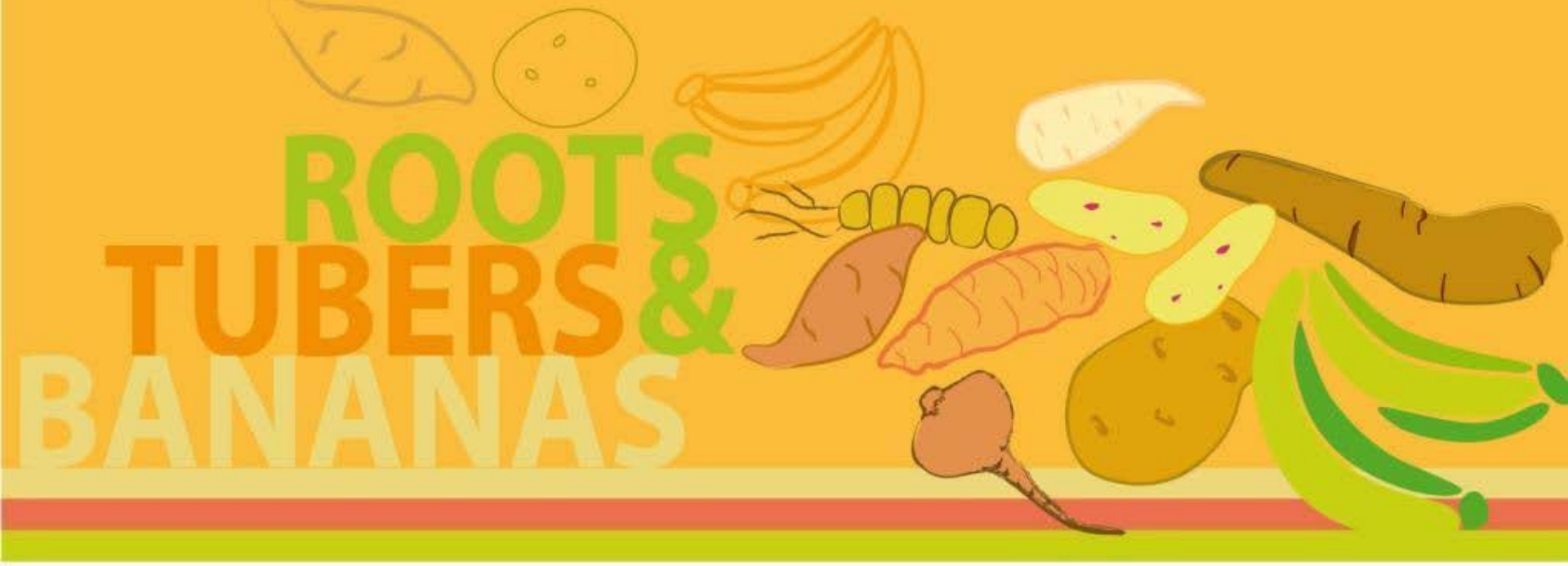


Can RTB seed systems learn from each other?

Jorge Andrade,
Graham Thiele et al.

CGIAR Research Program on Roots, Tubers and Bananas

Led by

CIP INTERNATIONAL POTATO CENTER
A member of the CGIAR Consortium

7th Annual SPHI Technical and Steering Committee Meeting
ILRI Campus, Addis Ababa, Ethiopia
8 Oct 2016

Background

- Planting material (*seed*) RTB crops:
  - *Accumulation of diseases leading to degeneration*
  - *Relatively low multiplication rates*
  - *Perishability, bulkiness*
- Farmer-based seed systems 95+% of planting materials

DRC, Photo by Carl Walsh. Great Lakes Cassava Initiative

Background

- Challenges:
  - *Improve quality & access*
  - *Improve dissemination of new varieties*
  - *Commercially sustainable*

- Analysis gender blind

- Many interventions, little systematic learning

- Can RTB seed systems learn from each other?

Partners


CENTRO INTERNACIONAL DE LA PAPA
CIP
A member of the
CGIAR Consortium

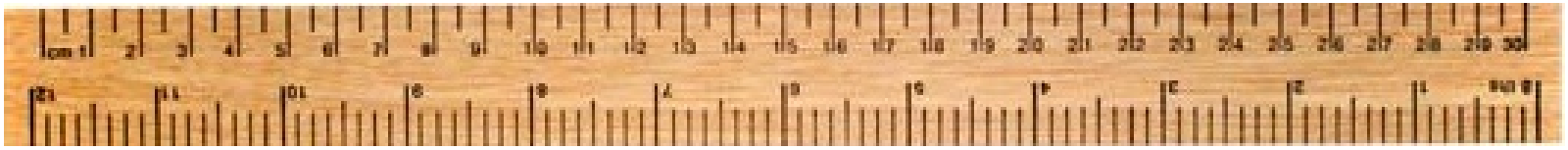

WAGENINGEN UR
For quality of life

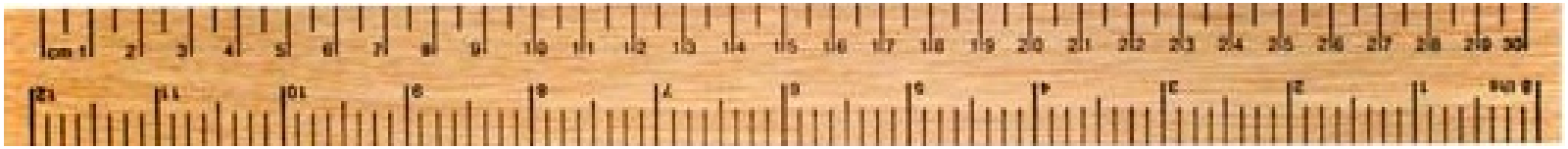

UF
UNIVERSITY of
FLORIDA

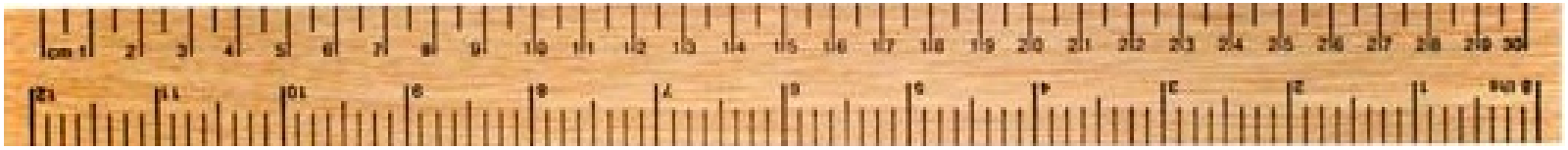

IITA
Research to Nourish Africa


CIAT
Centro Internacional de Agricultura Tropical
International Center for Tropical Agriculture
Consultative Group on International Agricultural Research


