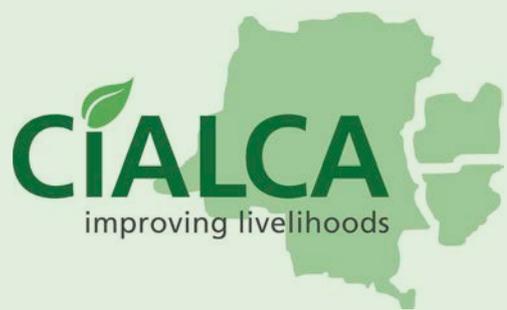


# CIALCA

## 2013-2016

### report



# 7 CIALCA facts

(2)

## fact #1

Since its inception, CIALCA's agricultural technologies has significantly contributed to lifting people out of poverty and shaping agricultural policies.

## fact #2

CIALCA has strengthened collaboration between farmers, private sector, government, and service suppliers to increase food, nutrition, and income security.

## fact #3

Improved intercropping, disease, and nutrient management technologies have contributed to enhanced productivity, soil fertility, and disease control.

## fact #4

CIALCA technologies have been able to reduce the 'gender gap' in technology adoption and have empowered women.

## fact #5

Households adopting CIALCA value chain innovations have improved food security and purchasing power.

## fact #6

CIALCA has championed the use of nutrient-dense foods and dietary diversity to improve nutrition while enhancing production resilience.

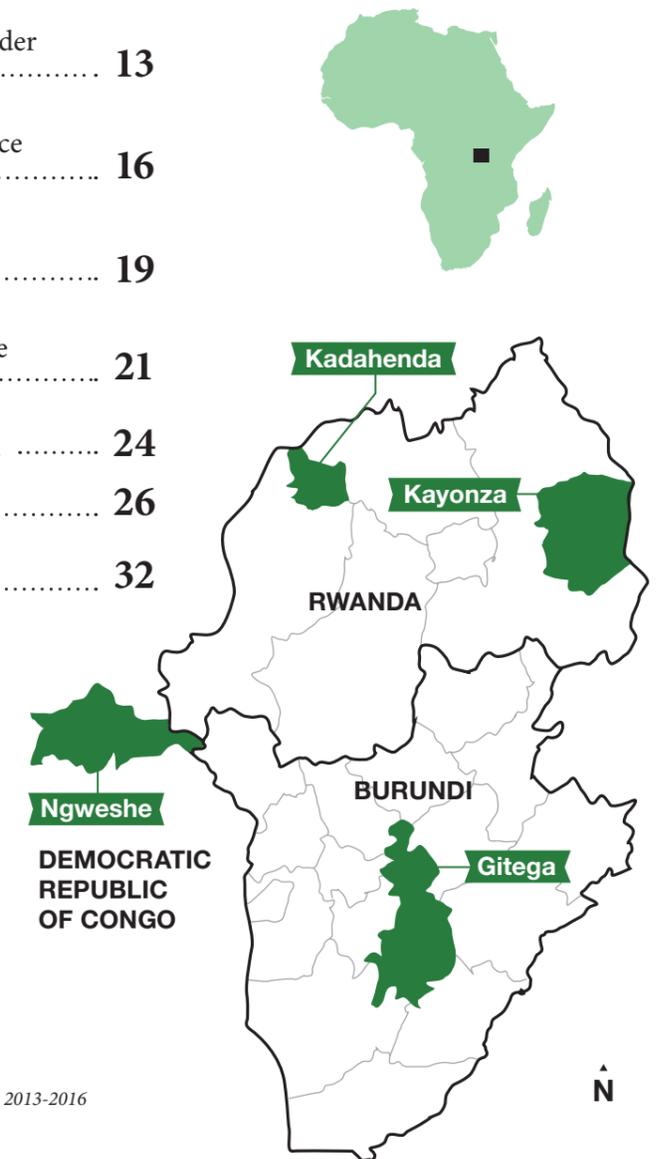
## fact #7

CIALCA successfully trained science, policy, and business leaders and developed capacity of government, public, and private sector partners.

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Map. Key intervention zones where CIALCA has been active in the period 2013-2016

# Introduction

(4)

The Consortium for Improving Agriculture-based Livelihoods in Central Africa (CIALCA) was created in 2006 by the International Institute of Tropical Agriculture (IITA), Bioversity International, and the International Center for Tropical Agriculture (CIAT), and funded by the Belgian Directorate General for Development Cooperation (DGD). CIALCA operates in Rwanda, Burundi, and the Democratic Republic of the Congo (DRC) with national partners. Initially, its research-for-development (R4D) agenda focused on enhancing crop production technologies in legume- and banana-based systems while creating an enabling environment for the uptake of these practices.

## PHASE 1 Successful development, testing, and scaling of technologies

Phase 1 of CIALCA (2006-2008) tested several cropping systems and pest management technologies. CIALCA worked with local stakeholders in the on-farm testing and validating of improved germplasm, pest control, and integrated soil fertility management (ISFM) technologies in banana and legume systems. The project also restarted collaborative activities among the national research organizations from the three countries while providing PhD and MSc training to several of their staff in partnership with local and Belgian universities.

## PHASE 2 Capacity development for adoption of technologies and farming systems research

Phase 2 (2008-2012) focused more on the scaling of agricultural innovations through communication, training of partners,

new options for value addition, and in assisting farming communities with novel business models. More than 1000 trainers from partner organizations were trained on production technologies, such as improved varieties and systems of soil management, and new processing technologies, such as soybean milk. CIALCA was also at the forefront of combating the bacterial wilt disease (BXW) that had wiped out the banana production of entire farms and villages. In addition, CIALCA tested mixed banana-coffee systems for climate change mitigation and diversified farmer income. CIALCA also introduced novel cassava-legume, maize-legume, and banana-legume systems, increasing the productivity of smallholder farms by improving soil fertility management with new intercrop arrangements and practices.

## PHASE 3 From farming to integrated livelihood systems

During Phase 3 (2013-2016), CIALCA became a key operating platform for the CGIAR Research Program on Integrated Systems for the Humid Tropics (Humidtropics) in Central Africa. By building on many years of investment in innovation and partnerships, CIALCA was able to jumpstart activities and mobilize multi-stakeholder networks in Burundi, Rwanda, and eastern DRC. The integrated systems approach includes understanding livelihood diversity, gender, value chains, nutrition, markets, natural resource improvement, institutional innovation, and the scaling of successful innovations through multi-stakeholder partnerships. A one-year extension of CIALCA enabled the synthesis of key lessons learned, as well as engagement with the Belgian Embassy to re-set R4D agenda for the Great Lakes regions. This resulted in new proposals and the alignment of CIALCA under the CGIAR Research Program on Roots Tubers and Bananas (RTB). In June 2016, CIALCA celebrated its 10th Year Anniversary with its partners, donors, and alumni.

# Major CIALCA Impacts

(5)

An impact assessment conducted in 2014 concluded that CIALCA had contributed to lifting an estimated 560,000 people out of poverty in South Kivu, DRC, and Rwanda. Changes in poverty rates due to CIALCA are between 3%, 10%, and 21% for Burundi, South Kivu (DRC), and Rwanda, respectively.

CIALCA's strong capacity building in science resulted in the training of over 10 PhDs and 40 MSc students in a region that had lost of much of its science capacity during years of conflict. Many of CIALCA's former MSc and PhD students are now in key positions in ministries and NARS in the three countries.

CIALCA has trained over 50 partner organizations and more than 1000 trainers on seed multiplication technologies and effective pest and disease control, good agricultural practices and intercropping techniques, new crop varieties, postharvest processing, and collective marketing, among others.

CIALCA has contributed significantly to advancing science related to ISFM, climate-smart opportunities for smallholders, and the effectiveness of agricultural extension and other partnership modalities in supporting (specific groups of) farmers.



Farmer members of the CIALCA/ Humid-tropics Innovation Platform in Kadhenda, Rwanda. Innovation platforms in Burundi, Rwanda, and eastern DRC bring together farmers and local government, private sector, and NGOs to identify, analyze, and explore solutions for agricultural problems.

Photo taken by M. Schut.

# Achievements CIALCA 2013-2016

(6) CIALCA (2013-2016) reflected seven main ambitions and intervention areas that were addressed in an integrated way (Figure 1):

