Review Meeting
Dryland Cereals 2012-2016

Dryland Cereals Highlights, 2012-2016

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http://drylandcereals.cgiar.org

A global alliance for improving food security, nutrition and economic growth for the world’s most vulnerable poor
PROGRAM BACKGROUND
STAPLE, CLIMATE-HARDY, MICRONUTRIENT-DENSE

WHY DRYLAND CEREALS?

- CLIMATE HARDY
- MICRONUTRIENT RICH
- CATERS TO 650+ M PEOPLE

DEMAND

40%

By 2020 demand for dryland cereals in target regions will increase by about 40%

- IFPRI IMPACT MODEL

YEAR 2020

USAGE

HUMAN FOOD (40%)
Human consumption contributes to 40% of farm gate value

EMERGING USES (10%)
Growing interest in the use of dryland crops for industrial uses contributes to 10% of farm gate value

ANIMAL FEED (50%)
Feed and fodder use contributes to 50% of farm gate value

Farm gate value of Dryland Cereals in LIFDCs is US$ 27.3 billion

TARGET CROPS AND COUNTRIES

BARLEY
- Ethiopia | India | Iran
- Kazakhstan | Morocco | Turkey

FINGER MILLET
- Ethiopia | Tanzania
- Uganda

PEARL MILLET
- Burkina Faso | India | Mali
- Niger | Nigeria | Senegal
- Sudan | Tanzania

SORGHUM
- Burkina Faso | Ethiopia | India
- Mali | Mozambique
- Nigeria | Sudan | Tanzania

RESEARCH PROGRAM ON Dryland Cereals
### CRP Timeline & 10-Year Target

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<tbody>
<tr>
<td>Launch</td>
<td>CRP Dir</td>
<td>IDOs</td>
<td>Gender Strategy</td>
<td>Ph I End Ext Start</td>
<td>Ph II Prep Start</td>
<td>Ph II Proposal Submit</td>
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**10-Year Targets:**

- 16% increase in dryland cereal farm-level production on at least **11.8 million ha** in Africa and Asia
- Improved technologies made available to **5.8 million smallholder households**
**Phase I Structure**

7 Product Lines; 5 Strategic Components

- **PL1. Sorghum for West Africa**
- **PL2. Pearl millet for East and West Africa**
- **PL3. Sorghum for East Africa**
- **PL4. Finger millet for East and Southern Africa**
- **PL5. Barley for Africa and Asia**
- **PL6. Pearl millet for East Africa and Asia**
- **PL7. Sorghum for South Asia**

**SUBSISTENCE** ← **SMALLHOLDER FARMERS** → **MARKET-ORIENTED**
Extension Phase Structure

Priority Setting & Adoption
- Demand analysis
- Gap/constraint analysis
- Priority setting
- Foresight planning
- Value Chains
- Policies

Improved Varieties & Hybrids
- Yield enhancement & stability
- Food, Feed & Fodder Quality
- Resistance to weeds, pests and diseases
- Phenotyping protocols

Integrated Crop Management
- Soil-Crop-Water management
- Micro-irrigation
- Conservation agriculture
- Adaptation to climate change

Seed Systems & Input Services
- Seed quality
- Seed multiplication
- Storage and distribution
- Access to inputs
- Outreach activities and services

Post-harvest Value & Output Markets
- Storage, processing & nutrition
- End-use orientation (food, feed, fodder, fuel, health foods/nutraceuticals)
- Market access

Gender Equity

Research Partnerships

Development Partnerships

1-3 years
- Farmers ‘000s

3-6 years
- Farmers 0’000s

6-9 years
- Farmers 00’000s

9-12 years
- Farmers 000’000s

10 October 2016
4-Year Achievements

**NUMBER OF NEW CULTIVARS RELEASED**
- 85 VARIETIES
- 34 HYBRIDS

**SEED PRODUCED / DISTRIBUTED**
- 14,386 metric tons

**34 MANAGEMENT PRACTICES DEMONSTRATED**

**AREA COVERED BY IMPROVED VARIETIES**
- 8,701,562 ha
  *conservative estimate

**TOTAL NUMBER OF PUBLICATIONS**
- 217
- ISI 102

**67,394 FARMERS AT FARMER FIELD DAYS**
- WOMEN: 18,372

**11,448 TRAINEES IN SHORT-DURATION TRAINING PROGRAMS**

**28 STUDENTS COMPLETED MASTER’S TRAINING**

**24 STUDENTS COMPLETED PHD TRAINING**
PROGRAM HIGHLIGHTS
PL1: Sorghum in West Africa

- Increase from 32 to 48% adoption of improved varieties in target zones over 3 years.
- 28 OPVs and 7 hybrids released (Mali, Nigeria)
- 60% higher yields from Integrated Striga management
- Micro-dosing reached >30,000 farmers
- Motorized seeder in Mali reducing labor time
PL2: Pearl Millet in West Africa

- 14 OPVs and 1 hybrid released (Niger, Nigeria and Mali)
- 59 to 113% yield advantage from micro-dosing
- 53% yield advantage by seed treatment
- 4085 metric tons seed distributed
- 80% larval mortality of head miner by release of parasitoid wasps
PL3: Sorghum in Eastern and Southern Africa