Bioversity
International







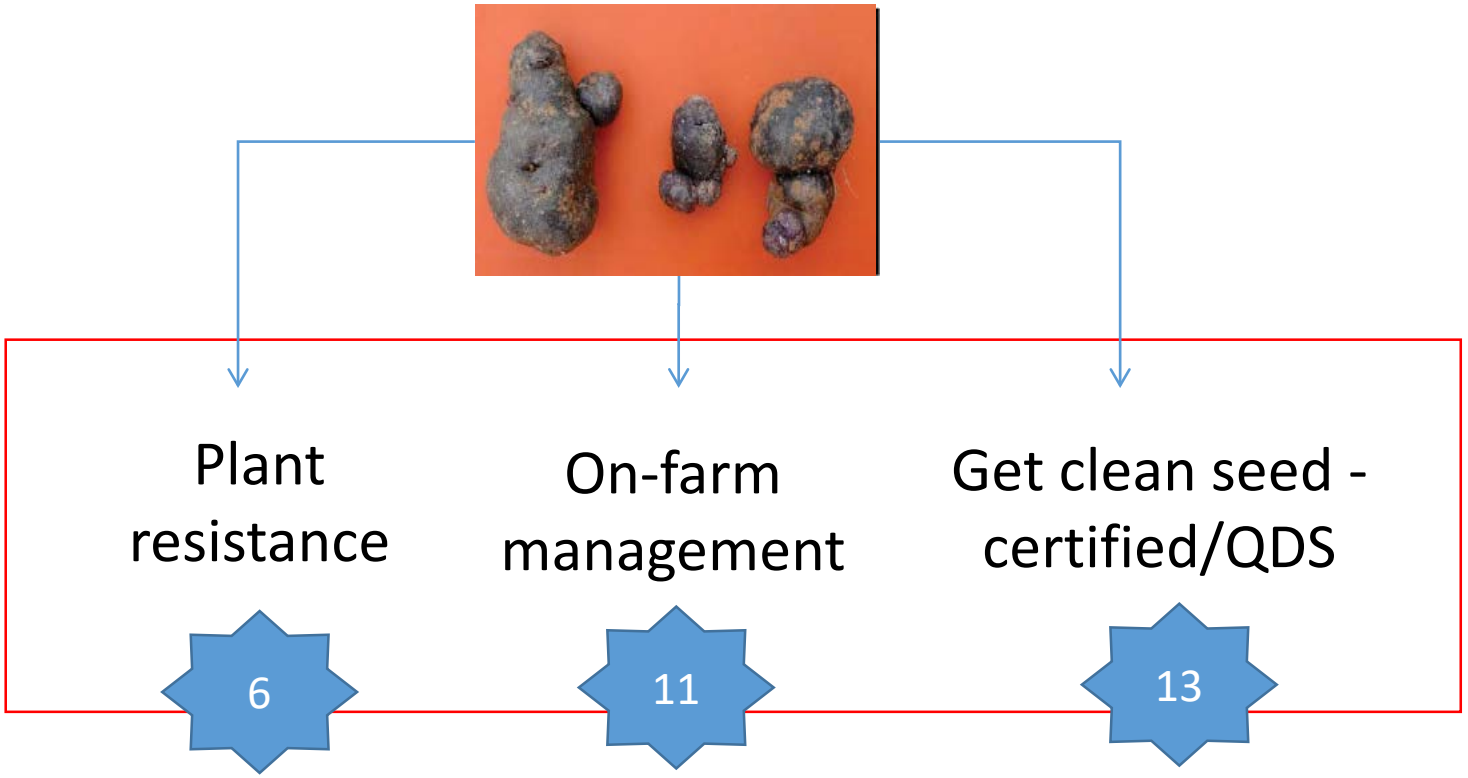
1. Stakeholder framework – seed security

Stakeholder	Availability/ supply	Accessibility			Quality, variety (incl. biodiversity)	Health, genetic purity, physiological age & physical quality
		Delivery channel features	Affordability/ profitability issues	Info to create awareness & demand		
Policy makers					Allowed the project to continue	
National research		Favored eradication of diseased plants, re-planting				
International research	IITA & CRS project	Got suckers from disease-free areas	Macro-propagation was slow		Susceptible, commercial varieties	The technology had problems
Traders (local markets)	Not involved					
Private seed sector	Not involved					
Farmer organizations		Propagation sited in communities	A technique too tedious for farmers			Farmers found other ways to get healthy seed
NGOs	CRS was a key partner	40 organizations involved				
Private sector processors				Keen market demand for the fruit		
Seed users			May have been little impacted			

Crop and country	Leading institution	Main focus
1. Potato, Ecuador	CIP	A local farmers' organization produces quality declared potato seed for accessing high value markets
2. Potato, Peru	CIP	Clean potato seed with funding from a mining company
3. Yam, Nigeria	IITA	Researchers improve an on-farm technique for planting more land with less seed yam
4. Sweetpotato, Tanzania	CIP	Delivering varieties, producing clean seed off-farm, managing vines on-farm, for nutrition and other outcomes
5. Sweetpotato, Rwanda	CIP	Similar to case above, with additional pull from a sweetpotato buyer
6. Potato, Kenya	CIP	Disseminate new varieties and clean seed with rationalized regulations permitting quality declared seed
7.Cassava, Nicaragua	CIAT	New varieties for cassava awaken government and farmer interest after a lull of several years, in response to demand by agro-industry
8. Potato, Malawi	CIP	Gender and seed. Men have better access to land and seed, but a new project fails both genders equally
9. Cassava, W&C Africa	IITA	Disseminating new, disease-resistant varieties in seven countries
10. Banana, East Africa	IITA	Helping to establish nurseries where communities can harden tissue cultured bananas to sell to farmers
11. Banana, East Africa	Bioversity	A new multiplication technology and training to help farmers manage a new crop disease

Lessons case studies (13):

Feasability of integrated seed health strategy



Thomas-Sharma et al., 2015

Lessons case studies (13)

- Theory of change: smallholders specialize in producing quality planting materials & become entrepreneurial suppliers
  - *Few case studies explicitly estimated farmer demand for clean seed*
- Seed systems projects need action-research:
  - *formulation of explicit assumptions*
  - *plan for collecting information*
- Seed purchase linked to ware market:
  - *esp. if industry demands a new variety*