**1** Improving 'whole farm' productivity in smallholder systems;

**2** Multi-stakeholder partnerships for priority setting, collective action, and impact;

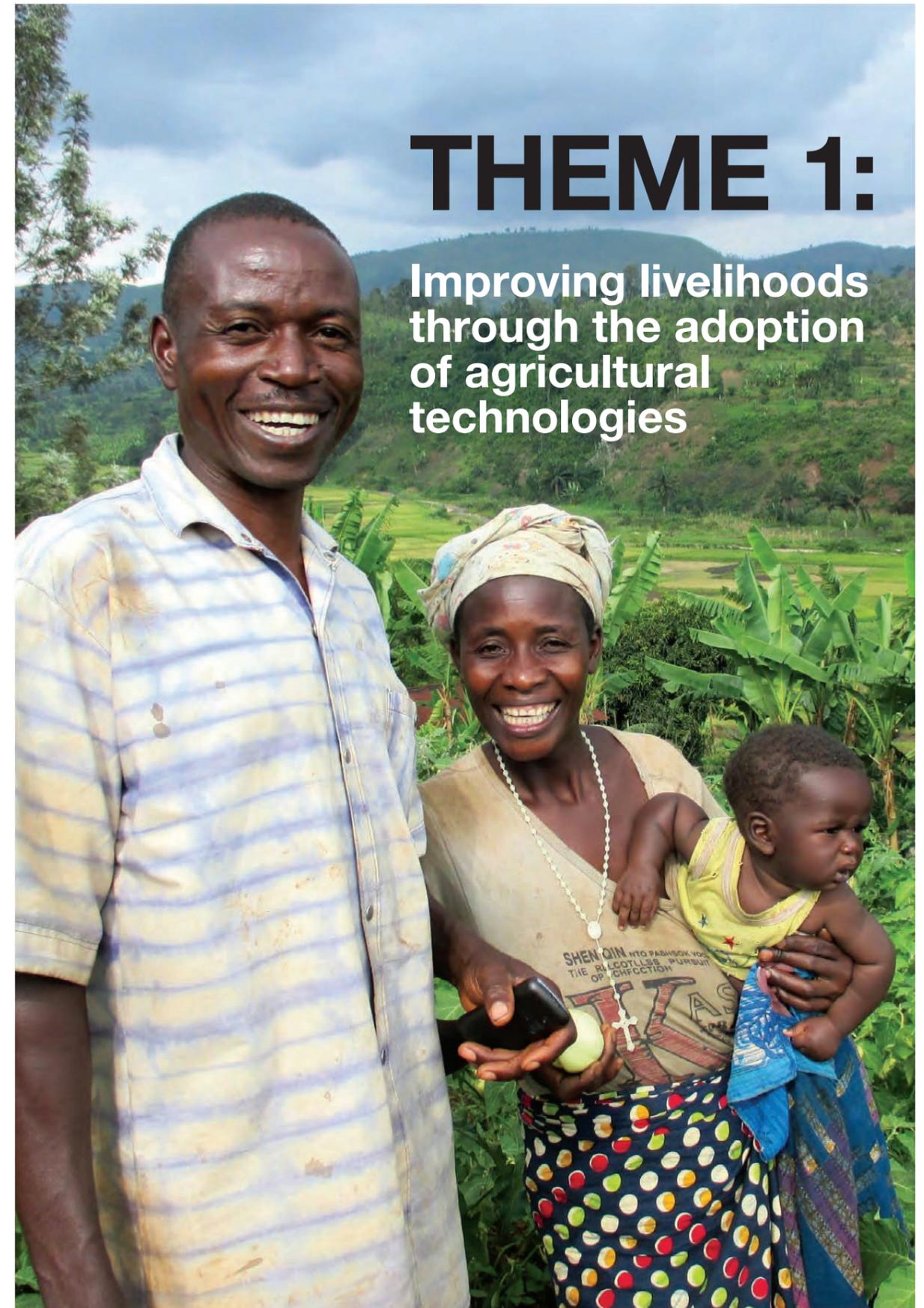
**3** Improving livelihoods through the adoption of agricultural technologies;

**4** Insights in gender and youth dynamics to enhance the targeting of development interventions;

**5** Value chain and credit innovation that link smallholders, youth, and women to markets;

**6** Dietary diversity and nutritious foods to enhance human health; and

**7** Capacity building of individuals and institutions.



(7)

**Since 2006, CIALCA's agricultural technologies have contributed to lifting over half a million people out of poverty**

**C**IALCA has disseminated more than 25 agricultural technologies ranging from improved germplasm to postharvest technologies and marketing of produce. Adopters of CIALCA technologies significantly increased their income from crops sales and household expenditures compared to non-adopters.

Increase in income and per capita expenditures consequently translated into a reduction of poverty by 21% in Rwanda, 10% in eastern DRC, and 3% in Burundi. Since 2006, CIALCA's agricultural technologies have contributed to lifting over half a million people out of poverty.

**ACHIEVEMENTS AND LESSONS LEARNED**

- #1 Operating as a consortium created synergy between organizations and avoided a duplication of efforts.**
- #2 Participatory research and extension approaches strengthened knowledge uptake and adoption of technologies by farmers.**
- #3 Public and private partnerships improved awareness and access to promoted technologies.**
- #4 Long-term investments contributed to better planning, implementation, and impact.**

**KEY SCIENTIFIC OUTPUTS**

Ainembabazi, J., L. Tripathi, J. Rusike, T. Abdoulaye, and V. Manyong. 2015. Ex-Ante economic impact assessment of genetically modified banana resistant to Xanthomonas Wilt in the Great Lakes Region of Africa. PLoS ONE 10(9): e013899. Available at: <http://dx.doi.org/10.1371/journal.pone.0138998>

Ainembabazi, J. H., P. Van Asten, B. Vanlauwe, E. Ouma, G. Blomme, E. Birachi, P.M. Dontsop-Nguezet, D.B. Mignouna, and V. Manyong. 2016. Improving the speed of adoption of agricultural technologies and farm performance through farmer groups: Evidence from the Great Lakes Region of Africa. Agricultural Economics, 48: 1 - 19, ISSN 0169-5150, 2016.

Desire, R. M., J.M. Bahananga, B.J. Basimine, S. Byombuka, C. Barhahakana, P. Dontsop-Nguezet, and S. Amato-Masirika. 2016. Facteurs affectant le choix des pratiques et strategies paysannes face au flétrissement bacterien du bananier dans la region du Bushi, à l'Est de la Republique Democratique du Congo. International Journal of Innovation and Applied Studies, 18(1): 58 - 65, ISSN2028-9324, 2016.

Dontsop-Nguezet, P.M., V. Manyong, T. Abdoulaye, A. Alene, M.S.\* Amato, J.H. Ainembabazi, D.B. Mignouna, and C. Okafor. 2016. Non-farm activities and adoption of improved cassava and beans varieties in South-Kivu, DRC. Tropicicultura, 34(3): 262 - 275, ISSN 0771-3312, 2016. [www.tropicicultura.org/eng/home](http://www.tropicicultura.org/eng/home)

Frelat, R., S. Lopez-Ridaura, K.E. Giller, M. Herrero, S. Douxchamps, A.A. Djurfeldt, O. Erenstein, B. Henderson, M. Kassie, B.K. Paul, C. Rigolot, R.S. Ritzema, D. Rodriguez, P.J.A. van Asten, and M.T. van Wijk. 2016. Drivers of household food availability in sub-Saharan Africa based on big data from small farms. Proceedings of the National Academy of Sciences 113(2): 458-463. Available at: [www.pnas.org/content/113/2/458.full](http://www.pnas.org/content/113/2/458.full)

**DEVELOPMENT OUTCOMES**

CIALCA disseminated various crop system intensification (CSI) technologies including improved varieties, best crop management practices and ISFM, integrated pest management and best marketing practices, which were enthusiastically adopted and used by farmers in the three CIALCA countries in the Great Lakes Region of Central Africa.

Table 1 presents the endogenous switching regression (ESR)-based average treatment effects of adopting CIACLA technologies on consumption expenditure and poverty in the CIALCA region under actual and counterfactual conditions. The predicted outcome variables from ESR are used to

examine the mean change in household consumption expenditure between adopters and non-adopters. Overall, ESR estimates show that adoption of CIACLA technologies had a positive and significant effect on household consumption expenditure to both adopters and non-adopters in the Great Lakes region. Although adopters and non-adopters would benefit from CIACLA technologies in three countries, non-adopters would benefit even more if they were to switch to CIACLA technologies. In addition, female-headed households will benefit more than men-headed counterpart. Average treatment effects on the treated (ATT) and untreated (ATU) for household consumption expenditures were all statistically significant from zero at 1% (see Table 1).

	Means of outcome variable	Farm households' type and treatment effect	DECISION STAGE		Average treatment effects
			To adopt	Not to adopt	
<b>CIALCA REGION</b>	<b>Consumption expenditure (US\$/capita/day)</b>	<b>ATT ATU</b>	<b>0.46 0.53</b>	<b>0.39 0.40</b>	<b>0.07***(t=28.12) 0.13***(t=19.31)</b>
<b>MEN</b>	<b>Consumption expenditure (US\$/capita/day)</b>	<b>ATT ATU</b>	<b>0.44 0.51</b>	<b>0.41 0.40</b>	<b>0.04***(t = 16.03) 0.10***(t = 17.40)</b>
<b>FEMALE</b>	<b>Consumption expenditure (US\$/capita/day)</b>	<b>ATT ATU</b>	<b>0.45 0.54</b>	<b>0.14 0.37</b>	<b>0.32***(t = 75.85) 0.17***(t = 15.12)</b>
<b>BURUNDI</b>	<b>Consumption expenditure (US\$/capita/day)</b>	<b>ATT ATU</b>	<b>0.45 0.60</b>	<b>0.42 0.41</b>	<b>0.03***(t = 7.50) 0.19***(t = 12.57)</b>
<b>DRC</b>	<b>Consumption expenditure (US\$/capita/day)</b>	<b>ATT ATU</b>	<b>0.73 0.94</b>	<b>0.52 0.64</b>	<b>0.21***(t = 21.64) 0.30***(t = 9.66)</b>
<b>RWANDA</b>	<b>Consumption expenditure (US\$/capita/day)</b>	<b>ATT ATU</b>	<b>0.56 0.54</b>	<b>0.31 0.45</b>	<b>0.25***(t =52.54) 0.08***(t = 3.83)</b>

Note : \*\*\*Significant at 1%. Source: Author's calculations using CIALCA survey data 2014

We provide estimates of the total number of people lifted out of poverty due to the adoption of the CSI technologies in the Great Lakes regions. Results revealed that adoption of CSI technologies resulted in poverty reduction among rural population by

3% points in Burundi, 10% in DRC, and 21% points in Rwanda with 18 974, 115 114, and 425 723 individuals, respectively, being lifted out of poverty. This makes a total of more than half a million individuals lifted out of poverty in the region.

<sup>1</sup>The poverty lines (PL) of different countries were estimated as official exchange rate (OER) equivalent of the \$1.25 at PPPER. That is, PL = \$1.25 \* PPPER/OER. For Burundi, the OER for 2014 was 1500 franc per \$, but the PPPER was 575. This means PL=1.25\*575/1500 = \$0.48. For DRC, the OER for 2014 was 920 franc per \$, but the PPPER was 546. This means PL=1.25\*546/920 = \$0.74. For Rwanda, the OER for 2014 was 700 franc per \$, but the PPPER was 286. This means PL=1.25\*286/700 = \$0.50.