- Farmers linked to grain markets through aggregator model
  - Grain yield increased from **0.8 to 2.0 t/ha**
  - >8000 farmers marketing grain to malting industry

- **9 OPVs and 4 hybrids** released (Ethiopia, Kenya, Tanzania)

- Productive **sorghum-cowpea or sorghum-green gram systems**

- New end uses including **sorghum as fish feed**
PL4: Finger Millet for Eastern & Southern Africa

- > 50% area now under improved varieties
- Average **grain yield** increase from **0.6 to 1.2 t/ha** in target areas; highest in Tanzania
- **13 varieties** released (Ethiopia, Kenya, Tanzania, Uganda)
- **25-40% yield increase** by microdosing
- **252 women farmers** trained in QDS production
**PL5: Barley for Africa and Asia**

- **23 varieties released** in 10 countries
- **2224 tons seed** distributed
- **56,000 farm households** growing varieties released during the CRP period
- **11,960 ha** covered by improved varieties
- Malt barley production technology with refined fertilizer dose and seed rate in India
- Conservation agriculture and sprinkler irrigation in Morocco
- Double cropping of barley after potato in Ethiopian highlands
PL6: Pearl Millet for South Asia and Eastern Africa

- ~60% area of pearl millet hybrids in India are based on ICRISAT-bred hybrid parents
- 20 hybrids released (India)
- High-iron pearl millet, Dhanashakti, released in India (with A4NH)
- Biofortified cultivars up-scaled: 50,000 ha

- 71 ppm Fe density
  over leading check, ICTP 8203

- 2.21 t/ha grain
  over leading check, ICTP 8203
PL7: Sorghum for South Asia

- **28 - 35% productivity increases** over baseline in project areas
- **Increase from 32 – 90% and from 12 to 46% in area** under improve varieties in two project areas in Maharashtra
- Seed consortium providing **seed to 150,000 farmers** annually
- **33-44 % enhanced income** in project areas
New Technologies for Discovery Research

- CRISPR/Cas9 based genome editing technologies customized for sorghum; pre-integrated Cas9 lines developed
- CENH3-mediated haploid induction for doubled haploidy in sorghum
- *Tnt1* insertional mutant lines in sorghum generated with random insertions for forward and reverse genetics
Empowering Women

Two products developed by women entrepreneur groups with ICRISAT Agribusiness and Innovation Platform released to market in 2014

- ‘Rigdam’ Sorghum Crispies by Ind-Millet Foods
- ‘Navya Smart Brkfast’ by Mathesis Engineers Pvt Ltd
Partnerships

Public-Private Partnerships and the HPRC Model

*Contribution of the Hybrid Parent Research Consortium (HPRC)*

- **60% of 110 pearl millet hybrids** sold in India are based on ICRISAT-bred lines; 50 in the pipeline.
- **56% of 55 sorghum hybrids** sold in India are based on ICRISAT-bred lines; 8 in the pipeline.
# DRYLAND CEREAL SCHOLARSHIPS

Administered by: **APAARI, RUFORUM, WACCI**  
Also through **CRP directly (Track B)**

**Total recipients currently:** 21 (7 women, 14 men)

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<tr>
<th>Administering Organization</th>
<th>Disbursements</th>
<th>Total</th>
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<tr>
<td>APAARI</td>
<td>Ph D (partial): 3 Women, 3 Men</td>
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<tr>
<td>RUFORUM</td>
<td>Ph D: 2 Men; Post-doc: 2 Women; Interns: 1 Woman, 1 Man</td>
<td>6</td>
</tr>
<tr>
<td>WACCI</td>
<td>Ph D (partial): 1 Woman; 2 Men</td>
<td>3</td>
</tr>
<tr>
<td>TRACK B</td>
<td>Masters (partial): 1 Man; Ph D (partial): 3 Men</td>
<td>4</td>
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DCL eATLAS Launched

Geospatial data, assessments of poverty, drought, heat and other information related to crop improvement and management.
Monitoring & Evaluation Platform

MEL ONLINE TOOLS
Dryland Cereals and Grain Legumes CRPs

Enrico Bonaiuti
Research Program Coordinator
CRP on Dryland Systems

DC&GL MEL configuration, ICRISAT
Hyderabad, India | 1 September 2016
Lessons Learned

- First four years of a massive reform process: bound to be a learning phase!

- CRPs offered:
  - opportunities for co-ordination and streamlining research processes, and monitoring
  - opportunities for cross-learning of best practices, and development of Communities of Practices
  - improved inter-Center exposure, learning

- Cross-region, cross-Center collaboration just starting; requires conscious effort

- Mainstreaming gender research requires time and education

- Scaling on some fronts/regions remain a challenge

- Budget stability
A global alliance for improving food security, nutrition and economic growth for the world’s most vulnerable poor

Thank you!

Esther

Acar

SK

Eric

Zewdie

Malick

Henry

Ashok

Alphonse

Kiran

Girish

Jummai

Ramesh

and public and private institutes and organizations, governments, and farmers worldwide

CGIAR

RESEARCH PROGRAM ON
Dryland Cereals

ICRISAT

International Crops Research Institute for the Semi-Arid Tropics

ICARDA

Science for Better Livelihoods in Dry Areas

A global alliance for improving food security, nutrition and economic growth for the world’s most vulnerable poor