2. Seed degeneration

Yam, nematodes

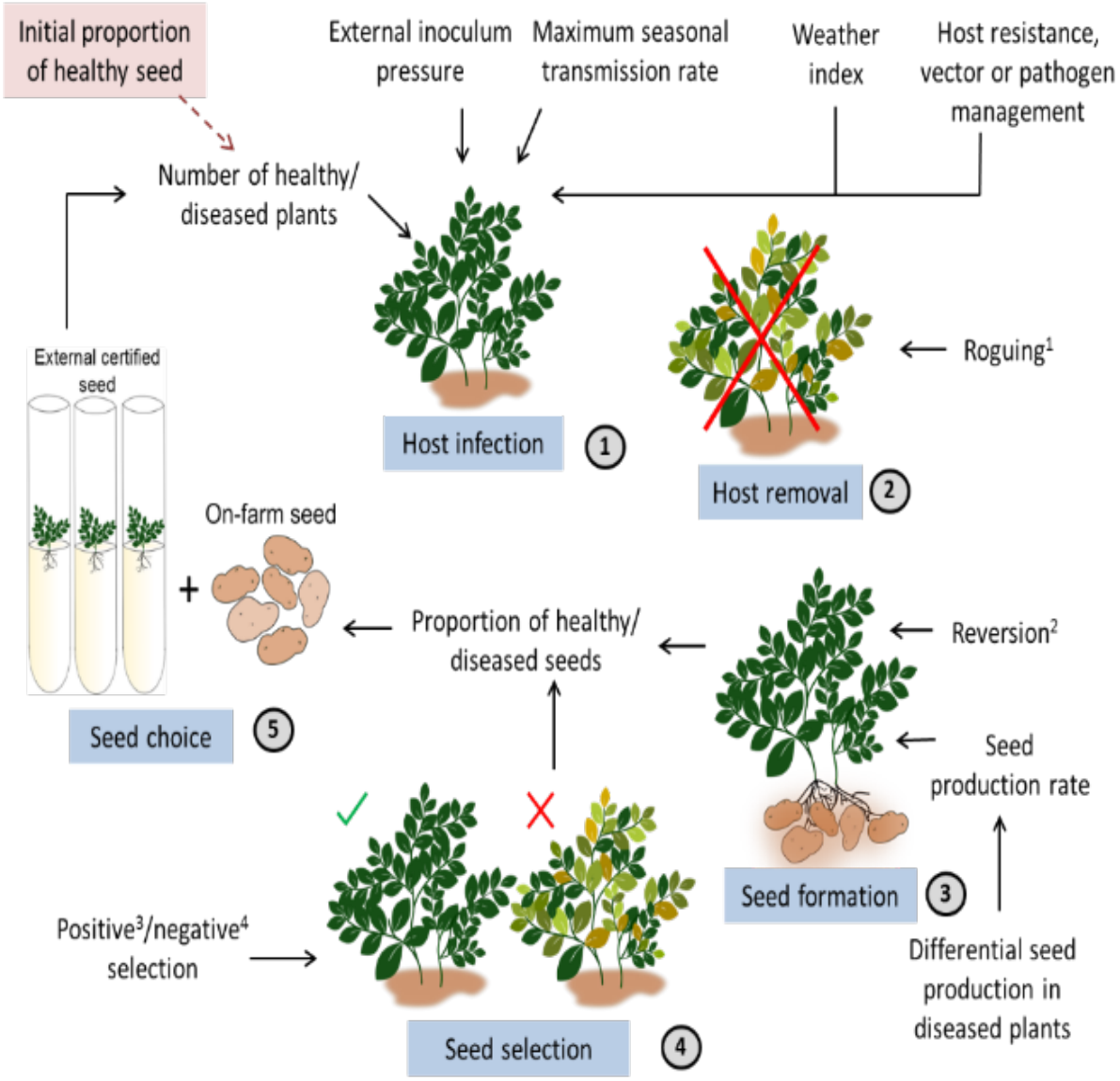
Sweetpotato, SPVD

Potato, *Ralstonia*

Cassava, CMD

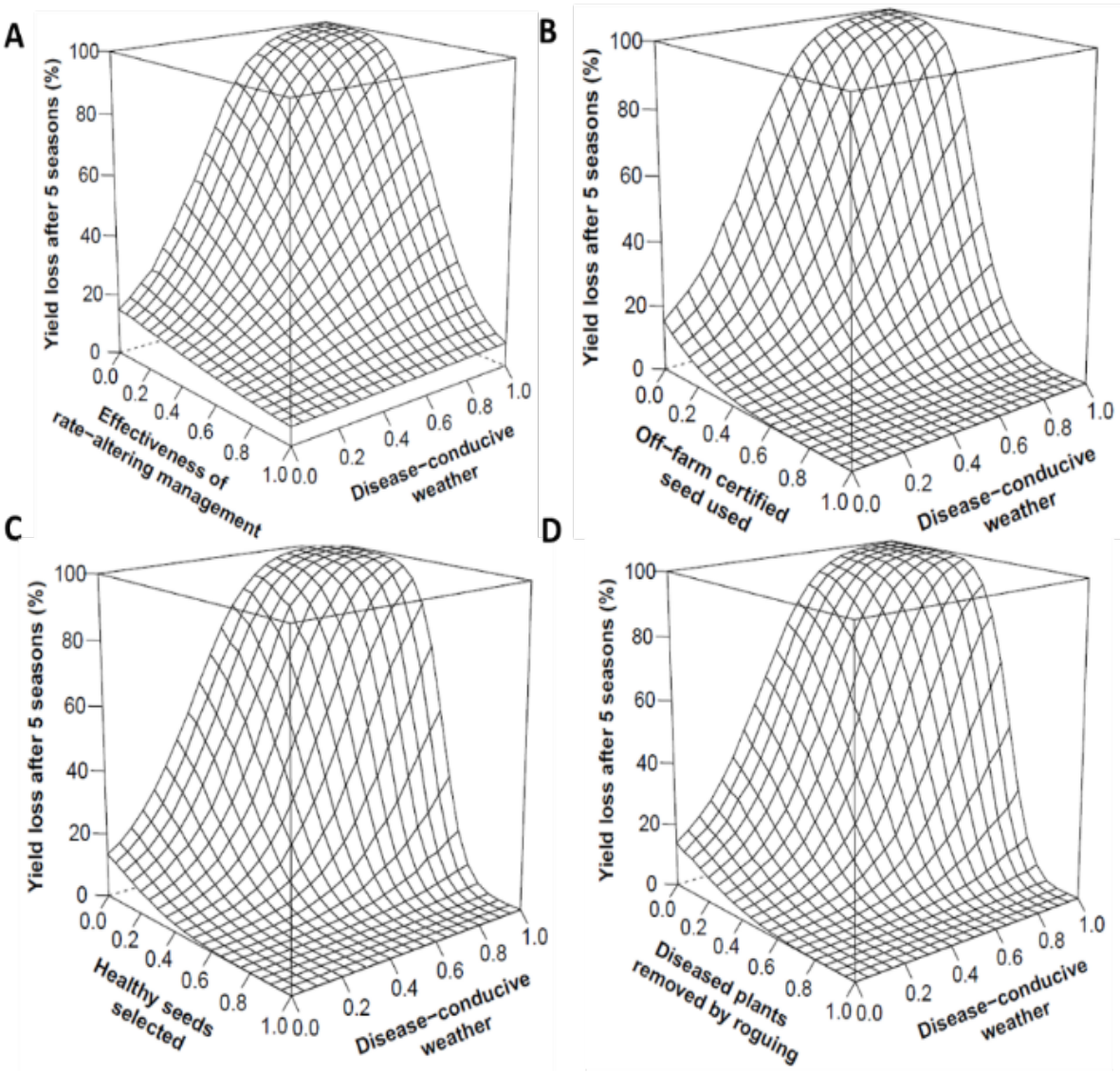
Banana, *Xanthomonas*

Risk assessment framework for seed degeneration: integrated seed health strategy for vegetatively-propagated crops



Thomas-Sharma et al., 2016

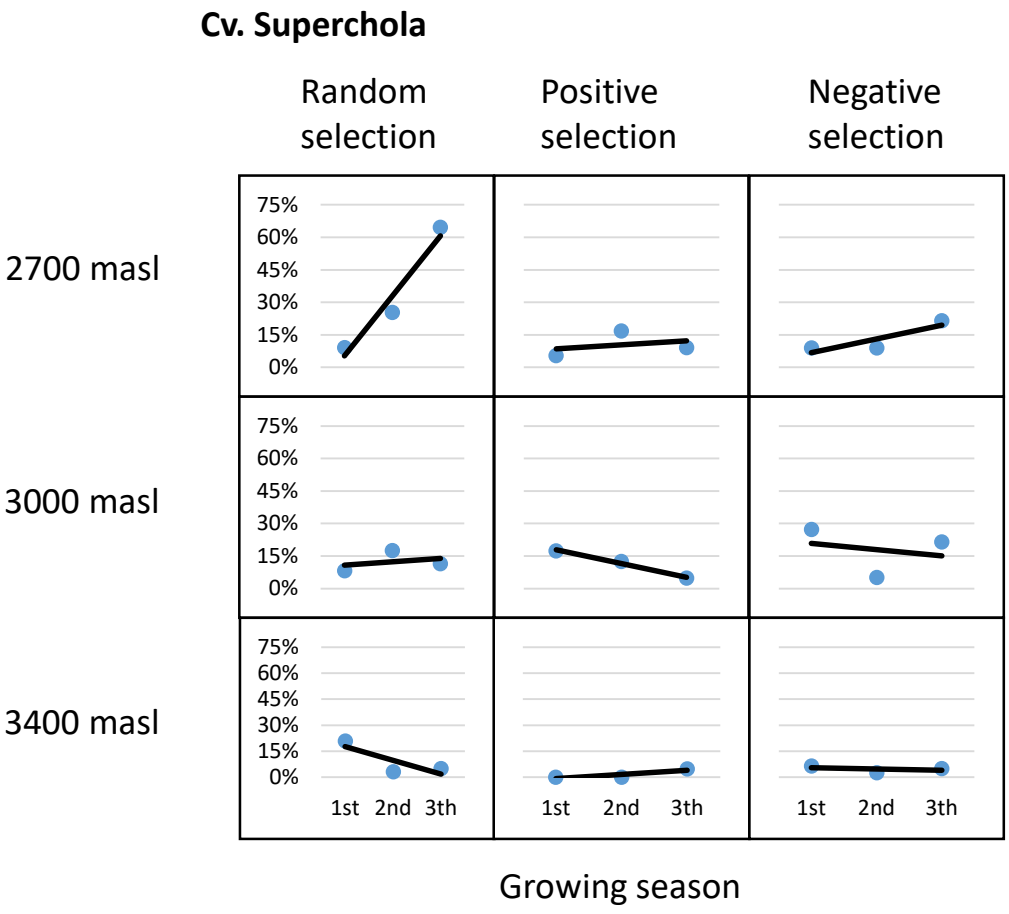
A risk assessment framework for seed degeneration: Informing an integrated seed health strategy for vegetatively-propagated crops