(8)

(9)

**INFOGRAPHICS PROVIDING AN OVERVIEW OF SOME OF THE KEY CIALCA ACHIEVEMENTS**

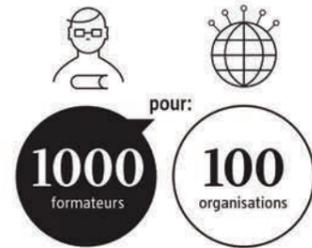
**La capacité individuelle et institutionnelle a été établie.**

Depuis 2006, CIALCA a supporté:



Aujourd'hui, plusieurs occupent des emplois stratégiques, tels que les directeurs des instituts nationaux de recherche, et des postes de direction au sein des institutions gouvernementales.

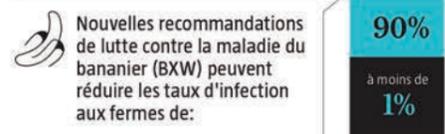
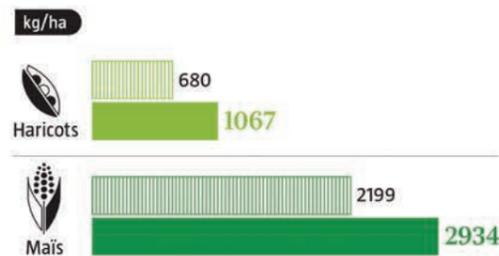
CIALCA a développé la capacité de:



(10)

**Nouvelles technologies**

Les nouvelles technologies améliorent la productivité, la fertilité des sols et le contrôle des maladies. L'utilisation de fumier et d'engrais simultanément, a augmenté la productivité de:



**CIALCA est en train de réduire la pauvreté**

Augmentation du revenu et de dépenses de ménage ont réduit les niveaux de pauvreté.



(11)

# THEME 2:

## Multi-stakeholder partnerships for priority setting, collective action, and impacts

CIALCA has strengthened collaboration between farmers, private sector, government and service suppliers to increase food, nutrition and income security

MARCHÉS	COLLABORATION	NUTRITION	FEMMES
<p><b>Innovations du marché bénéficient les petits exploitants.</b></p> <p>A ce jour, les agriculteurs au Nord du Rwanda ont un meilleur accès au crédit. Ceci est investi dans des actifs productifs et augmente les revenus des agriculteurs. Les agriculteurs qui adoptent les innovations du marché de CIALCA, tels que les systèmes de garanties des cultures, sont plus en sécurité alimentaire et ont plus d'argent à dépenser.</p>	<p><b>La collaboration entre les agriculteurs et les autres parties prenantes s'est améliorée.</b></p> <p>Relier les agriculteurs avec les parties prenantes du secteur public leur a permis d'accéder des installations collectives de stockage de pommes de terre au Rwanda. Le Ministère de l'agriculture en RD Congo aide les agriculteurs de CIALCA d'accéder à l'engrais.</p>	<p><b>CIALCA améliore la nutrition.</b></p> <p>L'offre et la demande d'aliments nutritifs est en augmentation grâce aux formations en nutrition, les agriculteurs diversifient leur production et le développement de nouveaux marchés pour une gamme de produits riches en nutriments.</p>	<p><b>Les femmes sont des utilisateurs enthousiastes des innovations de CIALCA.</b></p> <p>L'utilisation de variétés améliorées de haricots, de manioc et de maïs est le plus élevée chez les femmes en RD Congo. Les femmes chefs-de-ménages qui adoptent les technologies de CIALCA dépensent plus sur la nourriture et des articles non alimentaires que les ménages dirigés par des hommes.</p>

**C**ontinuous collaboration between stakeholders in the agricultural sector in identifying problems and exploring innovations to overcome these problems is essential for three reasons:

- **Different stakeholder groups can provide various pieces of the puzzle to solve complex problems;**
- **Stakeholder groups become aware of their fundamental interdependencies and the need for collective action; and**
- **Stakeholder groups are more likely to support specific solutions when they have been part of the decision-making process.**

CIALCA has strengthened collaboration between farmers, private sector, government, and service suppliers to increase food, nutrition, and income security.

## ACHIEVEMENTS AND LESSONS LEARNED

- #1 Multi-stakeholder Innovation Platforms (IPs) at both community and national levels guide, implement, and facilitate the upscaling of research and development activities.**
- #2 Long-term partnerships between research, government, and public and private sectors are key to develop an enabling environment for technological and institutional innovation.**

## KEY SCIENTIFIC OUTPUTS

Hermans, F., M. Sartas, B. van Schagen, P. van Asten, and M. Schut. 2017. Social network analysis of multi-stakeholder platforms in agricultural research for development: Opportunities and constraints for innovation and scaling. *PLoS ONE* 12. Available at: <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0169634>.

Lamers, D., M. Schut, L. Klerkx, and P. van Asten. 2017. Compositional dynamics of multi-level innovation platforms in agricultural research for development. *Science and Public Policy* First published online: <https://academic.oup.com/spp/article-lookup/doi/10.1093/scipol/scx009#>.

Muchunguzi, P., P. van Asten, B. Vanlauwe, and G. Blomme. 2016. Overcoming challenges for crops, people and policies in Central Africa. The story of CIALCA stakeholder engagement. In: *Innovation Platforms for Agricultural Development. Evaluating the mature innovation platforms landscape*, 42-55 (Eds I. Dror, J.-J. Cadilhon, M. Schut, M. Misiko and S. Maheshwari). London, UK: Routledge. Available at: <https://www.routledge.com/Innovation-Platforms-for-Agricultural-Development-Evaluating-the-mature/Dror-Cadilhon-Schut-Misiko-Maheshwari/p/book/9781138181717>

Schut, M., L. Klerkx, M. Sartas, D. Lamers, M. Mc Campbell, I. Ogbonna, P. Kaushik, K. Atta-Krah, and C. Leeuwis. 2016. Innovation platforms: Experiences with their institutional embedding in Agricultural Research for Development. *Experimental Agriculture*. Available open access on <http://dx.doi.org/10.1017/S001447971500023X>.

Schut, M., J.J. Cadilhon, M. Misiko, and I. Dror. 2017. Do mature innovation platforms make a difference in agricultural research for development? A meta-analysis of case studies. *Experimental Agriculture* First published online: <http://dx.doi.org/10.1017/S0014479716000752>.

## DEVELOPMENT OUTCOMES

Working in partnership is a corner stone of CIALCA. Since its inception, CIALCA has actively sought to identify and fulfil the needs of public and private development partners. The most successful CIALCA innovations include BXW control through single diseased stem removal (SDSR) or banana seed multiplication by using the macro-propagation technique. By working in partnerships, CIALCA knows what the key conditions and criteria for our partners to use our research outputs. Through its partnerships, CIALCA has achieved the following development outcomes.

**(1)** Increase income for rural households: Through their involvement with the IP, more farmers in Kadahenda, Rwanda have been linked to a micro-finance institute to access credit, resulting in increased incomes. Farmers in DRC re-invested money earned from collective management of land to expand their activities and increase their income.

**(2)** Better nutrition for rural households: CIALCA has tested Vitamin A-rich bananas in Kayonza (eastern Rwanda) with the

local IP. We have received valuable feedback from farmers on what is important for them in the case of bio-fortified crops. In Kadahenda (northern Rwanda), crop-livestock integration was tested with farmers to improve food, income, and nutrition security. A solidarity scheme was successfully implemented to sustain the distribution of cattle together with the Rwanda Agricultural Board.

**(3)** Sustainable natural resource management: Through a coordinated initiative called “Hilltop Approach,” the platform in DRC has successfully maintained a mechanism that allows R4D partners to establish demonstration plots at hilltops to showcase proven technologies to farmers. To date, 1500 households from 11 farmer groups from Lubona and Mushinga groups are engaged in the Hilltop Approach. The initiative has

encouraged farmers’ adoption of ISFM technologies promoted by CIALCA and INERA.

**(4)** Enhanced innovation capacity: Overall, the IPs have provided new opportunities to its members in terms of identifying and overcoming their key constraints. Increased collaboration between IP actors in Kadahenda (northern Rwanda) allowed farmers to access collective potato seed storage facilities (DLS).

The key lessons learned from working through multi-stakeholder IPs have been captured in a guideline booklet that was developed for agricultural development agencies. The guidelines strongly build on CIALCA experiences and seek to provide a realistic image of what innovation platforms can and cannot achieve when it comes to supporting agricultural R4D.

# THEME 3:

## Improving ‘whole farm’ productivity in smallholder systems

Improved intercropping, disease and nutrient management technologies have contributed to enhanced productivity, soil fertility and disease control



**T**he cassava-legume and banana-legume intercropping systems predominate in the African Great Lakes region. Declining farm productivity and the supporting natural resources, especially fertility of soils, is a critical problem for the resource poor households in this region. This has been aggravated by diseases (e.g. BXW) rapidly changing the composition of agroecosystems in the region. CIALCA's research on 'Improving Whole Farm Productivity' in the region is focused on improving household productivity, nutrition, incomes, and resilience of natural resources through:

- **Assessing options for livestock integration into the agroecosystems;**
- **Understanding changes in land use/cropping patterns in landscapes affected by BXW; and**
- **Exploring strategies for the recovery of productivity, incomes,**

#### **nutrition, and natural resources in banana farms and landscapes affected by BXW through systems interventions.**

Improved intercropping, and disease and nutrient management technologies have contributed to enhanced productivity, soil fertility, and disease control.

