

- Aids microbial diversity
- Breaks pest cycles
- Reduces nitrogen fertilizer use



MULTIPLE USES

- Food
- Fodder
- Fuel
- Green manure
- Fences/baskets
- On-farm diversity



YIELD POTENTIAL

New varieties and hybrids have 3 times more yield potential

Added traits:

- Early maturity
- Tolerance to biotic and abiotic stresses
- Climate smart



MARKET POTENTIAL

Developing value chain creates marketing options for farmers leading to higher incomes

Communication initiatives

Modernized ICRISAT logo

Our journey of change: The logo was modernized in 2016 to reflect the new and dynamic phase of ICRISAT

The stylized leaves represent the leaves of sorghum and millets, which primarily grow in the drylands and are our mandate crops.

The half circle represents the seed of pulses – our mandate crops.

The circle and curve represent (a) drop of water and soil or (b) a farmer's head and arms and carrying food on her head.

The stylized "I" represents the farmer who is at the center of our research in the drylands.

Keeping the previous logo font and color provides a visual recognition for the organization as well as its own uniqueness.

The curve represents the globe reflecting our international work.

A new font has been chosen to represent the new and dynamic phase of ICRISAT.

Other notable initiatives

► Celebrating the International Year of Pulses (IYP)

<http://www.icrisat.org/iyp/>

► Launched Agri-buzz blog

<http://www.icrisat.org/agribuzz/>

► Positioning ICRISAT in key research areas

► Climate-Smart Villages

<http://annualreport2015.icrisat.org/>

► Digital Agriculture

<http://www.icrisat.org/digital-agriculture/>

► Empowering Women

<http://www.icrisat.org/empowering-women/>

► New timelines

► Combating Aflatoxin

<http://www.icrisat.org/aflatoxin-timeline/>

► Fertilizer Microdosing

<http://www.icrisat.org/Timelines/microdosing/>

New 100 Voices series

Three new series with a total of 33 videos were launched as part of the 100 Voices series.

- Youth in Agriculture
- Women in Agriculture
- Public-Private Partnerships

Media coverage

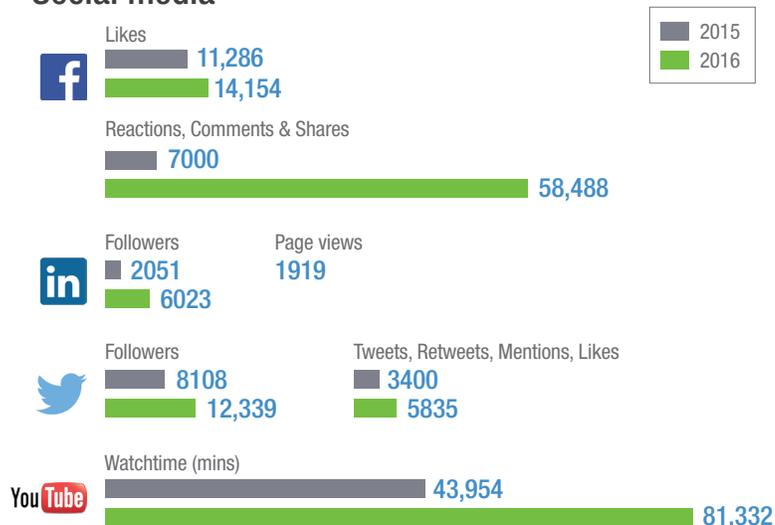
851

national/regional news posts

15

global news placements

Social media



Read the full report: annualreport2016.icrisat.org

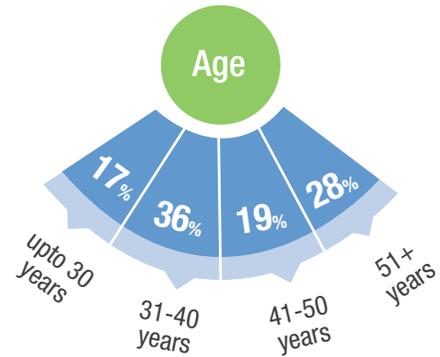
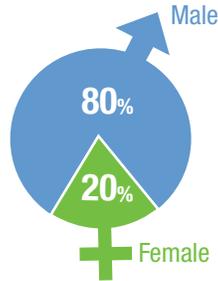