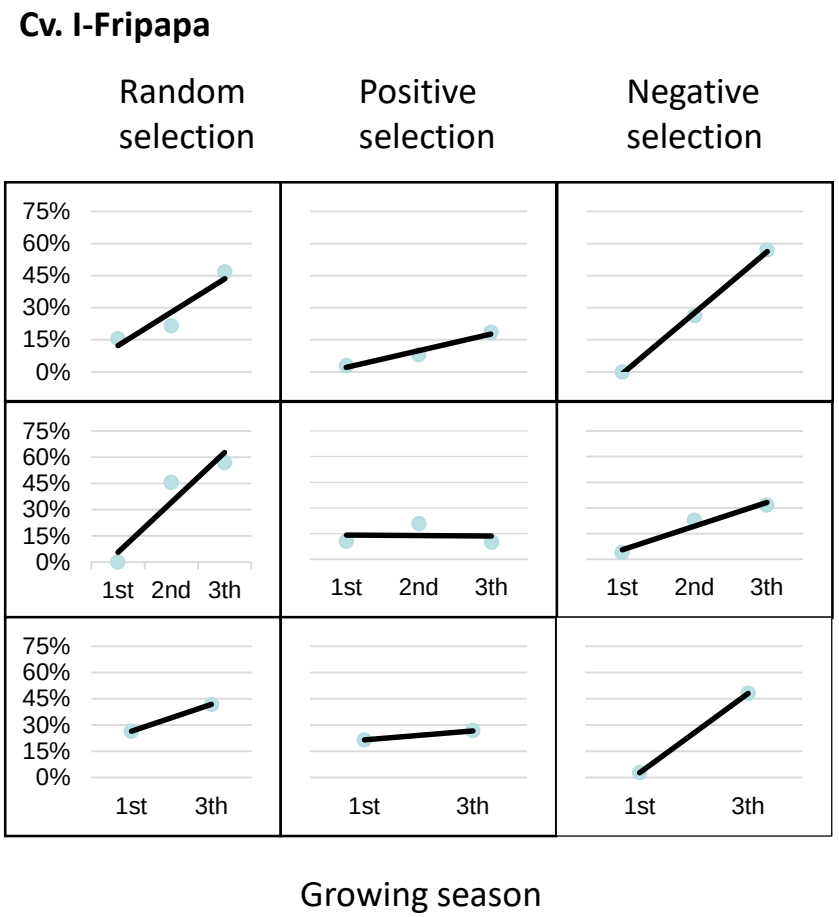
Thomas-Sharma et al., 2016

Modelling seed degeneration at crop level, starting with potato

Effect of environment, management practices and host genotype on virus incidence in 3 growing seasons in Ecuador