#### **ACHIEVEMENTS AND LESSONS LEARNED**

- #1 Whole farm productivity research was carried out by multi-disciplinary teams across various agroecological zones focusing on maize, cassava, and banana cropping systems.**

- #2 Effective use of organic manure with chemical fertilizer has increased beans productivity from 680 kg/ha to 1067 kg/ha and maize productivity from 2199 kg/ha to 2934 kg/ha among 463 farmers who participated in farmer adaptation trials in eight communities in eastern Rwanda.**

- #3 Legume rotational benefits increased maize productivity from 1452 kg/ha to 1790 kg/ha among 243 farmers who participated in farmer adaptation trials in eight communities in eastern Rwanda.**

- #4 Improved cassava-beans intercropping systems, using optimized crop arrangement, density, and small amounts of fertilizer increased beans productivity from 856 kg/ha to 1189kg/ha and cassava productivity from 11.9 t/ha to 14.0 t/ha among communities in Sud-Kivu, DRC.**

#### **KEY SCIENTIFIC OUTPUTS**

Blomme, G., K. Jacobsen, W. Ocimati, F. Beed, J. Ntamwira, C. Sivirihauma, F. Ssekiwoko, V. Nakato, J. Kubiriba, L. Tripathi, W. Tinzaara, F. Mbolela, L. Lutete, and E. Karamura. 2014. Fine-tuning banana Xanthomonas wilt control options over the past decade in East and Central Africa. *European Journal of Plant Pathology*, 139: 265–281. DOI 10.1007/s10658-014-0402-0.

Blomme, G., W. Ocimati, C. Sivirihauma, L. Vutseme, B. Mariamu, M. Kamira, B. van Schagen, J. Ekboir, and J. Ntamwira. 2017. A control package revolving around the removal of single diseased banana stems is effective for the restoration of Xanthomonas wilt infected fields. *European Journal of Plant Pathology* DOI: 10.1007/s10658-017-1189-6.

Blomme, G., W. Ocimati, J.C.J. Groot, J. Ntamwira, L. Bahati, D. Kantungeko, R. Remans, and P.A. Tittone. (in press). Agroecological integration of shade- and drought-tolerant food/feed crops for year-round productivity in banana-based systems under rain-fed conditions in central Africa. *Acta Hort.*

Ntamwira, J., C. Sivirihauma, W. Ocimati, M. Bumba, L. Vutseme, M. Kamira, and G. Blomme. 2017. Macropropagation of banana/plantain using selected local materials: A cost-effective way of mass propagation of planting materials for resource-poor households. *Eur. J. Hortic. Sci.* 82(1), 38-53. DOI: 10.17660/eJHS.2017/82.1.5.

Ntamwira, J., P. Pypers, P. van Asten, B. Vanlauwe, B. Ruhigwa, P. Lepoint, B. Dheda, T. Monde, M. Kamira, and G. Blomme.

2014. Effect of banana leaf pruning on banana and legume yield under intercropping in farmers' fields in eastern Democratic Republic of Congo. *Journal of Horticulture and Forestry*, 6(9): 72-80.

Ocimati, W., J.C.J. Groot, P.A. Tittone, and G. Blomme. (in press). Effects of banana Xanthomonas wilt and other banana diseases on ecosystem services in banana based agroecosystems. *Acta Hort.*

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Vanlauwe, B., K. Descheemaeker, K.E. Giller, J. Huisling, R. Merckx, G. Nziguheba, J. Wendt, and S. Zingore. 2015. Integrated soil fertility management in sub-Saharan Africa: Unravelling local adaptation. *SOIL* 1, 491-508.

Vanlauwe, B., D. Coyne, J. Gockowski, S. Hauser, J. Huisling, C. Masso, G. Nziguheba, M. Schut, and P. van Asten. 2014. Sustainable intensification and the African smallholder farmer. *Current Opinion in Environmental Sustainability* 8, 15-22.

Vanlauwe, B., G. Blomme and P. van Asten. 2013. Agroecological intensification of farming systems in the East and Central African Highlands. In: B. Vanlauwe, P. van Asten, and G. Blomme (Eds.). *Agro-Ecological Intensification of Agricultural Systems in the African Highlands*. Earthscan from Routledge. pp. 1-19. Available at: [www.tandfebooks.com/isbn/9780203114742](http://www.tandfebooks.com/isbn/9780203114742).

#### **DEVELOPMENT OUTCOMES**

Farm productivity and income in the banana-based east and central African regions has been heavily constrained by land pressure and biotic factors. Fields are continuously cultivated, season after season, resulting in low soil fertility and low productivity. This has been further compounded by the widespread and gradual destruction of the banana crop, a foundation species with multiple ecosystem benefits, following the outbreak of BXW. Maintaining whole farm productivity in these regions has been a key research focus in South Kivu, east DRC, especially at sites where BXW has severely affected small-scale farmer livelihoods.

Cultural control packages including the application of SDRS have proven to be effective. However, strategies for minimizing stress and food, nutrition, and income insecurity in affected households during the recovery of banana fields to pre-infection yield levels are necessary. Integration of high yielding and nutrient-rich annual crops form the first and easiest options for maintaining whole farm productivity. Numerous on-farm trials were carried out in banana plots with various levels of shade to pinpoint suitable annual intercrops and best practices. For example, bean types and amaranth perform markedly better when shade levels are low while acceptable yields can be obtained under higher shade

levels for yam, cassava (for leaves), taro, and red bird-eye chili pepper.

Integration of multipurpose tree/grass hedges at the edge of plots/fields for preventing erosion on steep slopes, as well as boosting nutrient recycling, mulch, green manure and/or fodder production have been explored for improved soil nutrient management and potential integration of small ruminants. These intensification and diversification options will offer input for further bio-economic modelling of farms/trade-off analysis. In addition, research on drought-tolerant crops for integration in banana-based systems during the dry seasons

revealed that Mucuna (when planted two months before the start of the dry season) was a good cover crop. It generated a huge biomass for use as mulch or green manure while chick peas are promising. Novel agronomic practices (i.e., banana leaf bending to prevent disease transmission and low-cost macro-propagation units) complement the recovery effort. The package focusing on disease control, diversification, and improved agronomy has attracted attention from FAO, Government Organizations (e.g. INERA) and NGO partners (e.g. CRS and World Vision) leading to an initial out-scaling drive. It is hoped that additional out-scaling interests will emerge in 2017/2018.

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## THEME 4:

### Insights in gender and youth dynamics to enhance the targeting of development interventions



### CIALCA technologies have been able to reduce the "gender gap" in technology adoption and have empowered women

Women's and men's opportunities and constraints to adopt agricultural innovations often differ from one country to another in Central African community contexts. Gender and other social characteristics (i.e., age and ethnicity) often influence an individual's capacity to innovate and gain access to extension services. Therefore, it is essential to understand how similarities and differences are created and sustained, often through social relations, in the communities where we work. This will help us improve target and optimize planning for R4D interventions.

How can we better identify the needs of men and women and utilize those findings to design improved and more efficient mechanisms to reach vulnerable groups in the community? Understanding contextual norms and social relations is key to assure that interventions are not potentially harmful to specific (vulnerable) groups. Case studies and gender analyses have enabled us to assess poverty across different contexts and the ways in which women and men may fall into, or move out of poverty traps. Findings revealed information for CIALCA to come up with strategies to tailor innovations to meet the specific needs of community members. Such insights will help us to develop more appropriate interventions for specific (vulnerable) social groups. CIALCA technologies explicitly target men and women to optimize technology adoption.

Apart from optimizing technology adoption, the conducted gender studies also allow us to take a step back and think more broadly about gender inequality and the generally disadvantaged position of women in Burundi, Rwanda and eastern-DRC. Can we contribute to eliminating the root-causes of gender inequality? What is the position of the CIALCA team on gender-inequality and how can we assure that our R4D interventions and activities don't perpetuate gender inequalities?

#### ACHIEVEMENTS AND LESSONS LEARNED

#1 Household survey data on the uptake of improved legume and maize varieties for South Kivu, DRC shows that uptake is highest among female headed households. These results suggest that CIALCA has contributed to closing the gender gap on adoption impact when looking at adoption based on the sex of the household head.

#2 Based on survey data in South Kivu, male and female household heads were reported to adopt improved beans at rates between 86-94% of all households. In male-headed households, all female-owned plots were reported to be planted with improved bean varieties. Women's average plots sizes are smaller than male-owned plots. Women's autonomous land ownership was one of the factors that influences women's participation in decisions. In focus group discussions, results showed that women performed most of the production tasks associated with beans. Women also sells beans and consults with their husbands on how to use the money from the sales. Lessons from these findings demonstrate that CIALCA has made important contributions to closing gender gaps through introduction of improved varieties. However, gaps in assets and financial management still exist and require continued targeting efforts.

#3 In South Kivu a survey was conducted with several household members per household about involvement in banana farming and control of the banana disease Xanthomonas Wilt. The objective was to increase understanding of intra-household dynamics in relation to BXW control and to identify household characteristics that favor successful BXW control. Analysis is still ongoing but preliminary results suggest that both men and women are involved in BXW control but that they get their information about BXW control from different sources. Where men learn about BXW from NGO's churches and researchers, women tend to learn from friends

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and family in their social network. Such results could indicate that women are less integration into extension networks than men.

- (18) #4 In our data from the GENNOVATE case-study conducted in Kayonza, Rwanda, women and men, both young and older, express diverging opinions about the current norms associated with women's mobility, engagement in economic activity and inclusion. On the one hand norms restricting women's mobility and inclusion seem to be relaxing but on the other hand they are also still frequently mentioned. In our data it was especially the female youth who emphasized the actuality of norms that associate women's mobility with sexual promiscuity. Most of the girls argue for instance that a 'respectful wife' will not leave the house without informing her husband or even asking him for permission. Adult women on the contrary emphasize the relaxation of these norms, one adult woman describes the change as follows: "It was not only in the mind of women but also in the men's mind; women going out, was not seen well. Now, the husband encourages his wife to work and bring money home. You are no longer obliged to ask everything from the husband". As much as women seem to increasingly engage in domains which were formerly exclusively the domain of men, as little do men venture into 'female domains' such as in the domestic sphere (food preparation, child's care, cleaning) but also in relation to crop-management (weeding).

