Pulse of ICRISAT
Celebrating the International Year of Pulses
Annual Report 2016
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 600 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

- **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
  - 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

- **Preventing environmental degradation**
  - Watersheds
    - 70,000 ha and 50,000 families covered in 15 pilot watersheds in India
    - 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

- **Coping with climate change**
  - Climate mapping of Telangana state completed
  - Modeling tools: New improved modeling tools for dryland crops leading to robust global forecasts

- **Wastewater treatment**
  - 27 locations piloted in 5 Indian states
  - 30-92% reduction in pollutants

**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 Nigeria

- **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

- **Coping with climate change**
  - Climate monitoring tools: New improved modeling tools for dryland crops leading to robust global forecasts
  - Upgraded CRAFT (CCAFS Regional Agricultural Forecasting Toolbox)

Our work contributes towards the following SDGs

**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 the private sector.**
Glimpses of ICRISAT’s research work on pulses over 45 years in Asia and Africa

Machine-harvestable variety
NBg 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
Africa: 41 chickpea varieties in 4 countries
Pigeonpea: 91 pigeonpea varieties/hybrids in 19 countries
Pigeonpea: 32 pigeonpea varieties/hybrids in 8 countries

Expansion of varieties based on ICRISAT-origin material

Genebank established at ICRISAT-India

1979: Our journey begins

1989: World’s shortest duration chickpea ICCV 2 (85-90 days)

1991: World’s first pigeonpea hybrid ICPH8

2008: Start of core and mini core germplasm collection

2016: Machine-harvestable chickpea

2009: Pigeonpea and chickpea draft genome sequences

Accessions deposited at Svalbard Global Seed Vault

1972: Our journey begins

Towards SDGs

Crop improvement (as of 2016)

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

Pigeonpea
Yield potential: 2.2-2.5 t/ha (varieties)
3.3-3.5 t/ha (hybrids)
<100 days to maturity

Seed samples distributed (as of 2016)
Chickpea
153,193 samples to 88 countries
75,335 samples to 113 countries
Pigeonpea

Subsets collection (as of 2016)
Chickpea
3000 Composite
1956 Core
211 Mini core
300 Reference sets
Pigeonpea
1000 Composite
1290 Core
146 Mini core
300 Reference sets

Impacts

India
Chickpea
Production: 130% increase
Growth: 48%
Pigeonpea
Production: 175% increase
Growth: 37%

Myanmar
Chickpea
Production: 39%
Growth: 48%
Pigeonpea
Production: 50%
Growth: 37%

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Some of the biggest global issues are:

- Poor diets
- Malnutrition to obesity
- Environmental issues
  - Climate change, water scarcity
  - 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**
- High protein
- High fiber
- Zero cholesterol
- Rich in vitamins and minerals

**GOOD FOR THE PLANET**
- Low carbon footprint
- Low water footprint
- Multiple uses
  - Food
  - Fodder
  - Fuel
  - Green manure
  - Fences/baskets
  - On-farm diversity

**GOOD FOR THE FARMER**
- Improved soil health
- Aids microbial diversity
- Breaks pest cycles
- Reduces nitrogen fertilizer use
- Yields and market potential
- New varieties and hybrids have 3 times more yield potential
- Added traits:
  - Early maturity
  - Tolerance to biotic and abiotic stresses
  - Climate smart

PULSES ARE GOOD...

**for you**

**NUTRI-DENSE**
- Helps manage:
  - Obesity
  - Diabetes
  - Celiac disease
  - Gluten sensitivity

**HEALTHY CHOICE**
- High protein
- High fiber
- Zero cholesterol
- Rich in vitamins and minerals

**BALANCED DIET**
- The UN World Food Programme includes 60gm of pulses in its typical food basket

**for the planet**

**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

**for the farmer**

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

**YIELD 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

Social media

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<th>Likes</th>
<th>Reactions, Comments &amp; Shares</th>
<th>Followers</th>
<th>Page views</th>
<th>Tweets, Retweets, Mentions, Likes</th>
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</tbody>
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Media coverage