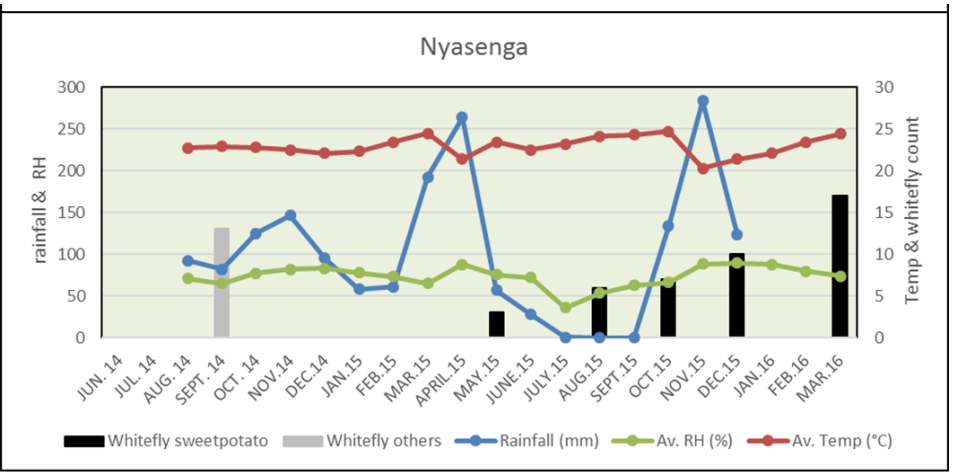


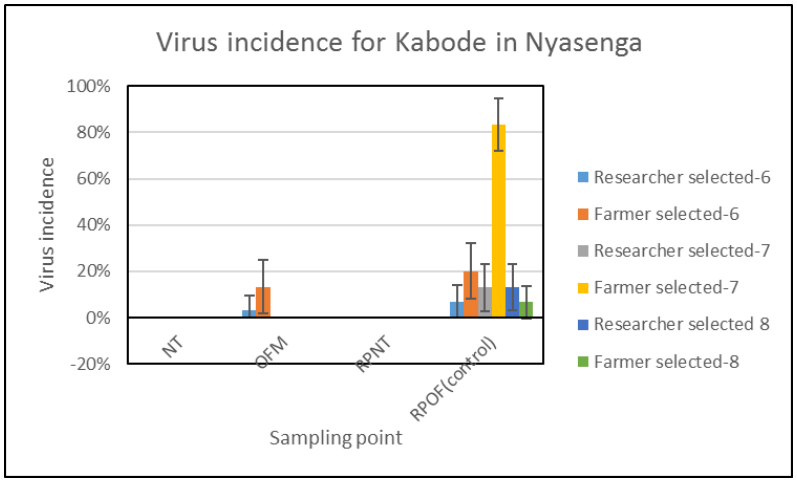
Kromann et al., in preparation



Buddenhagen et al., in preparation

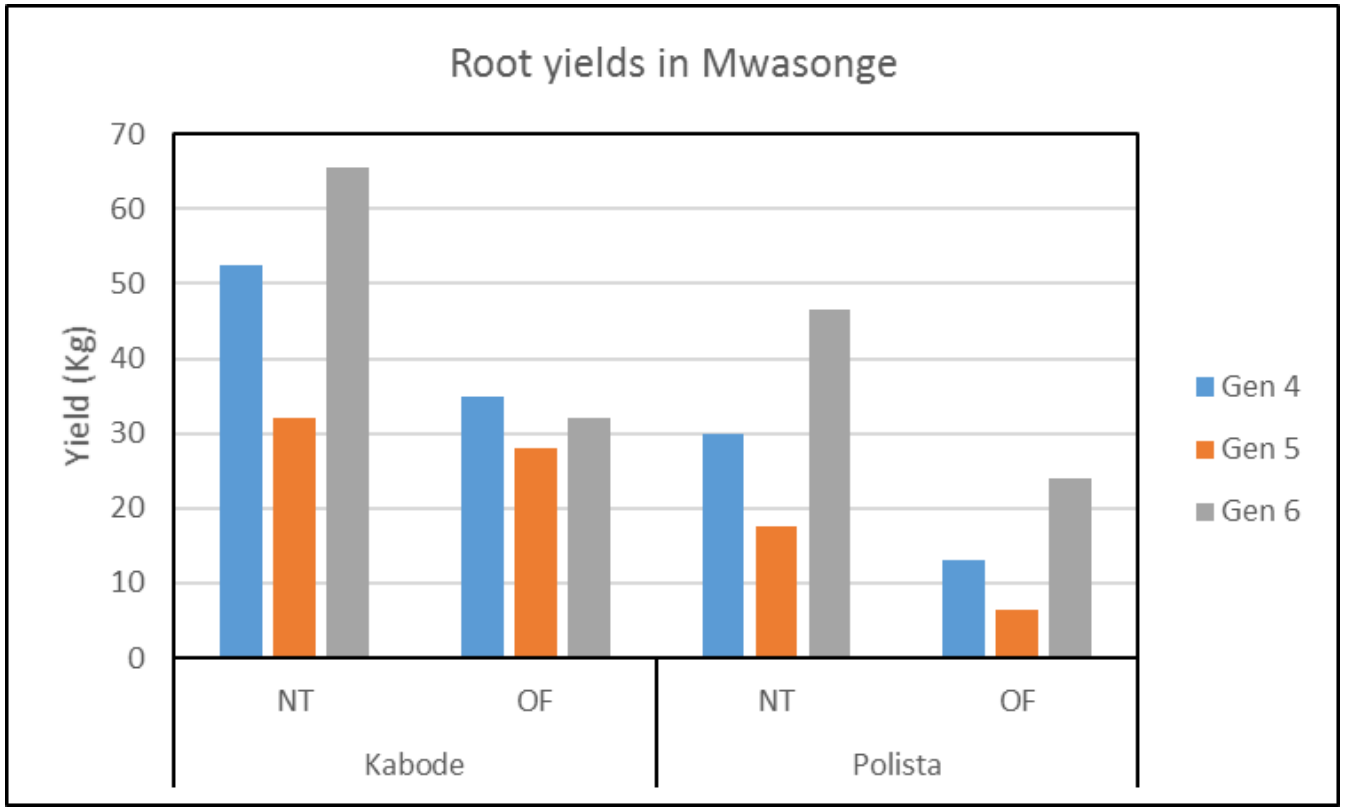
Sweetpotato degeneration trial Tanzania





Kwame and Kreuze

Sweetpotato degeneration trial Tanzania



NT: net tunnel OP: open field

Kwame and Kreuze

Reviews on degeneration

Plant Pathology (2015) 64, 1–15 Doi: 10.1111/ppa.12273

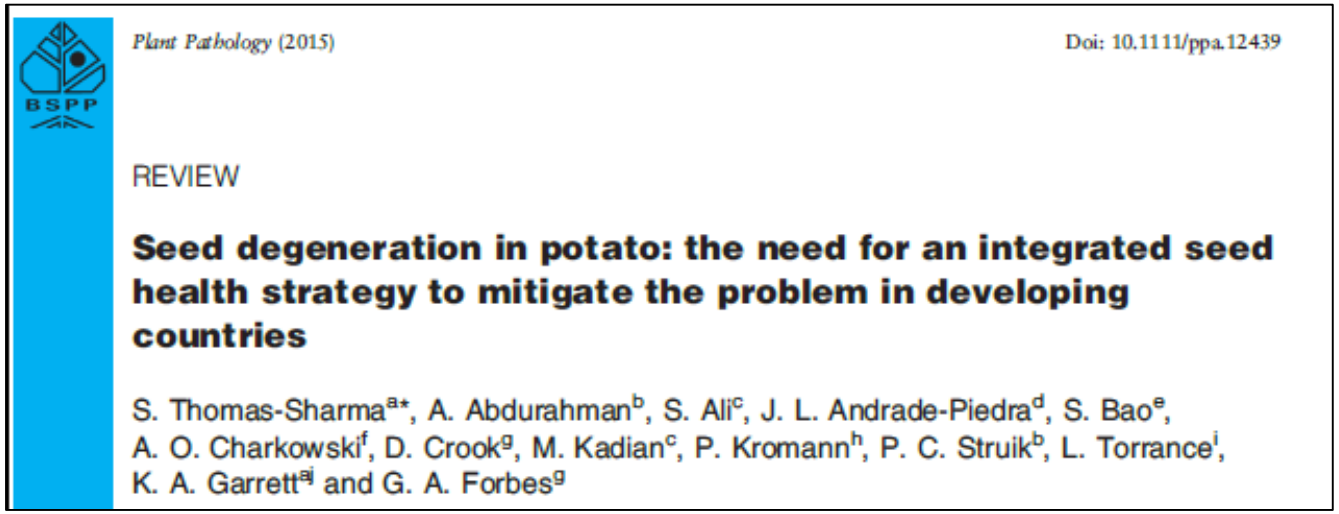
REVIEW

Degeneration in sweetpotato due to viruses, virus-cleaned planting material and reversion: a review

R. W. Gibson[a*] and J. F. Kreuze[b]

[a]Natural Resources Institute, Chatham Maritime, Kent, ME4 4TB, UK; and [b]International Potato Center (CIP), Avenida La Molina 1895, Apartado 1558, Lima 12, Peru

"breeding for this attribute [reversion] will be the best strategy for achieving long-term control of most sweetpotato viruses."



Plant Pathology (2015) Doi: 10.1111/ppa.12439

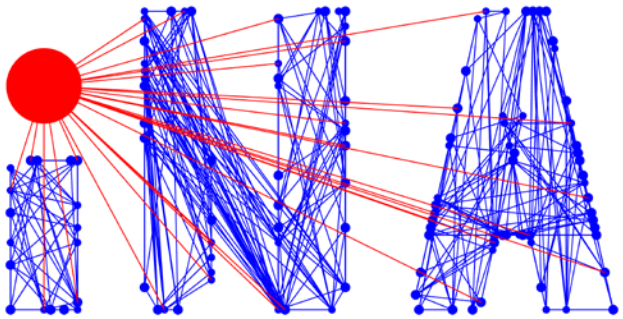
REVIEW

Seed degeneration in potato: the need for an integrated seed health strategy to mitigate the problem in developing countries

S. Thomas-Sharma[a*], A. Abdurahman[b], S. Ali[c], J. L. Andrade-Piedra[d], S. Bao[e], A. O. Charkowski[f], D. Crook[g], M. Kadian[c], P. Kromann[h], P. C. Struik[b], L. Torrance[i], K. A. Garrett[aj] and G. A. Forbes[g]

"emphasizes the need to refocus management efforts in developing countries on improving the health status of seed tubers in the informal system by integrating disease resistance and on-farm management tools with strategic seed replacement."

3. Impact network analysis (INA)

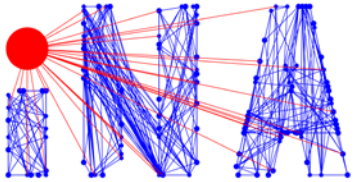


Platform for evaluating system management strategies (seed systems or integrated pest and disease management)

- Impact **OF** research products
- Impact **ON** spatial ecological processes
- Impact **THROUGH** communication and decision-making networks, and linked biophysical networks

UF UNIVERSITY of FLORIDA

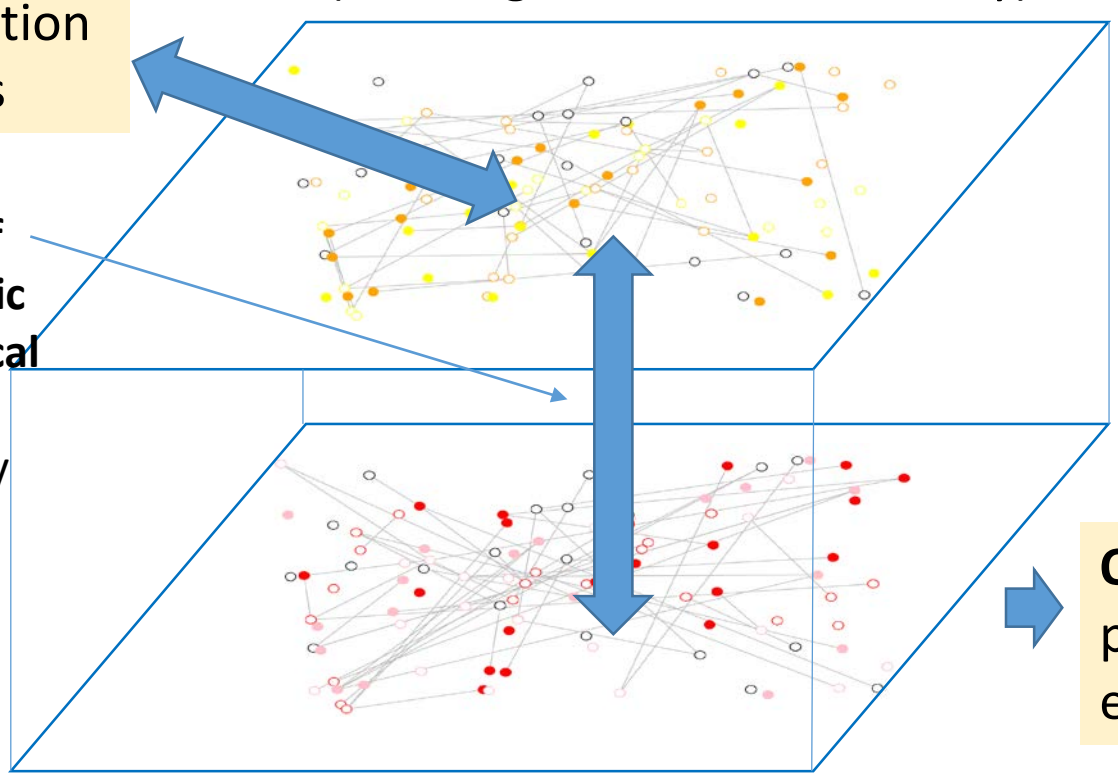
Impact network analysis



Socioeconomic network
(exchange of ideas and money)