## KEY SCIENTIFIC OUTPUTS

GENNOVATE (in press) A global comparative research initiative, which addresses the question of how gender norms and agency influence men, women, and youth to adopt innovation in agriculture and natural resource management. First publications will be available end 2016 on <https://gender.cgiar.org/collaborative-research/gennovate>.

GENNOVATE RTB-HT team, 2017. Gender in Agricultural Change: Towards more inclusive innovation in farming communities. GENNOVATE Report to the CGIAR Research Programs on Roots, Tubers and Bananas and Humidtropics.

GENNOVATE Research Paper, RTB, Lima, Peru. Lambrecht, I., B. Vanlauwe, and M. Maertens. 2016. Agricultural extension in Eastern Democratic Republic of Congo: Does gender matter? European Review of Agricultural Economics. Available at: <http://erae.oxfordjournals.org/content/early/2016/01/20/erae.jbv039.abstract>.

Rietveld, A. 2017. Gender norms and agricultural innovation: Insights from Uganda Anne Rietveld. In: Sustainable intensification in smallholder agriculture: An integrated systems research approach. Edited by I. Öborn, B. Vanlauwe, M. Phillips, R. Thomas, W. Brooijmans and K. Atta-Krah. Routledge. Taylor & Francis Group.

de Bruijn, M. 2016. From peasantry to profit Entrepreneurial Farming in Rwanda: The Constraints and Opportunities for Female-headed Households in Transitioning away from Peasantry through a State-run Modernization Model. Master (major) thesis for the Knowledge, Technology, and Innovation Group submitted in partial fulfillment of the degree of Master of Science in Development and Rural Innovation at Wageningen University, the Netherlands. [http://www.cialca.org/fileadmin/Cialca-uploads/documents/student-theses/M.A.\\_de\\_Bruijn\\_Thesis\\_Final.pdf](http://www.cialca.org/fileadmin/Cialca-uploads/documents/student-theses/M.A._de_Bruijn_Thesis_Final.pdf).

## DEVELOPMENT OUTCOMES

Scientific outputs have strengthened efforts to target and effectively reach particular groups, such as women and youth. A gender norms study was conducted in Kayonza to better understand constraints for women and youth in agriculture. This was followed up by MSc research (de Bruin, 2016) that explored the gender implications of the Rwandese Crop Intensification Program. We also experienced that working through the innovation platforms empowered women and men of different age; providing more equal access to inputs, information and services. In Burundi, surveys and focus group discussions led to a better understanding of the gender implications of introducing pigs in smallholder livelihood systems, based on which alternative and complementary strategies were identified to avoid unintended outcomes on gender.

# THEME 5:

## Value chain and credit innovation that link smallholders, youth, and women to markets

Households adopting CIALCA value chain innovations have improved food security and purchasing power



**T**hrough their involvement in multi-stakeholder IPs, farmers in northern Rwanda have been linked to a micro-finance institute and now have access to credit. A recent impact study shows that households adopting CIALCA value chain innovations have improved food security and purchasing power.

CIALCA supports different groups of Youth Agripreneurs in the Central Highlands. The IITA Kalambo Youth Agripreneurs (IKYA) program in eastern DRC aims at developing viable models for youth entrepreneurs that can be scaled up to create employment for youth in agricultural enterprises. The group operates as a self-managed semi-independent group that develop enterprises around IITA technologies and emerging business opportunities. In 2015, the core enterprises included soy and cassava processing, seed multiplication, vegetable production, sale of high quality maize and cassava flour, and fish farming. Each enterprise is initially explored at pilot-scale. It is up-scaled when the skill level is sufficient and the business case is promising.

## ACHIEVEMENTS AND LESSONS LEARNED

- #1 **IKYA was established in 2014 to channel the energies of unemployed university graduates towards agri-enterprises. It has supported the transformation of several CIALCA research outputs/products into profitable enterprises. It has also become ‘business-builders’ for other youths in the urban and rural areas.**
- #2 **IKYA trained 667 people from partner organizations in 2015.**
- #3 **The group (15 males and 5 females) presently owns 14 ha cassava farm, 10 ha maize farm, 4 bean farms, 15**

**fish ponds (for tilapia and cat fish), and processes an average of 4 tons of high quality cassava flour (HQCF) and similar quantity of high quality maize flour.**

- #4 **IKYA owns a big marketing center in Bukavu City for selling its produce/products, as well as those of its affiliate youth groups and farmer organizations. It uses its enterprises as incubation centers for both the urban youth and rural youths.**
- #5 **IKYA has currently different modes of out-sourcing/contract agreements with 34 youth groups in South Kivu.**

## KEY SCIENTIFIC OUTPUTS

Lamers, D., C. Okafor, M. Sartas, and M. Schut, et al. 2015. Building multi-stakeholder processes in agricultural research for development in Burundi, Rwanda, and DRC. Case study developed under the CGIAR Research Program on Integrated Systems for the Humid Tropics (Humidtropics). Wageningen University (WUR) and the International Institute of Tropical Agriculture (IITA). Case studies are available online: <http://humidtropics.cgiar.org/case-studies-building-multi-stakeholder-processes-in-burundi-rwanda-and-drc/>.

## DEVELOPMENT OUTCOMES

IKYA has enabled rural farmers to have access to Bukavu Market (e.g. IKYA has trading agreements with eight community-based cassava processing centers to buy and sell their HQCF). IKYA provides embedded services such as training, technical backstopping, and quality control part of transactional relationship.

Table 3 presents the average treatment effects on the treated (ATT) of adopting CSI technologies on crop income in the Great Lakes region. In Burundi, adopters earned \$49.7 more from the adoption of the CSI technologies while non-adopters would have earned about \$50 had they adopted the same technologies. Similarly, in DRC, the gain derived from the adoption of CSI technologies is \$12.6 compared to \$59.7 that would have been gained by non-adopters had they adopted the

same. The gain is relatively smaller in Rwanda where adopters gained \$7.9 compared to \$20.6 that would have been gained by non-adopters. Overall ESR estimates show that adoption of CSI technologies had a positive and significant effect on crop income in the Great Lakes region. While the current adopters had benefited from CSI technologies in the region, non-adopters would have benefited more had they adopted the same technologies.

**Table 3: ESR-based average treatment effects on the treated (ATT) and untreated (ATU) of the adoption of CSI technologies on crop income**

Country	Farm households' type and treatment effect	DECISION STAGE		Average treatment effects
		To adopt	Not to adopt	
BURUNDI	Households who adopted-ATT	62.2	12.6	49.7***(t = 37.4)
	Households who did not adopt -ATU	58.6	8.3	50.3***(t = 20.2)
DR CONGO	Households who adopted-ATT	18.9	6.4	12.6***(t = 3.6)
	Households who did not adopt -ATU	76.0	16.3	59.7***(t = 9.5)
RWANDA	Households who adopted-ATT	23.3	15.5	7.9***(t = 7.6)
	Households who did not adopt -ATU	28.8	8.3	20.6***(t = 5.0)

# THEME 6:

## Dietary diversity and nutritious foods to enhance human health

**CIALCA has championed the use of nutrient-dense foods and dietary diversity to improve nutrition while enhancing production resilience**

**T**hrough CIALCA research and IPs, the major barriers to improving dietary quality in the Great Lakes regions have been identified:

- Limited access to appropriate knowledge with regards to nutrition practices (basic nutrition concepts, postharvest handling, dietary diversity/combination, food safety, and hygiene); and
- Limited access to a range of highly nutritious food items to ensure nutrient adequacy throughout the year, particularly among vulnerable population groups.

CIALCA has championed the use of nutrient-dense foods and dietary diversity to improve nutrition while enhancing production resilience.

## ACHIEVEMENTS AND LESSONS LEARNED

A combination of three main entry points serves as the strategy to address nutrition barriers in the Great Lakes region:

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**#1 Increasing supply of a diversity of nutritious foods through diversification of production, value chains, and markets with nutrient dense food items and varieties;**

**#2 Increasing sustainability and incentives for producing and marketing nutritious foods through generating win-win options for income, nutrition, and environment-related outcomes; and**

**Increasing demand for a diversity of nutritious foods through nutrition knowledge trainings, marketing, and empowering underlying determinants of diverse diets.**

### KEY SCIENTIFIC OUTPUTS

DeFries, R., J. Fanzo, R. Remans, C. Palm, S. Wood, and T.L. Anderman. 2015. Beyond calories: Metrics for land-constrained agriculture. *Science* 349: 238-240. Available at: <http://science.sciencemag.org/content/349/6245/238>.

Ekesa, B., V. Johnson, G. Kennedy, D. Nabuuma, I. Van den Bergh, and W. Ocimati. 2017. A community resource persons' training guide: Improving food and nutrition security through banana-based farming systems and foods. *Scripta Horticulturae* No. 19. Available at: <http://www.ishs.org/scripta-horticulturae>.

Ekesa, B., D. Nabuuma, G. Kennedy, and I. van den Bergh. 2017. Evaluation of sensory attributes of provitamin a carotenoids-rich banana cultivars on trial for potential adoption in Burundi and eastern Democratic Republic of Congo. *European Journal of Horticultural Sciences (EJHS)* (Accepted).

Ekesa, B., J. Jagwe, G. Kennedy, and I. van den Bergh. 2017. Determinants of a household expenditure and consumption of animal source foods in Rwanda. Submitted to the *African Journal of Food Agriculture, Nutrition and Development* (feedback not yet received).

Ekesa, B., D. Nabuuma, G. Blomme, and I. van den Bergh. 2015. Provitamin A carotenoid content of unripe and ripe banana cultivars for potential adoption in Eastern Africa. *Journal of Food Composition and Analysis* 43: 1-6. Available at: <http://www.sciencedirect.com/science/article/pii/S0889157515001118>.

