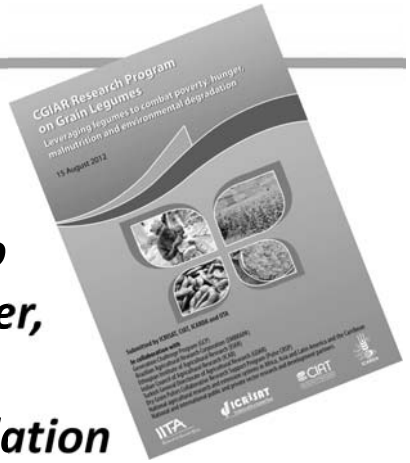
CRP 3.5

GRAIN LEGUMES

Leveraging legumes to combat poverty, hunger, malnutrition and environmental degradation



RESEARCH PROGRAM ON Grain Legumes — Led by ICRISAT — In partnership with CIAT, ICARDA, IITA and public and private institutes and organizations, governments, and farmers worldwide

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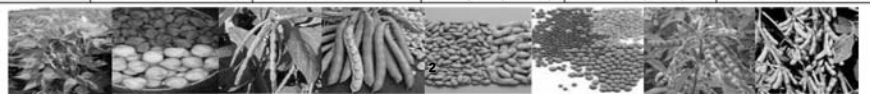
Priority Crops and Regions

Area	Number of Poor (<US$2 per day)				Total Area (M hectares)
	HIGH (>750million)	MEDIUM (250-750 million)	LOW (<250 million)		
	S Asia (1.3 billion)	SS Africa (539million)	CWANA (64 million)	Latin America (55 million)	
HIGH (>0.5M hectares)	Soybean, oil (11.4) **Chickpea (9.0)** **Groundnut (7.9)** Mung bean (5.0) **Pigeonpea (4.2)** **Lentil (1.7)** Pea (0.78)	**Groundnut (10.8)** **Cowpea (10.4)** **Bean, common (5.8)** **Soybean (1.4)** **Faba bean (0.50)** **Pigeonpea (0.50)**	**Chickpea (1.2)** **Lentil (0.6)**	Soybean, oil (4.4) **Bean, common (2.7)**	**Groundnut (19.02)** **Chickpea (10.71)** **Cowpea (10.62)** **Bean, common (8.75)** Mung bean (5.00) **Pigeonpea (4.74)** **Lentil (2.43)** **Soybean (1.58)** Pea (1.47) **Faba bean (1.04)**
LOW (<0.5M hectares)	Cowpea (0.17)	Pea (0.45) Chickpea (0.42) Bambara nut (0.12) Lentil (0.11) Pea (0.04)	Faba bean (0.4) Bean, common (0.25) Soybean (0.18) Groundnut (0.13) Pea (0.13) Cowpea (<0.01)	Groundnut (0.19) Faba bean (0.14) Chickpea (0.09) Pea (0.07) Cowpea (0.04) Pigeonpea (0.04) Lentil (0.02)	



Bean Chickpea Cowpea Faba bean Groundnut Lentil Pigeonpea Soybean

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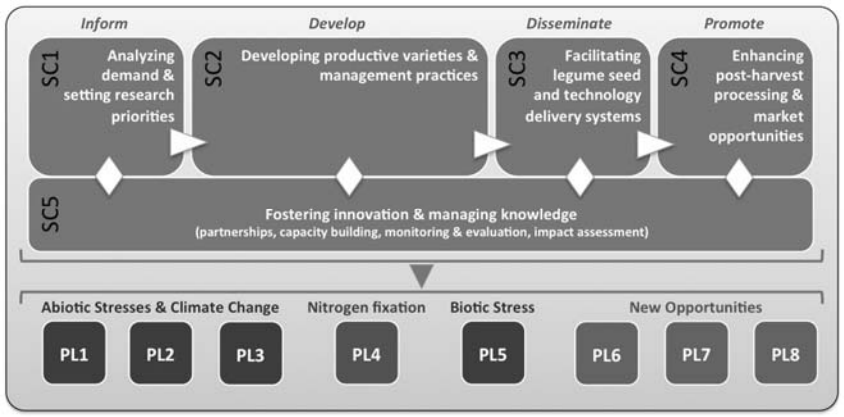
Strategic Components deliver Product Lines



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Abiotic stresses

- **PL1** – **Drought** and **low-phosphorus** tolerant **common bean, cowpea and soybean**