Seed production technologies

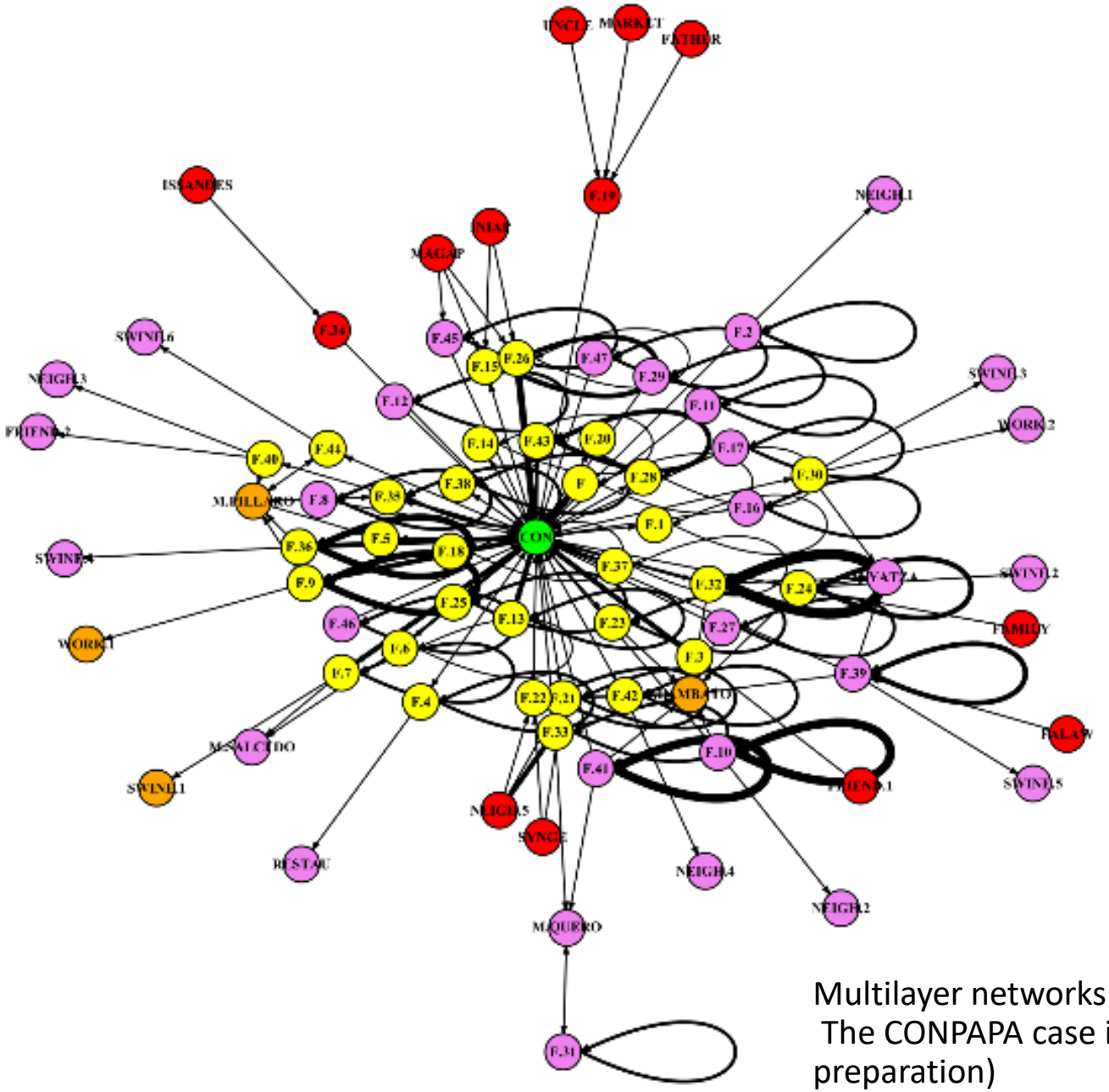
Integration of socioeconomic and biophysical components
Heterogeneity
Phenotypes
Constraints



Outcome: yield, profit, system resil, etc.

Biophysical network
(exchange of seed and potentially pathogens)

Garrett, in review



High level of connection

Connected

Moderate

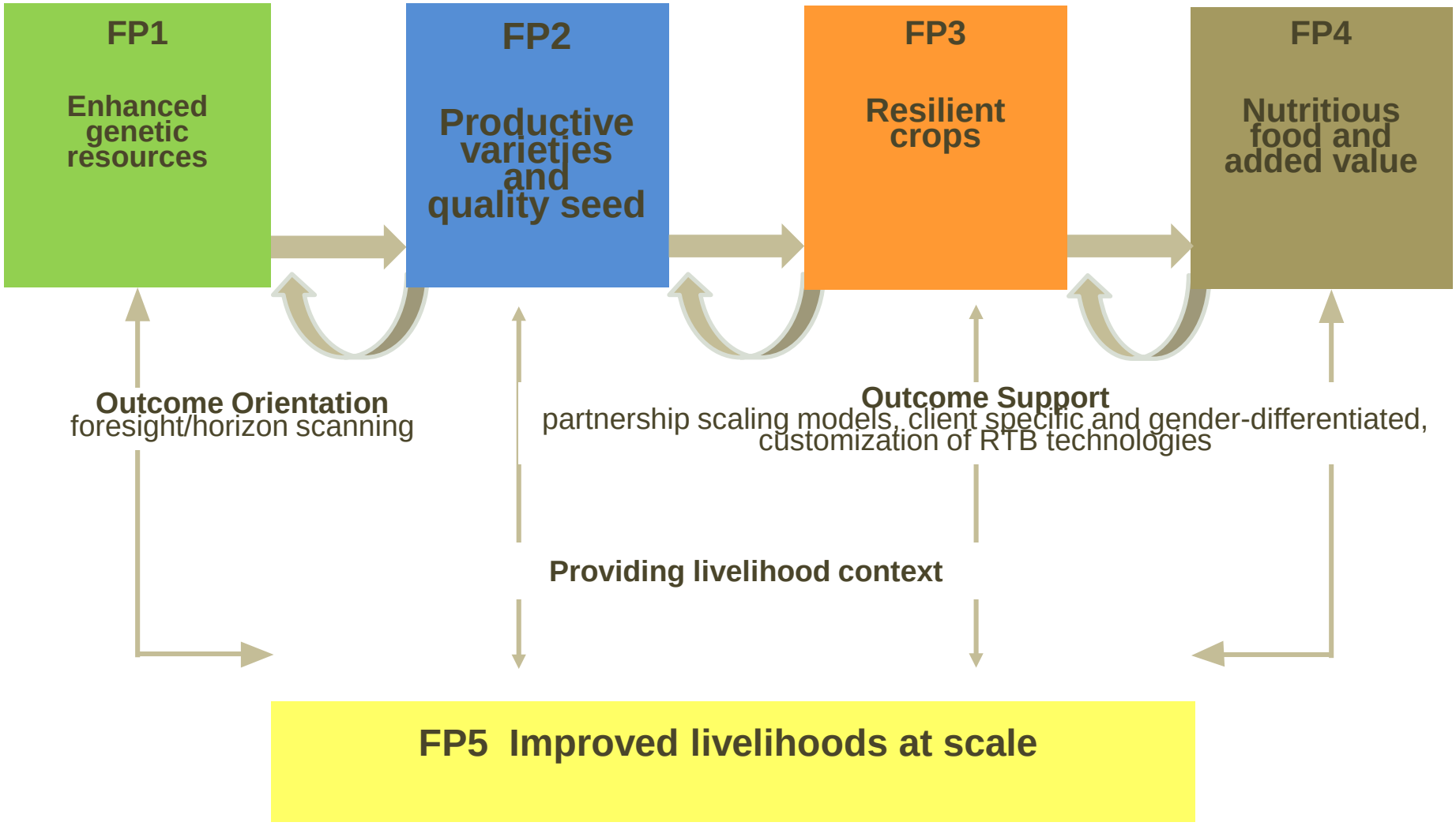
Low connection

Lacking connection

Multilayer networks supporting potato seed systems: The CONPAPA case in Ecuador (Nopsa et al. in preparation)