Our people

Diversity

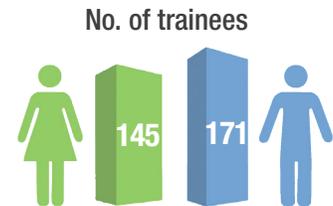
29
Nationalities

7 USA, Europe and Australia **4** Asia and Southeast Asia
11 West and Central Africa **7** Eastern and Southern Africa



Knowledge sharing

316
Training courses and scientific visits conducted



568
Research publications

237
Papers in ISI/Thomson Reuters listed journals

53
Papers in other peer reviewed journals

39
Books and journal volumes

9
Articles in international newsletters

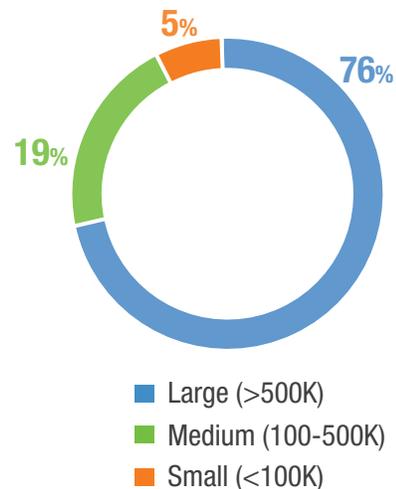
30
Monographs

64
Book chapters

12
Policy briefs

124
Conference proceedings

Contribution to grant revenue by project size



ICRISAT Governing Board



Chandra A Madramootoo, Canada
Chair, ICRISAT GB



S Ayyappan, India
Vice Chair, ICRISAT GB
(till Feb 2016)



Trilochan Mohapatra, India
Vice Chair, ICRISAT GB
(from Feb 2016)



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Nigeria



Rachel K Chikwamba
South Africa



Sissel Rogne
Norway



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Australia



David Bergvinson, Canada
Director General, ICRISAT



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Pradeep Chandra
India (from Dec 2016)



Rajiv Sharma
India (till Nov 2016)



Shobhana Pattanayak
India (from Feb 2016)



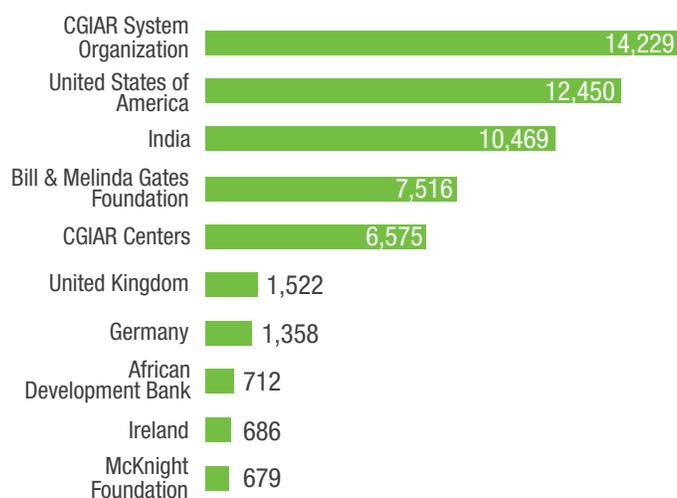
Siraj Hussain
India (till Feb 2016)

Financial summary

(in US\$ thousands)

Top Ten Donors for 2016

(in US\$ thousands)



