Research design, innovation and theory of change: CGIAR Research Program on Roots, Tubers and Bananas

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CGIAR

RESEARCH PROGRAM ON Roots, Tubers and Bananas

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Program Objectives

RTB is working globally to harness the untapped potential of those crops to improve food security, nutrition, income, climate change resilience and gender equity of smallholders


Banana Plantain


Cassava


Potato


Sweetpotato


Yam


Other R&T

LED BY CIP INTERNATIONAL POTATO CENTER A CGIAR RESEARCH CENTER

Bioversity International

CIAT Centro Internacional de Agricultura Tropical International Center for Tropical Agriculture

cirad AGRICULTURAL RESEARCH FOR DEVELOPMENT

IITA Transforming African Agriculture

Program structure: Flagship Projects (FP)

DISCOVERY	DELIVERY		
FP1: Enhanced genetic resources	**FP2:** Productive varieties & quality seed	**FP3:** Resilient crops	**FP4:** Nutritious food & added value
DI1.1 Breeding CoP	**CC2.1** Access to quality seeds/varieties	**CC3.1** (Pest/disease management	**CC4.1** Post-harvest innovation
DI1.2 Next generation breeding	**BA2.2** User preferred banana cultivars/hybrids	**CC3.2** Crop production systems	**CA4.2** Cassava processing
DI1.3 Game changing traits	**CA2.3** Added value cassava varieties	**BA3.3** Banana fungal & bacterial wilts (Foc/BXW)	**CA4.3** Biofortified cassava
DI1.4 Genetic diversity	**PO2.4** Seed potato for Africa	**BA3.4** Banana viral diseases (BBTD)	**SW4.4** Nutritious sweetpotato
Single crop/problem	**PO2.5** Potato varieties for Asia	**CA3.5** Cassava biological constraints, Asia/Americas	
	SW2.6 User preferred sweetpotato varieties	**CA3.6** Cassava biological threats, Africa	
	YA2.7 Quality seed yam		

Multi-crop

Glue!

FP 5: Improved livelihoods at scale

CC5.1 Foresight and impact assessment

CC5.2 Sustainable intensification and diversification for improved resilience, nutrition and income

CC5.3 Gender-equitable development and youth employment

CC5.4 Scaling RTB agri-food system innovations

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Research design: where is glue?

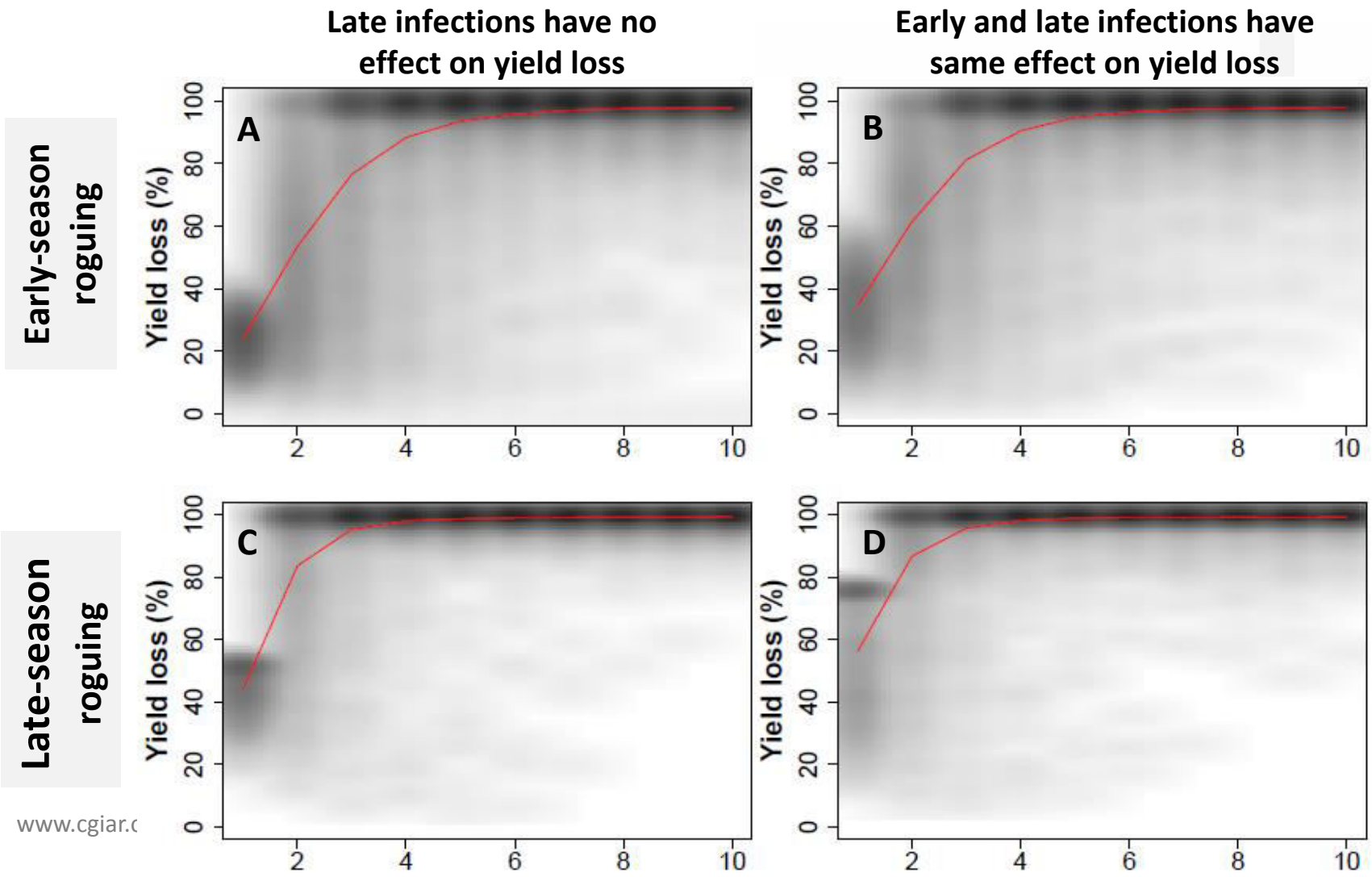
RTB crops share:

- **Genetic complexity (> grains)**
- **Vegetative propagation, similar seed systems**
- **Perishability, bulkiness and post harvest/value chain options**

Research design: seed systems

- Yield loss viruses and seed system major shared constraint
- Knowledge gap on actual losses and degeneration
- Common framework: banana, cassava, potato, sweetpotato, yam

Research design: seed systems



Research design: seed systems

JOURNAL OF CROP IMPROVEMENT
https://doi.org/10.1080/15427528.2018.1476998

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Understanding root, tuber, and banana seed systems and coordination breakdown: a multi-stakeholder framework

Jeffery W. Bentley[a], Jorge Andrade-Piedra[b], Paul Demo[c], Beloved Dzomeku[d], Kim Jacobsen[e], Enoch Kikulwe[f], Peter Kromann[g], P. Lava Kumar[h], Margaret McEwan[i], Netsayi Mudege[j], Kwame Ogero[k], Richardson Okechukwu[l], Ricardo Orrego[b], Bernardo Ospina[m], Louise Sperling[n], Stephen Walsh[o], and Graham Thiele[p]

Innovation

1) Identify ready to scale

INNOVATIONS

2) Assess their

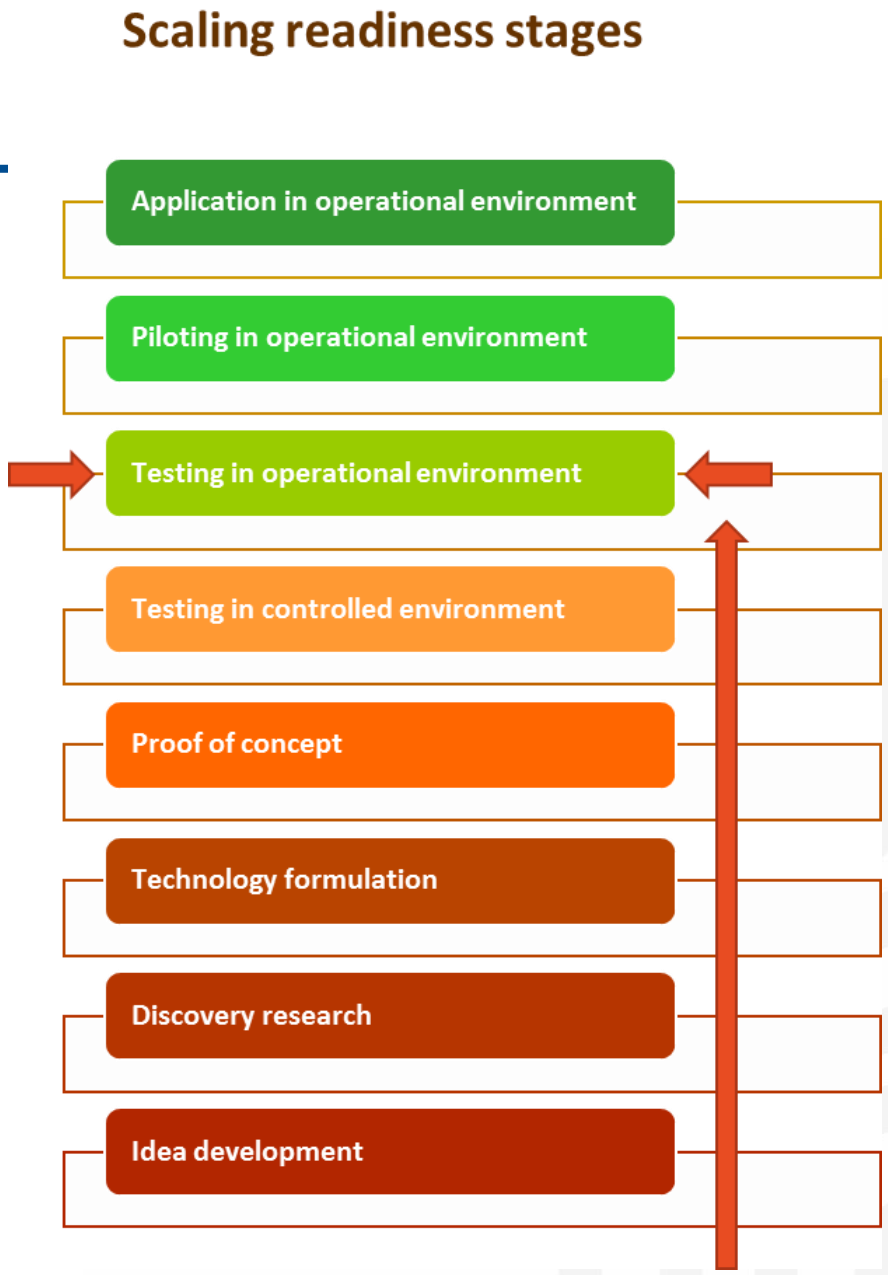
CAPACITY OF GENERATING IMPACTS

3) Strengthen

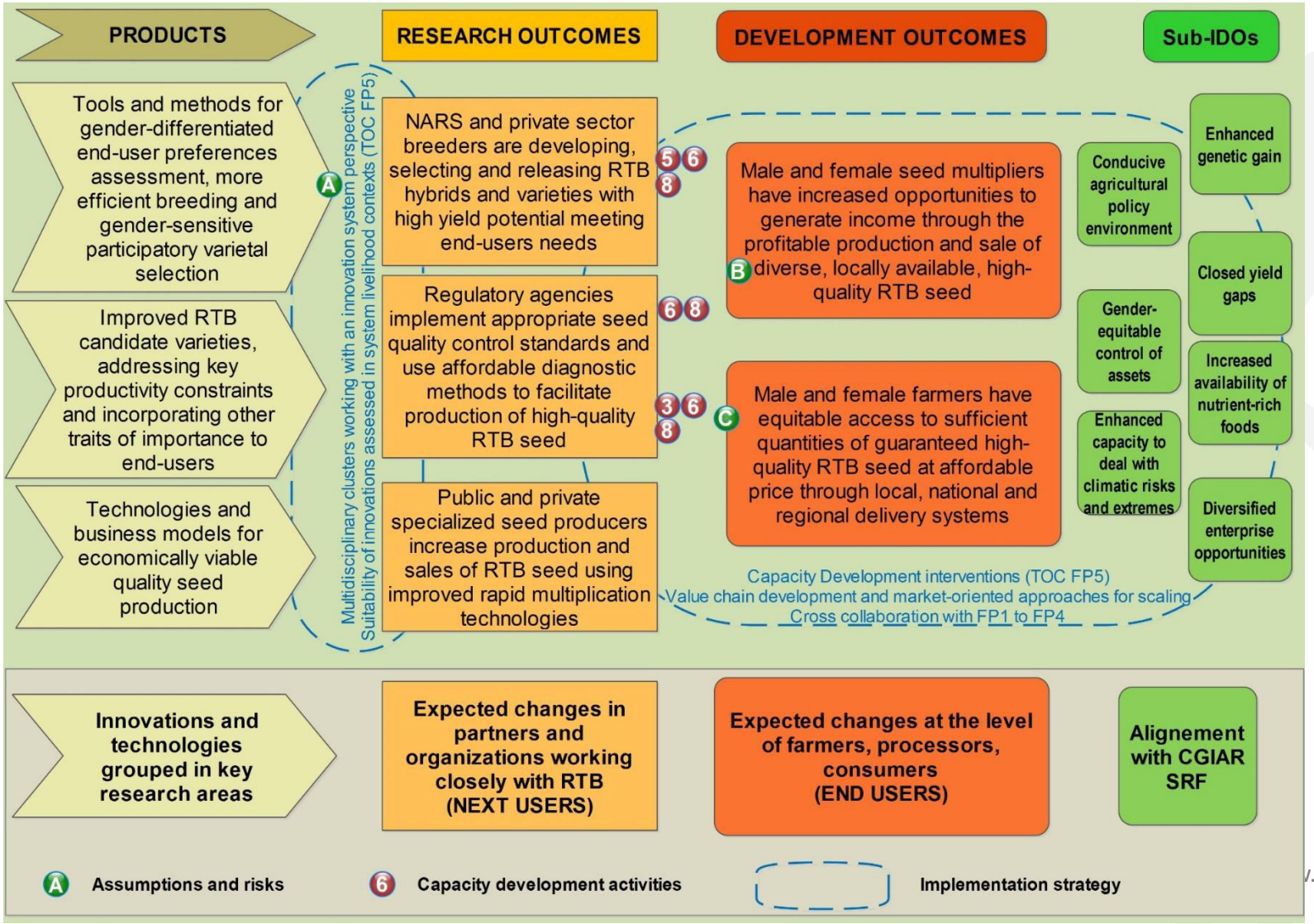
SCALING PARTNERSHIPS

4) Learn and adapt effective

SCALING STRATEGIES



Theory of change: flagship varieties/seed



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Theory of change: measurement

RTB-FP1- Enhanced genetic resources - Luis Augusto Becerra Lopez-lavalle - Budget: $3,309,319 - *See Overview* - 2017-11