Knowledge management: Community of users

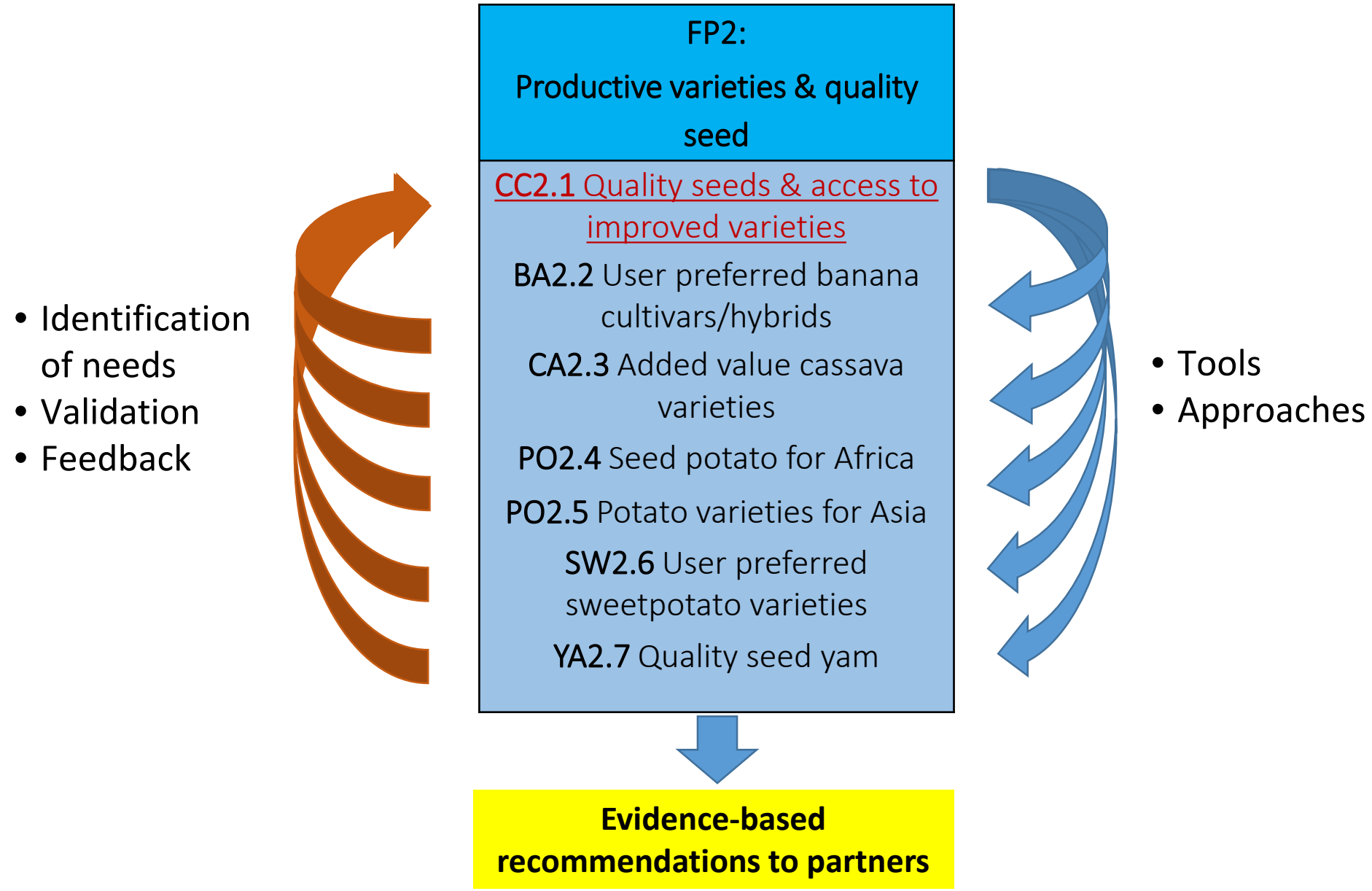
RTB Program Structure



Flagships and their Clusters of Activities

DISCOVERY	DELIVERY		
FP1: Enhanced genetic resources	**FP2:** Productive varieties & quality seed	**FP3:** Resilient crops	**FP4:** Nutritious food & added value
DI1.1 Breeding CoP **DI1.2** Next generation breeding **DI1.3** Game changing traits **DI1.4** Genetic diversity	CC2.1 Quality seeds & access to improved varieties **BA2.2** User preferred banana cultivars/hybrids **CA2.3** Added value cassava varieties **PO2.4** Seed potato for Africa **PO2.5** Potato varieties for Asia SW2.6 User preferred sweetpotato varieties **YA2.7** Quality seed yam	**CC3.1** (Pest/disease management **CC3.2** Crop production systems **BA3.3** Banana fungal & bacterial wilts (Foc/BXW) **BA3.4** Banana viral diseases (BBTV) **CA3.5** Cassava biological constraints, Asia/Americas **CA3.6** Cassava biological threats, Africa	**CC4.1** Postharvest innovation **CA4.2** Cassava processing **CA4.3** Biofortified cassava SW4.4 Nutritious sweetpotato
FP 5: Improved livelihoods at scale			
CC5.1 Foresight, impact assessment and co-learning **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			

Cross Cutting Cluster: Knowledge management



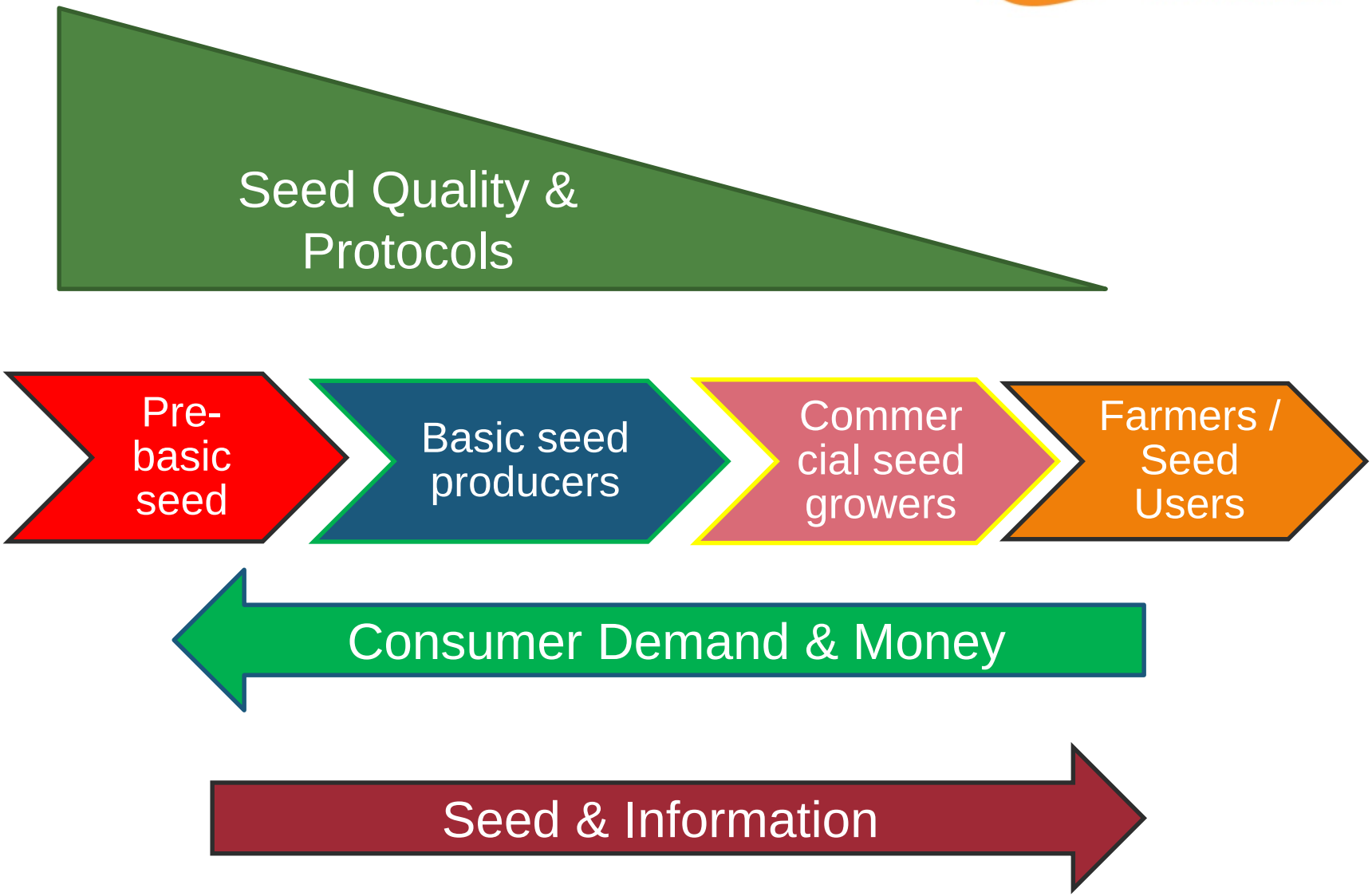
Piggybacking on and adding value to new and existing projects