	Legume/Crop								Target/Region				
	Bean	Chickpea	Cowpea	Faba bean	Groundnut	Lentil	Pigeonpea	Soybean	LAC	ESA	WCA	CWANA	SSEA
Productivity Constraints													
Abiotic													
Drought	14	21	18	18	14	16	18	23	20	16	17	17	16
Heat	7	7	5	0	5	8	0	5	13	5	6	8	7
Waterlogging, Salinity	12	13	0	0	0	10	0	0	0	9	0	11	10
Threats													
Climate Change Impacts	2.7	2.7	2.4	2.0	2.0	2.9	2.0	2.1	3.0	2.4	2.4	3.0	2.8
Soil Fertility													
pH, phosphorus, micro-nutrients	30	9	17	12	13	11	12	24	28	17	18	8	12

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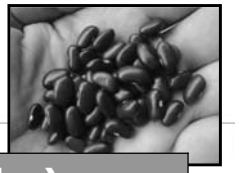
Drought Tolerance improves Yield Potential



	Yield (Kg / ha)	
	Drought	Irrigated
SCR 2	2246	3744
SCR 3	2064	3859
SCR 4	2027	3704
SCR 16	1970	4161
SER 16 (TOL. CHECK)	1988	3422
T. CANELA (COMM. CH.)	1427	2887
LSD (0.05)	516	473

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Soil Characteristics

	Depth. - cm	pH	% O.M.	Al - meq/ 100g	K - meq/ 100g	Ca - meq/ 100g	Mg - meq/ 100g	Σ Bases	% Sat Al	Ca/ Mg	P ppm	Zn ppm	B ppm	CEC - meq/ 100g
Crítical level		< 5.5 > 6.5	1,7 a 2,6	> 1.0	< 0.15	< 4.5	< 2.0	1-5	>10 S. Min; > 50 S. Org	4,0	< 15	< 0.8	0,4 a 0.6	
Lote C-4-11	10	**5,31**	5,34	0,30	0,26	7,26	2,49	10,3	2,9	2,9	**6,5**	5,7	0,7	16,1

BF 17294-05 (SER 118 x RCB 593)F1 X (BFS 29 x ALB 67)

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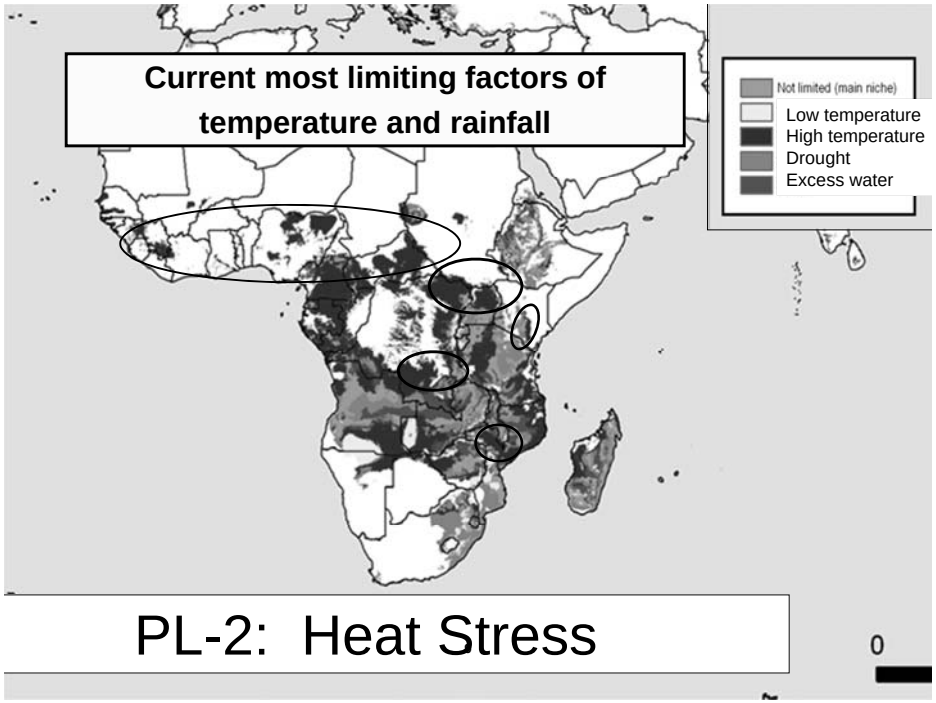
Abiotic stresses

- **PL2** – **Heat-tolerant chickpea, common bean**, **faba bean** and **lentil**