- 851 national/regional news posts
- 15 global news placements

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
39 Books and journal volumes
30 Monographs
12 Policy briefs

53 Papers in other peer reviewed journals
9 Articles in international newsletters
64 Book chapters
124 Conference proceedings

Contribution to grant revenue by project size

- Large (>500K)
- Medium (100-500K)
- Small (<100K)
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)

Oluwande Muoyo
Nigeria

Rachel K Chikwamba
South Africa

Sissel Rogne
Norway

Wendy Umberger
Australia

David Bergvinson, Canada
Director General, ICRISAT

Nigel Wells Kerby
Britain

Paco Sereme
Burkina Faso

Paul C Anderson
USA

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

Top Ten Donors for 2016
(in US$ thousands)

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<tr>
<th>Donor</th>
<th>2016</th>
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<td>10,732</td>
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<tr>
<td>India</td>
<td>10,469</td>
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<td>CGIAR Centers</td>
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<td>United Kingdom</td>
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<td>Germany</td>
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<td>African Development Bank</td>
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ICRISAT

Balance Sheet

(in US$ thousands)

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<th>Category</th>
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<td>Assets</td>
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<tr>
<td>Cash and Cash equivalents</td>
<td>22,882</td>
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<tr>
<td>Investments</td>
<td>44,961</td>
<td>42,499</td>
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<tr>
<td>Accounts receivable</td>
<td>15,811</td>
<td>10,732</td>
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<tr>
<td>Inventories</td>
<td>702</td>
<td>783</td>
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<tr>
<td>Prepaid Expenses</td>
<td>295</td>
<td>277</td>
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<tr>
<td>Property and Equipment - net</td>
<td>7,654</td>
<td>8,145</td>
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<tr>
<td>Other assets</td>
<td>2,884</td>
<td>3,836</td>
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<tr>
<td><strong>Total Assets</strong></td>
<td>95,189</td>
<td>80,014</td>
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<tr>
<td>Liabilities</td>
<td></td>
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<tr>
<td>Accounts payable</td>
<td>11,882</td>
<td>11,295</td>
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<tr>
<td>Accruals and provisions</td>
<td>2,203</td>
<td>2,538</td>
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<tr>
<td>Payments in advance from donors</td>
<td>31,629</td>
<td>23,396</td>
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<tr>
<td>Long-term liabilities</td>
<td>5,585</td>
<td>6,579</td>
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<td><strong>Total Liabilities</strong></td>
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<td>43,808</td>
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<td>Net Assets</td>
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<td>Unrestricted</td>
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<tr>
<td>Undesignated</td>
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<td>Designated</td>
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<tr>
<td>Permanently Restricted</td>
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<tr>
<td><strong>Total Net Assets</strong></td>
<td>43,890</td>
<td>36,206</td>
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<tr>
<td><strong>Total Liabilities &amp; Net Assets</strong></td>
<td>95,189</td>
<td>80,014</td>
</tr>
</tbody>
</table>

Read the full report: annualreport2016.icrisat.org
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).

Country Representatives
- Niger
- Nigeria
- Mali

Country Representatives
- Malawi
- Ethiopia
- Zimbabwe
- Kenya

Crop Improvement
- Integrated Crop Management
- Policy and Impact
- Plant Quarantine Unit
- Farm and Engineering Services
- ICRISAT Development Center

Agribusiness and Innovation Platform
- System Analysis for Climate Smart Agriculture
- Monitoring, Evaluation, Impact & Learning
- Digital Agriculture & Youth
- Markets, Institutions, Nutrition & Diversity

Genebank
- Pre-breeding
- Cell, Molecular Biology & Genetic Engineering
- Genomics & Trait Discovery
- Forward Breeding
- Seed Systems

West & Central Africa

Eastern & Southern Africa

Asia

Innovation Systems for the Drylands

Genetic Gains

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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.

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](http://www.icrisat.org/icrisat-donors.htm) for full list of donors.

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