Project	Donor	Phase	Tools being used
Potato seed systems in Georgia	ADA	Design	ISHA, MSHF, INA, SDM
Potato seed systems in India	GIZ	Design	ISHA, MSHF
Potato seed systems in Guatemala	USAID	Design	ISHA, INA
PhD thesis in the Andes	McKnight	Design	ISHA, INA, SDM
PhD thesis in Kenya	WUR, RTB	Design	ISHA, INA, SDM
Cassava in Nigeria - BASICS	**BMGF**	**Implementation**	**INA, MSHF**
Sweetpotato in Africa (countries?)	???	Implementation	SDM?
Cassava in Cambodia and Vietnam	RTB	Implementation	MSHF
Banana in East Africa	RTB	Implementation	MSHF

ISHA: Integrated seed health approach
MSHF: multi-stakeholder framework
INA: Impact network analysis
SDM: degeneration modelling

CGIAR RESEARCH PROGRAM ON Roots, Tubers and Bananas

BASICS
BUILDING AN ECONOMICALLY SUSTAINABLE, INTEGRATED CASSAVA SEED SYSTEM



Outcomes

BASICS
BUILDING AN ECONOMICALLY SUSTAINABLE, INTEGRATED CASSAVA SEED SYSTEM

- 3+ seed companies selling high quality early generation seed:
  - Processor led multiplication
  - National Program (NRCRI)
- Two seed loops:
  - Processor outgrowers
  - Village seed entrepreneurs

Piggy backing

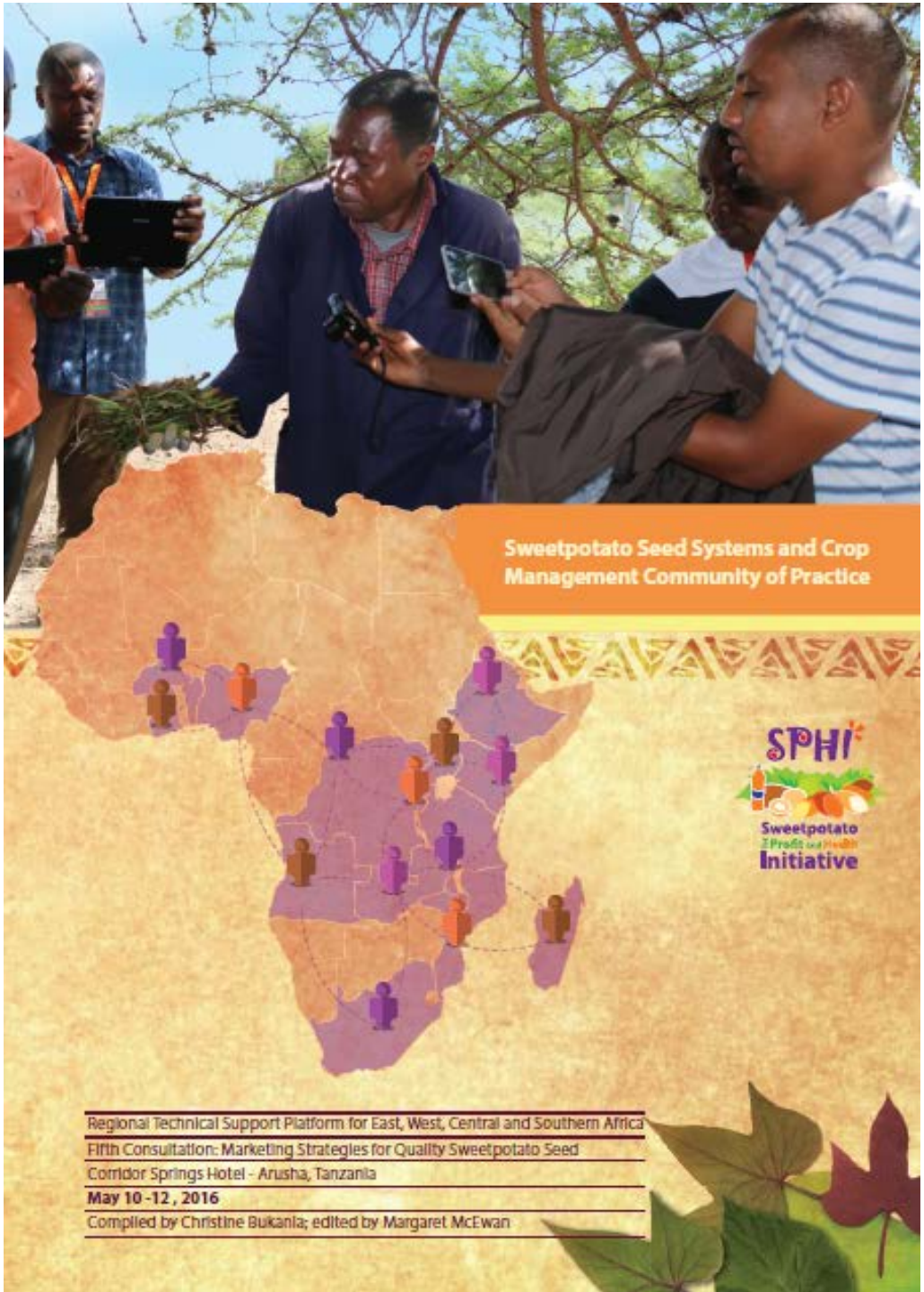
BASICS
BUILDING AN ECONOMICALLY SUSTAINABLE, INTEGRATED CASSAVA SEED SYSTEM

- Seed network maps
- Control: current seed system
- Interventions:
  - Processors loop (factories)
  - VSE loop (gari)
- Gender differentiated network map

Knowledge management: Other options

Sweetpotato Seed System Community of Practice

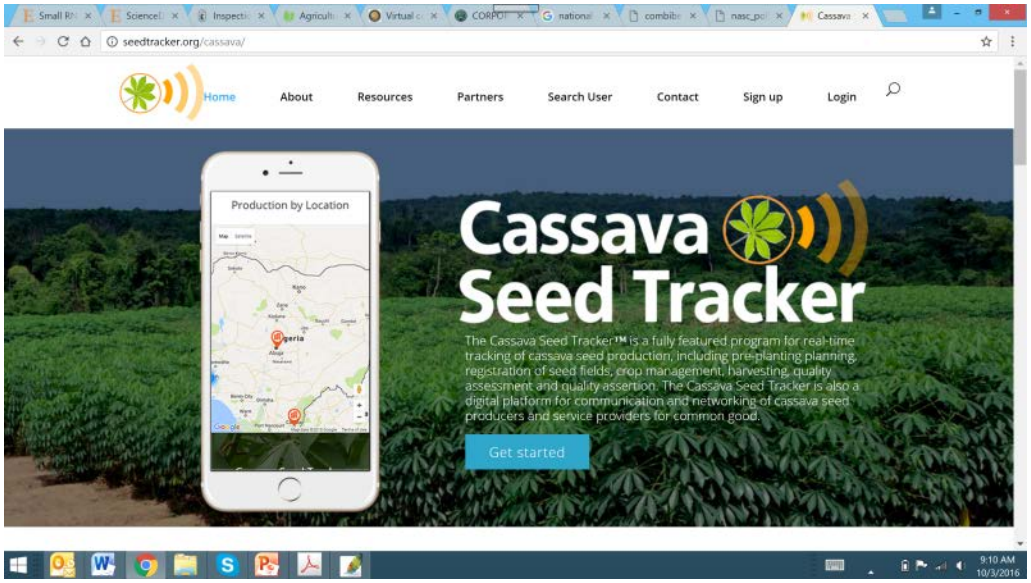
- "Outer membership" 120+ members
- Smaller group 20-30 interacting on a regular basis
- Google discussion groups
- www.sweetpotatoknowledge.org portal
- Face to face meetings
- Learning journeys



BASICS
BUILDING AN ECONOMICALLY SUSTAINABLE, INTEGRATED CASSAVA SEED SYSTEM

Cassava seed tracker

Integrated 'seed resource' management software for 'seed sector'



Users

Producers **Researchers** **Traders**

Regulators **Extension specialists** **Logistics/input dealers**

Potential official tool for seed registration, inspection and certification

Flexible and customizable to end user needs, other crops, and country seed regulations

Can RTB seed systems learn from each other?

Answer – part 1

- Yes!
- Strong progress in “rulers” for cross crop learning and modelling
- Knowledge Management:
  - RTB cross crop dedicated seed cluster
  - connect with sweetpotato seed system CoP

Answer – part 2

- BUT
- Limitations “ex-post” case studies
  - On-going seed system projects
- Missing rulers:
  - Profitability/willingness to pay
  - Multi-crop seed tracker

Thanks!