Herrero, M., P. Thornton, B. Power, J. Bogard, and R. Remans, et al. 2017. Farming and the geography of nutrient production for human use: A transdisciplinary analysis. *The Lancet Planetary Health* 1: e33-42

### DEVELOPMENT OUTCOMES

A key barrier to healthier diets identified in the research and IPs is limited access to knowledge on good nutrition-related practices. Using insights from the agrobiodiversity and other qualitative studies, and in collaboration with the program Harvest Plus, the team set up nutrition training sessions adapted to the local context and needs. Nutrition education materials were developed and adapted to the local settings and were also made available to other development partners.

In March 2016, a total of 70 Kadahenda IP members were trained on nutrition, diet quality and diversity, and related production and cooking practices, building on the gained scientific insights. They later received a refresher training course in October 2016. In addition, the trainees were also provided with inputs to facilitate formation and maintenance of a nutritious kitchen garden. This was carried out in collaboration with Gardens for Health, an NGO working within the same region. Following this training, the 71 IP members in Kadahenda served as community resource persons. By February 2017, a total of 453 farmer households had been reached directly with key messages following the training (see attached report).

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Between 25 and 27 April 2017, a total of 31 Kayonza IP members (14 women and 17 men) were also trained on nutrition, diet quality and diversity, and related production and cooking practices, building on the gained scientific insights. Participants were very enthusiastic and each got hold of a copy of the training manual translated in Kinyarwanda. They took the initiative to transfer the knowledge and training methods to community members and set up nutrition training themselves. By June 2017, the 31 IP members had directly reached 320 households with key messages following their training (see attached report on Kayonza IP training and community training). The training sessions met scientific insights together with cultural traditions and demand for improving well-being. New insights from ongoing studies (on diets, gender, and agricultural intensification) are further incorporated in the community training. These provide a unique bridge between science, culture and development, contributing to more diverse diets of children and mothers.

CIALCA agrobiodiversity studies in South Kivu and Burundi further demonstrated potential to leverage available biodiversity for improving diets. While vegetables and fruits are often missing in people's diets, it was revealed that a large variety of vegetables and fruits are available in small amounts in the area and the diversity can help to cover the seasonal gap in food availability and diversity. In South Kivu and Burundi, follow up studies are ongoing to establish changes in livelihoods with specific focus on consumption patterns among the target populations. However, results are still being analyzed. In addition, several crops are tested in on-farm trials (i.e., in Rwanda, banana trials with varieties naturally rich in Provitamin A carotenoids are still undergoing agronomic evaluation).

Following an urgent need to ensure the target farmers have a great understanding of the Vitamin A-rich bananas and can participate and take an active role in selecting their preferred varieties, sensory evaluations were carried out in June 2017 in Kayonza. This involved organoleptic testing of the varieties under trial alongside the local varieties. Findings are still undergoing analysis (preliminary report attached). The objective is to have farmers select varieties that they prefer for incorporation within their agri-food systems targeting dietary diversity. Agrobiodiversity assessment is also ongoing and this will serve as a guide to further investments in entrepreneurial vegetable and fruit production



# THEME 7:

## Capacity building of individuals and institutions

**CIALCA successfully trained more than 30 post-graduate students and over 1000 partner staff in their research and development skills**

**C**IALCA is strongly committed to building capacity in a region that had lost much of its best agricultural researchers during the long period of conflicts and strife. To ensure a food secure future, it is essential to enhance the capacity of farmers, project partners, and research institutions to overcome challenges in the agricultural sector. To do this, CIALCA prioritized capacity development as major component in agricultural R4D. Research outputs were converted to factsheets and videos in Kirundi, Kinyarwanda, and Kiswahili coupled with radio and TV programs to reach out to farmers. Furthermore, demonstrations, farmer field schools (FFS), field days, and exchange visits were organized to share knowledge.

CIALCA successfully trained more than 20 post-graduate students and over 1200 partner staff in their research and development skills. By investing in young talent, CIALCA has strengthened the capacity of science, development, and policy

### ACHIEVEMENTS AND LESSONS LEARNED

- #1 Throughout the past 10 years, CIALCA has trained over 55 graduate students (20 PhDs and 35 MSc) and more than 125 BSc students who now occupy strategic jobs such as Directors and Department Heads in national research institutes and central governments.
- #2 Enhanced upstream research and post-graduate training in collaboration with universities in Belgium and the Netherlands.
- #3 Capacity development at the institutional level was achieved through close research collaboration with RAB, ISABU, and INERA.
- #4 Impact assessment indicates that capacity building has contributed to the empowerment and self-organization of communities to address agricultural challenges.

### KEY SCIENTIFIC OUTPUTS

All student reports and theses can be downloaded from the CIALCA website: <http://www.cialca.org/resources/student-theses>.

### DEVELOPMENT OUTCOMES

CIALCA has played an important role in capacity building for farmers and project partners in the Great Lakes region over the past years with significant progress in human development and increased productivity. To strengthen the capacity of extension workers, research outputs were converted to manuals and factsheets, and radio programs were used to reach out to farmers. Furthermore, FFS, field days, and exchange visits were conducted to share knowledge.

Participatory assessment of capacity building needs is conducted and training of trainers organized under specific conditions for farmers and partners on improved agricultural practices. It ranged from appropriate varieties and seed systems through improved soil and crop management technologies, pest and disease control, nutrition and dietary diversity (including postharvest processing and gender), and work with farmer organizations to strengthen their efforts through collective marketing. Strong linkage and partnership is built with Belgian institutes [Katholieke Universiteit Leuven; Université Catholique de Louvain-la-Neuve (UCL); Faculté Universitaire des Sciences Agronomiques de Gembloux (FUSAGx); and WUR] for upstream research and post-graduate training for NARS with technical and supervisory support to students in home-based universities.

Within these framework and partnerships, over 20 BSc, 10 MSc, and 2 PhD students completed their studies during the 2016/2017 academic year. Additionally, the project strengthened the capacities of about 1200 farmers through in-field trainings and on-farm trials in Burundi, Rwanda, and DRC.

# CIALCA in the news

(26) CIALCA provides an important knowledge platform for R4D partners in the Great Lakes region. CIALCA seeks to actively start and support discussions on how to enhance food, income, and nutrition security in countries where it is active, as well as regionally and globally. CIALCA uses various media to communicate its findings. Besides the scientific channels, it also seeks to reach policy, development, and business sectors through traditional and modern (social) media.

## CIALCA WEBSITE

The CIALCA website ([www.cialca.org](http://www.cialca.org)) is our main repository and outlet for communicating our progress and science outputs.



Over 2016, there were 1254 sessions from 943 different users. They spent an average of 2 minutes on the site and viewed 2.1 pages. After the homepage, the publications pages were the most popular (453 views - no data for actual downloads). Top 10 countries visiting in ranked order were USA, France, Belgium, UK, Netherlands, Italy, Rwanda, India, Nigeria, Ukraine. DRC was 16th, Burundi was 19th.

## Glo.be

The September-December 2016 edition of Glo.be has dedicated a 2-page article to CIALCA, describing it as a 'success story for the Belgian Development Cooperation' projects. The article describes some of CIALCA's achievements as well as the 'refreshing' of its strategy for continued and improved impact in Central Africa. An example is by making better use of ICT for the scaling of banana disease management innovations and by working together more strongly with the private sector. The magazine can be downloaded here in French and Dutch.

### IMPLIQUER PLUS POUR PLUS D'IMPACT

Les défis en matière de développement sont souvent complexes et inter-dépendants; ils ne peuvent être résolus à un seul niveau ou par un seul acteur. Depuis 2006, un ambitieux consortium scientifique en Afrique centrale a fait grandement progresser la recherche intersectorielle. Un succès de la Coopération belge au Développement.

20 à 40% des petits exploitants sont incapables d'améliorer significativement leurs moyens de subsistance grâce à l'agriculture. Ils ont besoin de nouvelles technologies extra-agricoles.

2015 fut une année charnière dans le développement international. L'adoption des objectifs de développement durable (ODD) à l'unanimité par l'ONU le programme d'actions d'Addis-Abeba pour un cadre global de financement du développement après 2015 et, enfin, l'Accord de Paris qui a réaffirmé une période tant attendue dans le domaine du changement climatique. Au départ de ces réalisations, on trouve une action commune qui agit simultanément sur plusieurs fronts. Mais comment obtenir des résultats concrets? Le Consortium for Improving Agricultural Livelihoods in Central Africa (CIALCA ou Consortium pour l'amélioration des moyens de subsistance agricoles en Afrique centrale) a joué un rôle de pionnier dans la recherche appliquée, ainsi que dans des partenariats innovants au Rwanda, au Burundi et en RDC. Il contribue à trois objectifs globaux: réduire la pauvreté, accroître la sécurité alimentaire et améliorer la gestion des écosystèmes (voir Dimension 3, 1/2014, p. 17). L'approche intervient dans 11 des 17 ODD au moins. Elle fournit un excellent point d'entrée pour améliorer la vie des populations et leur environnement dans la région des Grands Lacs. Les sujets de recherche abordés sont par exemple: comment la gestion durable maladie du bananier peut-elle conduire au développement d'un secteur de la viande, mais aussi à un meilleur accès à des cultures riches en nutriments? Quelle est la portée réelle de la recherche axée à l'autocatalyseur des femmes? Comment les innovations de système agricole peuvent-elles contribuer à une alimentation plus saine, plus durable et plus accessible? Comment des plateformes composées de différents partenaires peuvent-elles influencer positivement les résultats? À l'heure actuelle, le consortium a 10 ans. Sa croissance s'est déroulée en 3 phases. Dans la première phase, l'accès a été mis sur la recherche et le développement dans le secteur agricole. CIALCA a essayé d'améliorer les systèmes de culture locaux et a introduit de nouvelles technologies de lutte contre les parasites et les maladies. Cette phase a favorisé des interactions avec les organisations de recherche des trois pays. Plusieurs collaborations ont pu mener une formation en recherche en partenariat avec les universités locales et belges. Une deuxième phase a privilégié la promotion et la diffusion à plus large échelle des nouveaux produits et technologies. Elle s'est appuyée sur des investissements dans les consommateurs et des partenariats avec des ONG locales et des plateformes de services pour la vulgarisation, qui ont été créés en 2011. La CIALCA est devenue une plateforme modulaire pour un programme scientifique et de développement plus complet. Grâce

### DE SECTEURS

aux années d'investissement dans l'innovation et aux partenariats, le CIALCA a pu faire des activités et mettre en place des réseaux complexes d'un large panel d'acteurs régionaux. Au total, sept thèmes de recherche ont été identifiés (voir infographie).