RTB-FP2- Productive varieties and quality seed - Elmar Schulte-Geldermann - Budget: $4,110,387 - *See Overview* - 2017-11

Flagship outcomes & indicators

RTB-CC2.1- Quality seeds & access to improved varieties - Jorge Andrade - Budget: $1,649,822 - *See Overview* - 2017-11-0

Cluster outcomes & indicators

RTB-CC2.1.1- Evidence-based systematic procedure to develop reliable, robust, profitable and sustainable seed systems - Sarah Kasyoka - Total budget: $0 - 2017-11-02

RTB-CC2.1.2- Modelling and theoretical analyses to improve understanding, design and evaluation of RTB seed systems - Sarah Kasyoka - Total budget: $0 - 2017-11-02

RTB-CC2.1.3- Improving seed system efficiency: on-farm and commercial seed production - Sarah Kasyoka - Total budget: $0 - 2017-11-02

Output	Type	Output Responsible	Deliverable	Crops	Reporting Scientist	Center	Type	Delivery date	Files
Tools for testing and improving on farm seed management techniques 2017-11-02		L: Jorge Andrade	-	-	-	-	-	-	-
			7770 - SOCIO-CULTURAL AND INSTITUTIONAL ARRANGEMENTS INFLUENCING THE UPTAKE OF SEED SYSTEM TECHNOLOGIES: THE CASE OF TISSUE CULTURE FOR CONTROL OF BXW IN CENTRAL UGANDA 2017-11-02	Multi RTB crops,	Enoch Kikulwe	Bioversity	Report/Working Paper	2017-02-15	Type:Report/Working Paper Date:2017-02-15
Tools for testing and improving commercial seed production techniques 2017-11-02		L: Jorge Andrade	6273 - Review of existing on-farm and commercial seed multiplication techniques in RTB crops 2017-11-02	Multi RTB crops, Multi RTB crops	Antoine Kalinganire	ICRAF	Report/Working Paper	2017-12-31	-

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CRP Program Impact

1. Single planning & reporting framework around theory of change
2. Achieved true collaboration around “glue”
3. Teamed up approach in responding to opportunities and threats
4. Critical mass for new initiatives eg scaling readiness
5. Joint research outputs (publications) and outcomes
6. **Enhanced impact in longer run**

RTB and China

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- CIP-China Center for Asia-Pacific Research Campus Yanqing, north of Beijing
- Next step: long history collaboration CIP and CAAS
- Laboratory building capacity 150+ scientists, meeting and teaching building, and state-of-the-art greenhouses.
  - GAU: Water stress memory
  - CAU: Molecular control of root development in sweet potato
  - CAAS: Molecular markers for traits of potato tuber quality
  - Chongqing: Novel methods of Fusarium wilt control in potato

RTB and China

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- Anti-infection mechanism to *Fusarium oxysporum* f.sp. *cubense* Tropical Race4 from wild banana Pahang (NSFC31560505).
- Elucidating mechanisms of banana-Fusarium interactions via small RNA regulation and molecular design for wilt-resistant breeding (CATAS-Bioversity Joint project; NSFC3161101316)

CGIAR
Science for a food-secure future

Thank you

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Xiè xiè dà jiā de guān zhù