Balance Sheet		
	2016	2015
Assets		
Cash and Cash equivalents	22,882	13,742
Investments	44,961	42,499
Accounts receivable	15,811	10,732
Inventories	702	783
Prepaid Expenses	295	277
Property and Equipment - net	7,654	8,145
Other assets	2,884	3,836
Total Assets	95,189	80,014
Liabilities		
Accounts payable	11,882	11,295
Accruals and provisions	2,203	2,538
Payments in advance from donors	31,629	23,396
Long-term liabilities	5,585	6,579
Total Liabilities	51,299	43,808
Net Assets		
Unrestricted		
Undesignated	18,716	10,934
Designated	21,113	21,113
Permanently Restricted	4,061	4,159
Total Net Assets	43,890	36,206
Total Liabilities & Net Assets	95,189	80,014



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)

Realigned research program structure

In 2016 the ICRISAT Research Program structure was realigned to facilitate greater agility and faster response to national needs and priorities (see below).

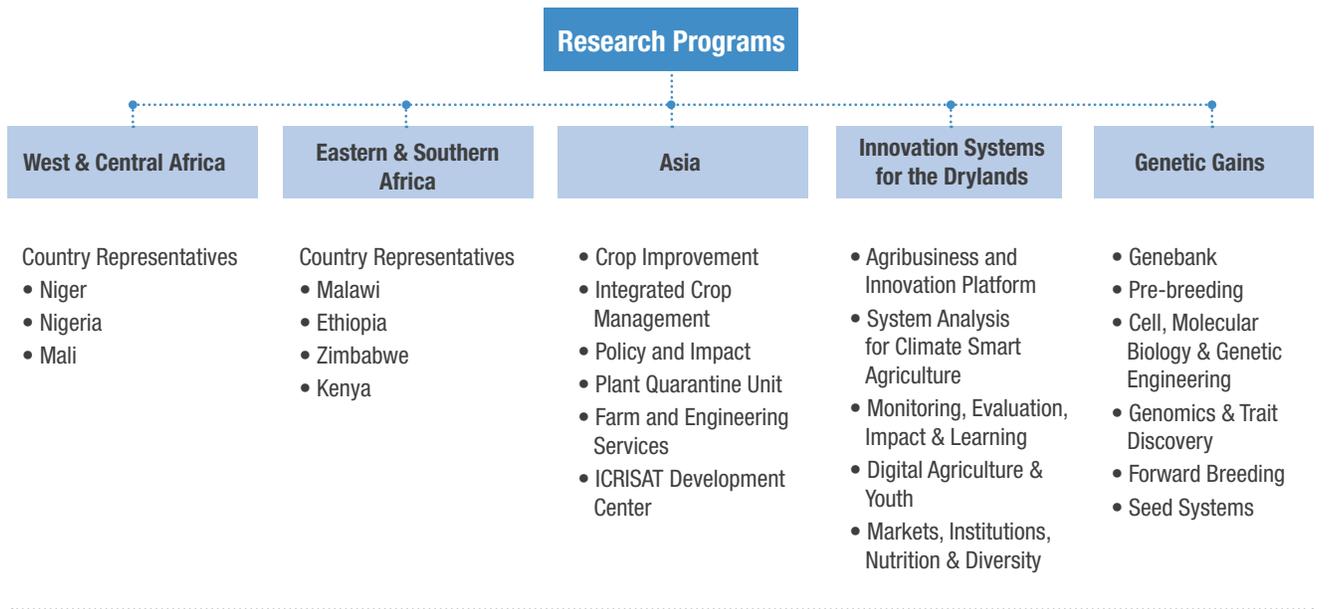


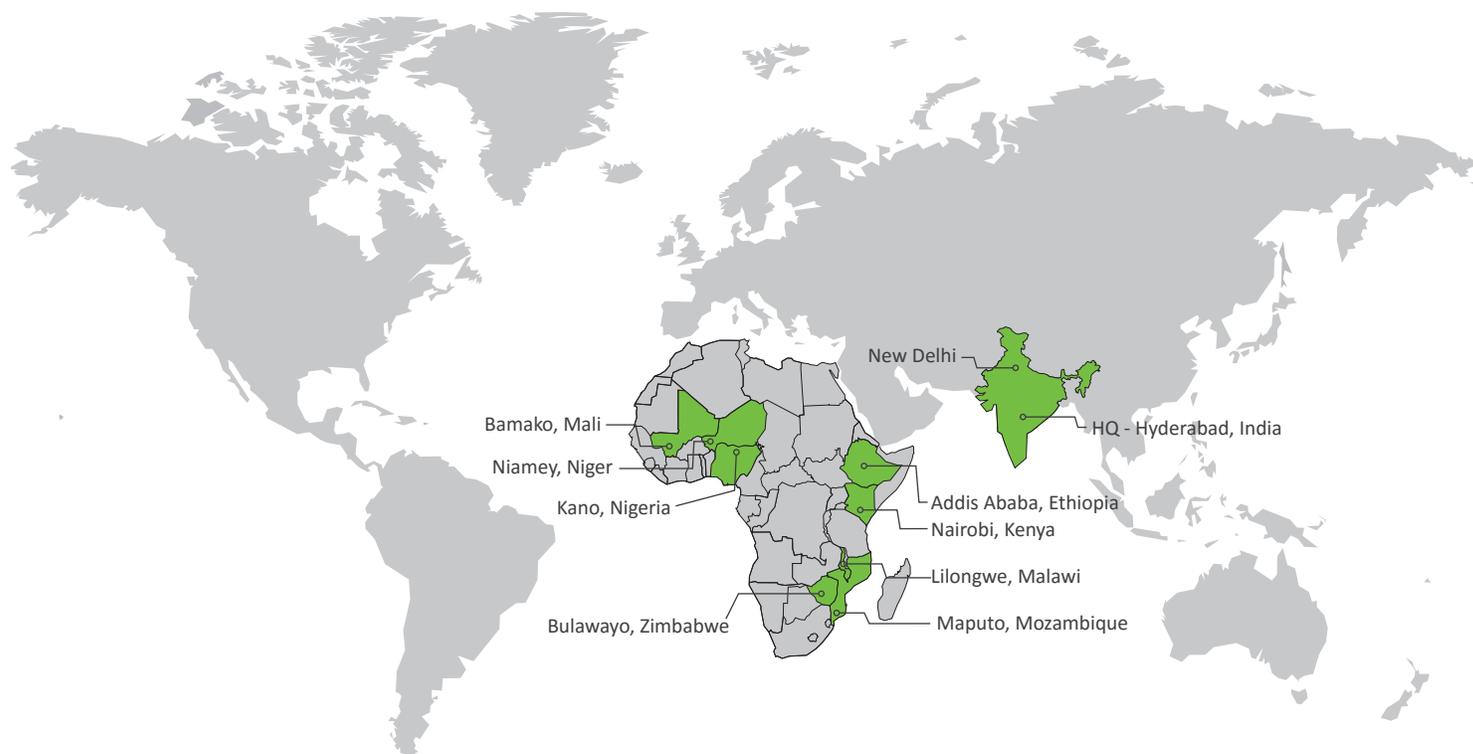
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ICRISAT locations



ICRISAT is a member of the CGIAR System Organization

We believe all **people** have a **right** to **nutritious food** and a **better livelihood**.

ICRISAT works in agricultural research for development across the drylands of Africa and Asia, making farming profitable for smallholder farmers while reducing malnutrition and environmental degradation.

We work across the entire value chain from developing new varieties to agribusiness and linking farmers to markets.

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ICRISAT appreciates the support of CGIAR investors to help overcome poverty, malnutrition and environmental degradation in the harshest dryland regions of the world. See <http://www.icrisat.org/icrisat-donors.htm> for full list of donors.



About ICRISAT: www.icrisat.org



ICRISAT's scientific information: [EXPLORE/it.icrisat.org](https://www.icrisat.org/explore/)



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