Quelles sont les réalisations et les leçons tirées? Quelle voie suivre? Le CIALCA a élaboré et appliqué une stratégie de partenariats technologiques incluant des machines de services performants ou des innovations de marketing et passées par la gestion des paramètres et des maladies. Les agriculteurs qui ont adopté des technologies gagnent davantage. Plus d'un demi-million d'agriculteurs au Burundi, au Rwanda et en RDC ont sorti de la pauvreté. Le CIALCA a contribué de manière significative au progrès dans le domaine de la gestion de la fertilité des sols, des indicateurs de planification pour les petits exploitants, et de l'efficacité de la vulgarisation agricole et d'autres modalités de partenariat pour soutenir les agriculteurs. CIALCA s'est rendu compte de l'importance de la collaboration entre les intervenants dans les secteurs agricole, commercial, environnemental et alimentaire pour un impact aussi large que possible.

**CIALCA est en train de réduire la pauvreté**  
L'impactation des revenus et des dépenses des ménages est liée au réseau de partenariats.

Année	Revenu moyen annuel	Expenditure moyenne annuelle
2010	559,811	425,725
2011	581,814	438,114
2012	612,214	475,114

Plus de 100 000 personnes ont été aidées à sortir de la pauvreté.

Les nouvelles technologies améliorent la production, la fertilité des sols et la qualité des rendements. L'adoption de la technologie permet d'augmenter la production de:

Produit	Quantité	Augmentation
Maïs	1.067 t/ha	+21%
Manioc	2.934 t/ha	+10%
Soja	2.199 t/ha	+3%

Nouvelles recommandations de lutte contre la maladie du bananier (BBD) peuvent réduire les pertes de rendement de 90%.

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# 10 years of CIALCA celebrations

The year 2016 marked a milestone as CIALCA celebrated its 10th Year Anniversary. During this time, CIALCA has contributed to lifting over half a million people out of poverty in Burundi, Rwanda, and eastern DRC. In celebration of this momentous event, IITA and Bioversity International organized a cocktail side-event during the 7th FARA Science Week in Kigali, Rwanda. The invited speakers were:

**The Belgian Ambassador to Rwanda (CIALCA is funded through the Belgian Directorate General for Development Cooperation);**

**Dr Murekezi, former CIALCA and currently the Director General of Agricultural development in the Rwanda Ministry of Agriculture and Animal Resources; and**

**Dr Ken Dashiell, Director of Partnerships at IITA, who played a major role in the creation of CIALCA.**

A blogpost on the event was posted on the IITA website and on the CIALCA website.

<http://bulletin.iita.org/index.php/2016/07/01/cialca-marks-a-decade-with-over-half-a-million-farmers-out-of-poverty/>

<http://www.cialca.org/news/detail/cialca-helps-half-a-million-farmers-out-of-poverty/>

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### **BELGIAN EMBASSY PARTNER EVENT AND NEEDS ASSESSMENT**

On occasion, the Belgium Embassy in Kigali, Rwanda hosts networking events for partners and citizens. On 3 May 2017, CIALCA was invited to present their activities and plans to private sector organizations interested in agriculture and agricultural R4D. It was an opportunity for CIALCA to prepare for a review of private and public sector organizations and initiatives with Belgian ties and to assess their knowledge and research needs.

After an informative presentation, participants were asked to structure their comments and discussion around the following questions:

**1) Where can CIALCA/CGIAR play a complementary role?**

**2) Which elements of CIALCA's research resonate with you?**

**3) Which researchable questions do you have?**

The responses were enthusiastic, with several salient comments and food for thought. One participant highlighted the need for proper impact assessment, particularly 'research conducted independently and objectively.' The same participant also stressed insufficient reliable statistical and real-time data (i.e., production and yield data) needed to help them make accurate projections and business decisions. Linked to this is the lack of understanding about what causes the large gaps between expected and actual yields.

Another participant said: "I am very glad to see that you conduct not only technology development research but also social science research because we have questions about aspects of working with farmers, such as understanding farmers' mindsets and motivations to act in certain ways. For example, side selling, unsustainable agricultural practices, and delivery of low quality produce."

Other researchable questions suggested were about the irregular supply of agricultural feedstock, which obstructs export for private sector. "How can supply and demand be matched and stabilized? How can we increase farmers' product quality so that it meets contractual obligations?" One participant shared their experience of needing to start primary productions themselves after failing to obtain the required produce quality from smallholder farmers.

Availability of high quality seeds was also raised as a major challenge. One company indicated that they have been unable to obtain rice varieties adapted to specific climatic conditions.



(29)



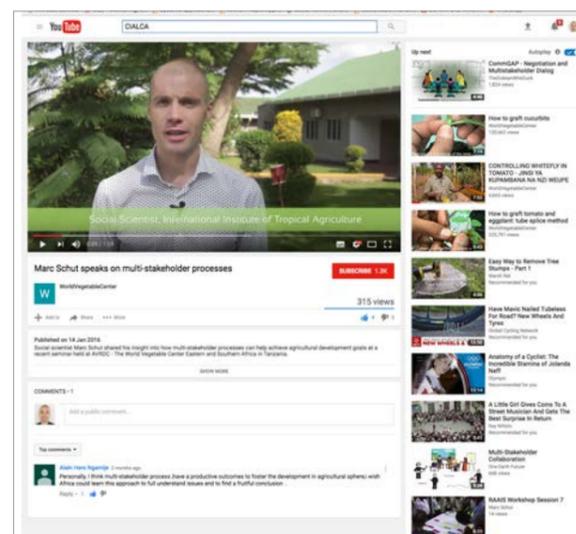
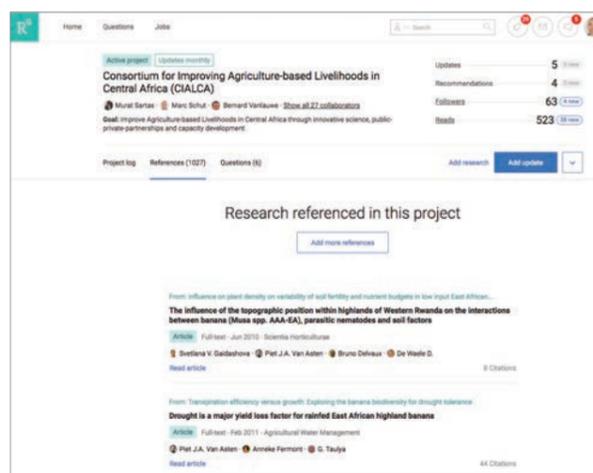
The evening was characterized by the revealing and dynamic exchange. CIALCA is pleased to see that there are so many areas in which research could contribute, and that there appears to be enormous untapped potential for collaboration with new partners. Some of the issues raised lie outside the current scope of CIALCA's research mandate but there is ample opportunity for bringing in expertise from other CGIAR centers in the region.

In the coming days, an online survey will be sent to the participants and organizations who will not be able to make it to the event. The questionnaire will be short and precise but will allow CIALCA and the Embassy of Belgium in Rwanda to learn more about individual organizations' challenges. Promising avenues for collaboration will be followed up.

# Social Media

(30)

CIALCA seeks to reach different types of audiences and uses different types of (social) media to achieve that. To reach a more general public, CIALCA is active on Twitter (@CIALCA\_R4D), YouTube, and Facebook. For more academic audiences, CIALCA clusters its science outputs on ResearchGate



## CIALCA TWITTER HIGHLIGHTS

In the last 15 months, CIALCA tweeted about:

- 10 CIALCA team and partner organizations;
- 7 programs, projects or initiatives;
- 7 countries in Africa and Europe; and
- 3 R4D approaches and toolsets.

CIALCA tweeted 52 aspects such as scaling, multi-stakeholder platforms, nutrition, agricultural growth, and trade.

CIALCA's Twitter account was used to disseminate CIALCA lessons, experiences, publications, findings, evidences, and impacts.

CIALCA tweeted not only about its aspects but also about other R4D interventions such as RTB, Humidtropics, EVOCA, PIM, IITA Youth Agripreneurs, and ACAI.

CIALCA tweeted about new approaches to improve the performance and cost-effectiveness of R4D interventions such as RAAIS, Scaling Readiness, and LESARD.

## NEW TIMES



### HOW IMPROVED BANANA GROWING HAS BOOSTED LIVELIHOOD IN KAYONZA

By: Jean D'amour Mbonyinshuti

Published: May 27, 2017

For many years, Eugene Rusanganwa used to practice traditional banana farming, resulting in low yields. He said that this was due to rudimentary practices, lack of modern farming skills, and unavailability of good banana seedlings, among other factors. In addition, the resident of Rukara Sector in Kayonza District says the region was experiencing diseases and drought, which denied them good yields. "I could hardly feed my family and was ranked among the poorest in the village," says Rusanganwa. But two years ago, the father of four, together with other farmers from two sectors in Kayonza, started collaborating to overcome their challenges. They received support from Rwanda Agriculture Board (RAB) in partnership with CIALCA, an innovative R4D partnership project.

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The full article can be accessed here:

[www.newtimes.co.rw/section/read/213187/](http://www.newtimes.co.rw/section/read/213187/)



Photo: Rusanganwa in his banana farm in Rukara Sector, Kayonza District. Photo taken by: Jean d'Amour Mbonyinshuti

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# Ambitions for the future

(32)

**C**IALCA thinks long-term and thereby, seeks to contribute to real transformation of agri-food systems in Central Africa. During the last phase, CIALCA has built in-depth problem-solving and analytical capacity together with Belgian universities, the Belgian Technical Cooperation (BTC), and other government, public, and private partners. Problems have been solved but new problems arose that CIALCA would like to continue to tackle.