	Legume/Crop								Target/Region				
	Bean	Chickpea	Cowpea	Faba bean	Groundnut	Lentil	Pigeonpea	Soybean	LAC	ESA	WCA	CWANA	SSEA
Productivity/Constraints													
Abiotic													
Drought	14	21	18	18	14	16	18	23	20	16	17	17	16
Heat	7	7	5	0	5	8	0	5	13	5	6	8	7
Waterlogging, salinity	12	13	0	0	0	10	0	0	0	9	0	11	10
Threats													
Climate change impacts	2.7	2.7	2.4	2.0	2.0	2.9	2.0	2.1	3.0	2.4	2.4	3.0	2.8
Soil Fertility													
pH, phosphorus, micro-nutrients	30	9	17	12	13	11	12	24	28	17	18	8	12



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SEF lines trial – Armero, Tolima, Colombia

SEF 14 **SEF 43** **SEF 60**
Pollen viability: 83.54%

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Nitrogen fixation

- **PL4** – High **nitrogen-fixing chickpea, common bean**, **faba bean** and **soybean**

	Legume Crop								Target Region				
	Bean	Chickpea	Cowpea	Faba bean	Groundnut	Lentil	Pigeonpea	Soybean	LAC	ESA	WCA	CWANA	SSEA
Productivity Constraints													
Soil Fertility													
pH, phosphorus, micro-nutrients	30	9	17	12	13	11	12	24	28	17	18	8	12

Two main opportunities in BEANS
- Climbing beans
- Stress tolerant beans

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Biotic stresses

- **PL5** – **Insect-smart chickpea, cowpea** and **pigeonpea** production systems

	Legume Crop								Target Region				
	Bean	Chickpea	Cowpea	Faba bean	Groundnut	Lentil	Pigeonpea	Soybean	LAC	ESA	WCA	CWANA	SSEA
Productivity Constraints													
Biotic													
Insect pests	12	19	37	34	16	6	34	8	9	19	20	13	16
Diseases	17	23	18	28	44	25	28	35	20	26	33	25	26
Weeds	8	7	5	8	8	24	8	5	10	7	6	17	13

Close cooperation with Barry Pittendrigh's project

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CRP4 on Agriculture for Health and Nutrition (A4NH)

- The home of HarvestPlus (Biofortication)
- Goal: Improvement of major crops as sources of micronutrients (iron, zinc, vitamin A)
- Beans:
  - one of the original crops (since 1994)
  - Increased concentration from ~50 ppm to 90+ ppm
  - Especially successful with climbing beans

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Refocusing the CGIAR on Research for *Development*

SLOs: System Level Outcomes

- Poverty reduction
- Food security
- Nutrition and health
- Environmental protection

↑

IDOs: Intermediate Development Outcomes

↑

Research outcomes

↑

Research outputs

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Common CRP IDOs

1. **Improved productivity** in pro-poor food systems
2. **Increased and stable access to food** commodities by rural and urban poor
3. **Increased consumption** of safe, nutritious foods by the poor, especially among nutritionally vulnerable women and children
4. **Increased and more equitable income** from agricultural and natural resource management and environmental services earned by low income value chain actors
5. **Increased control of assets, inputs, decision-making and benefits by women and other marginalized groups**
6. **Increased capacity to innovate** within low income and vulnerable rural communities allowing them to seize new opportunities to improve livelihoods and increase household income

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Common CRP IDOs

7. **Increased capacity to adapt to environmental and economic variability, shocks and longer term changes** in low income communities
8. **Additional policies** supporting sustainable and equitable agricultural and natural resource management developed and adopted by agricultural, conservation and development organizations, national governments and international bodies
9. **Minimized adverse environmental effects** of increased production and intensification
10. **Greater resilience** of agricultural/forest/water based/mixed crop livestock, aquatic systems through enhanced ecosystem services
11. **Increased carbon sequestration and reduction of greenhouse gases** through improved agriculture and natural resources management

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Grain Legumes – IDOs

- **Improved productivity** of pro-poor farming systems, especially among smallholder farmers
- **Increased and more equitable income** from grain legumes by low income value chain actors, especially women
- **Improved and stable access** to grain legumes by urban and rural poor
- **Increased consumption of healthy** grain legumes and products by the poor for a more balanced and nutritious diet, especially among nutritionally vulnerable women and children
- **Minimized adverse environmental effects** of increased production and intensification of grain legumes

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Is there anything *new* in this?

- Metrics!
- Accountability
- Credible documentation

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Thank you !

www.GrainLegumes.cgiar.org