CIALCA wishes to further advance delivering R4D in banana- and cassava-based agri-food systems. As proven over the past decade, CIALCA can leverage partnerships to connect farmers to a choice of options for transitioning out of poverty and for contributing to sustainable agri-food systems. We have a wealth of data and expertise that can support us in tailoring specific innovation and implementation models to different agroecological (e.g. highland, lowlands) and geographical zones (dynamic, intermediate or hinterland), as well as the needs and interest of farmers of different socio-economic, gender, and age groups engaged in different value chains.

CIALCA could achieve this through three distinct R4D pillars.

## 1. LEVERAGING OF PARTNERSHIPS FOR DEVELOPMENT

CIALCA can leverage active and effective public and private partnerships among partners along the agri-food system, matching demand, supply, and what happens in between. Together with partners, we can set up dynamic monitoring, evaluation, and learning systems that allow easy access and contribute to existing and new research findings, and monitor outcomes and impact. CIALCA can capture stakeholder demand for science products.

Priority-setting tools developed during Phase 3 of CIALCA can support the analysis of government strategies and a sustained engagement with investment actors. In doing so, CIALCA can continue to guide towards innovations and knowledge that can generate most impact. CIALCA is also ready to invest in exploring the use of ICT tools for information monitoring, feedback capturing, and dissemination. Mobile phone apps and web-based interfaces allow for a more rapid, cost-efficient, and tailored provision of information. Partners already have ICT expertise and invest in tool development but CIALCA can help design content and format, and test actual impact with the end-users.

## 2. CAPACITY DEVELOPMENT IN THE GREAT LAKES REGION

CIALCA aims to continue to deliver on capacity development in the Great Lakes region in view of the huge demands for state-of-the-art research methods and tools, and relevant agricultural and food system knowledge to meet the challenges small-scale farmers and their customers face. Based on previous experiences with visible results, capacity development needs to operate at various levels in close collaboration with the national agricultural research systems and Belgian partners. More specifically, CIALCA can build on the successes of the sandwich PhD system organized with Belgian partner universities and facilitate MSc training through regional universities. Participatory action research and continuous monitoring, evaluation, and learning with our partners ensures that we place our research 'in' development, which is an important strategy in developing institutional capacity for innovation and scaling.

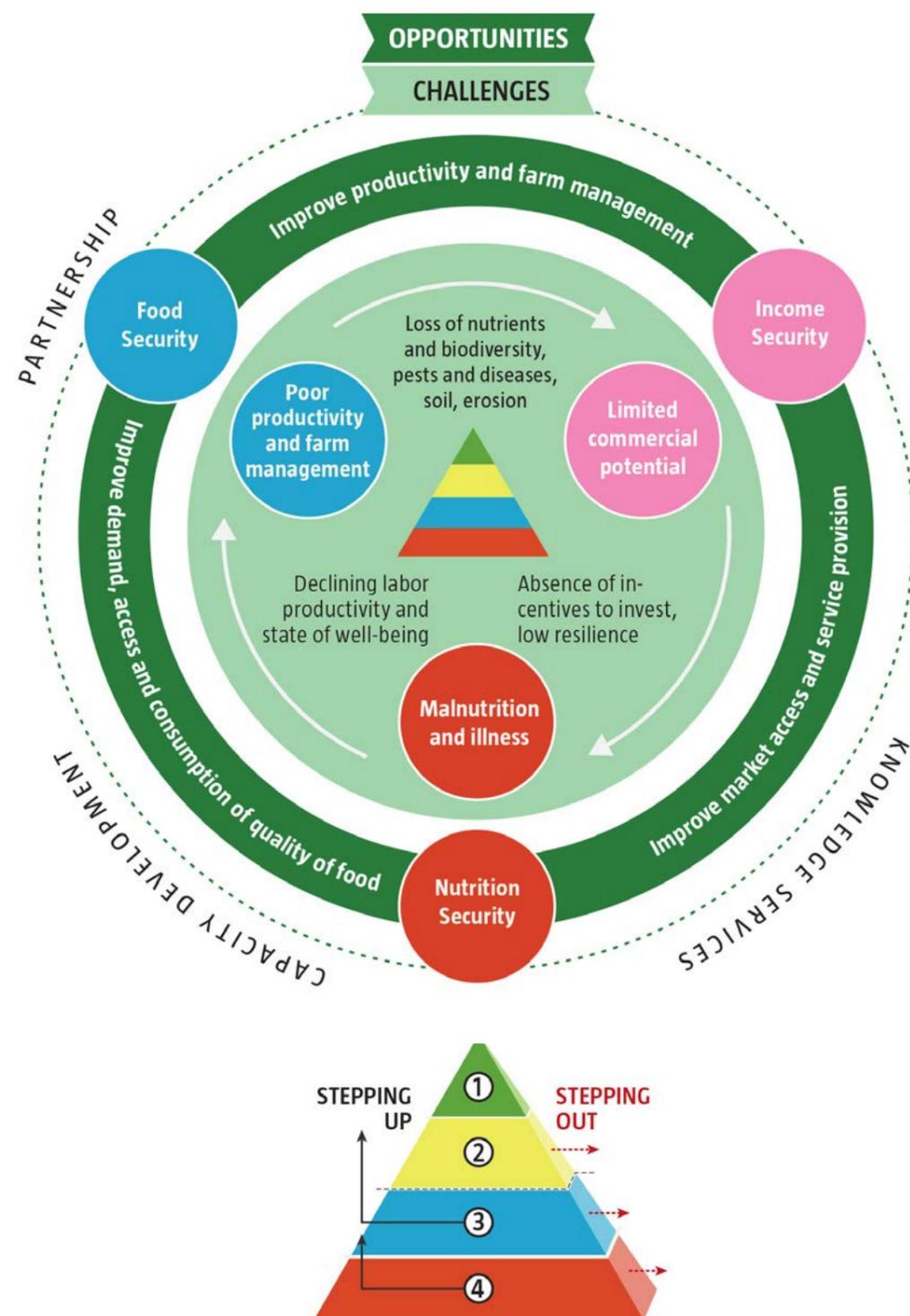
## 3. PROVISION OF KNOWLEDGE SERVICES

CIALCA is in a good position to further advance agri-food systems approach to provide novel insights on the potential adoption and ultimate importance of agricultural interventions for productivity, income, equity, nutrition, and environment (Figure 2). This can be achieved by placing agricultural innovations in the context of local food system dynamics and related dietary, market, and environmental trends and opportunities. This approach can then be applied with governments, public, and private partners who are working on agricultural interventions related to CIALCA expertise such as ISFM, BXW control, and intercropping in banana-and cassava-based systems.

(33)

Figure 2. CIALCA has the capacity to consider the interactions between key dimensions of the agri-food system.

(34)



## So, what are the future objectives to be achieved?

(35)

### OBJECTIVE 1

To leverage public and private partnerships for impact along the agri-food system and set up an inclusive, ICT-based monitoring, evaluation and learning (ME&L) system.

CIALCA has a 10-year legacy in the region, both in terms of its development impact and also through its partnerships and networks. This elaborate network can enable us to leverage CIALCA innovations with governments and other public and private sector development programs. While building on existing – strong – partnerships with the agricultural ministries and national research institutes, CIALCA can also advance collaboration with market parties (e.g. by linking farmers to agrifood processors) and non-governmental service providers (e.g. development organization with a track record of impact).

### OBJECTIVE 2

To strengthen the capacity of national scientists and practitioners to facilitate sustainable agri-food system transformation.

CIALCA can continue to deliver on capacity development in the Great Lakes region, an area that is still deprived of much of its science for development capacity. This is to respond to the huge demands for relevant agricultural knowledge to meet the many challenges small-holder farmers face. Capacity development

focuses both at the institutional level (strengthening skills and infrastructure of partners to conduct high quality research) and at the individual level (through MSc and PhD training) in collaboration with local and international universities.

### OBJECTIVE 3

To develop, validate, and avail best innovations and related implementation processes aiming at sustainably improving productivity, market engagement, and dietary quality tailored to the variability among producers and their customers in the Great Lakes region.

CIALCA can capitalize on its role as key knowledge partner in the agricultural domain in DRC, Burundi, and Rwanda. CIALCA's expertise focuses on technologies and innovations for sustainable intensification of roots, tubers and banana-based farming systems, as well as guidance on livelihood, dietary, and institutional innovations and implementation. Examples of such technologies include ISFM, banana/cassava-based intercropping with legumes, vegetables and fodder, and SDSR for BXW control. CIALCA's research has been proven to be adaptive and responding to the demand of the key actors in the food and agricultural sectors (i.e., both farming communities, as well as public and private sector investors in the area).

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# Acknowledgement

(36)

The Consortium for Improving Agriculture-based Livelihoods in Central Africa (CIALCA) is an innovative research-for-development partnership operating in Burundi, DR Congo and Rwanda. CIALCA is led by the International Institute of Tropical Agriculture (IITA) and Bioversity International, and supported by the Belgian Directorate-general Development Cooperation and Humanitarian Aid.

Embedded within the CGIAR Research Program on Roots Tubers and Bananas (RTB), CIALCA applies an integrated systems research approach for enhancing food, income and nutrition security, while ensuring eco-systems integrity.

CIALCA is a “consortium” of research and development organisations that builds on 10 years of investments and partnerships. These partnerships with national agricultural research systems, including the Institut des Sciences Agronomiques du Burundi (ISABU), the Rwanda Agricultural Board (RAB) and the Institut National pour l’Etude et la Recherche Agronomiques (INERA, DR Congo), the national agricultural universities in Burundi, Rwanda and DR Congo, and other governmental, public and private partners form the basis of CIALCA’s success, impact and learning, which we acknowledge and highly appreciate.

