

'Innovations in Technology, Institutional and Extension Approaches towards Sustainable Agriculture and enhanced Food and Nutrition Security in Africa'



**Rwanda
Country Report**

May 2018



**European
Commission**

Horizon 2020
European Union funding
for Research & Innovation

This project has received funding from the European Union's H2020 research and innovation programme under Grant Agreement No. 727201

Table of contents

1. Introduction.....	3
2. Project Sites	4
3. Challenges.....	6
4. Promising SAIs, IIAs, and EASs	7
4.1 Sustainable Agricultural Innovations.....	7
4.2 Institutional Innovations and Extension Advisory Services	7
5. Main VC actors/stakeholders, markets for the products	10
6. Policies and Institutional mechanisms	11
7. References.....	12

1. Introduction

Rwanda is a landlocked country in East Africa occupying 26,338 km² areas with a population of 10.5 million, making Rwanda the most populated country in the sub-Saharan Africa (NISR, 2014). The country has a tropical climate and most parts receive a bimodal rainfall in excess of 1,000 mm per annum. Agriculture is the foundation of the Rwandan economy, accounting for one-third of GDP and employing nearly 80% of the labour force. However, agricultural productivity in Rwanda is extremely low. Due to erosion and poor soil fertility practices, up to half of the country's land is severely degraded. The use of improved seeds, pesticides and fertilizers remains limited. Furthermore, agriculture is constrained by shortage of land, acidic soils, drought and high incidence of pests and diseases. Nearly half of all agricultural households in Rwanda experience food insecurity. Rwandan farmers practice crop-livestock farming system to increase food and nutritional security and generate income. Livestock productivity in Rwanda is constrained by inadequate quantity and quality of forage production (Mutimura et al., 2015). Nutrient depletion, inadequate management of forage options and diminishing grazing land are among major factors affecting livestock production, particularly in the face of climate change.

To achieve sustainable food and nutrition security (FNS) in Africa, integrated innovation processes in smallholder agriculture are needed that are implementable, sustainable and contribute to higher productivity and income. The project **InnovAfrica** will test, integrate, and disseminate potential sustainable agriculture intensification (SAI) systems (based on precision farming techniques suitable to smallholders), institutional approaches (e.g. Multi Actor Platforms (MAPs)) and extension and advisory services in six case study countries of Africa, including Rwanda, in cooperation with relevant partners in Europe.

InnovAfrica is a collaborative project of 16 institutions from Africa and Europe. The project is funded by the European Commission. The project started in June 2017 with its kick-off meeting in Nairobi, Kenya. To share the project objectives and develop project work plan in consultation with partners and stakeholders Rwanda Agriculture and Animal Resources Development Board (former Rwanda Agriculture Board - RAB) organised a programme planning meeting in Kigali from 22nd to 25th August 2017. The meeting was participated by project partners (RAB researchers, Biosciences eastern and central Africa- International Livestock Research Institute Hub, Wageningen Environmental Research, milk cooperative – IAKIB) and stakeholders including RAB field staff, members of multi-actor platforms (MAPs), and representatives from farmer's organisation.

InnovAfrica will be implemented in Nyamagabe and Kirehe districts. During the meeting, the project sites were identified in the two districts based on agricultural potential and institutional framework operating in the sites. A summary is given in this case country report.

2. Project Sites

InnovAfrica will be implemented in two districts of Rwanda: Nyamagabe and Kirehe (Figure 2.1). Nyamagabe is in the Southern Province (29°56' E and 2°47' S), occupies 1,090 km² with population of 333,587 and elevation ranges from 1,500 to 2,500 m asl. Kirehe is in the Eastern Province (30°45' E and 2°13' S), occupies 1,225 km² with population of 229,468 and elevation of 1,478 m asl. The topography in Kirehe district is flat land surrounded by hills and water bodies with moderate levels of soil erosion. Nyamagabe receives higher annual rainfall (1,636 mm) than Kirehe (750 mm). However, average temperature in Nyamagabe (16.5°C) is lower than Kirehe district (21°C).

The vegetation of Nyamagabe is dominated by *Eragrostis* sp., *Hyparrhenia* sp., *Digitaria* sp. and *Brachiaria decumbens* while Kirehe district is a savannas woodlands with xerophilous thickets. Soils in Nyamagabe are clayey and acidic (pH 4.3 to 4.9), and are high in aluminium level. Soils at Kirehe is of sandy loam texture with lower amounts of soil organic matter with pH > 5.5 (Mutimura and Everson, 2012).

Mixed crop-livestock system is prevalent in both districts. In Nyamagabe district, main crops are Irish potatoes, maize, tea and peas and major livestock are pigs, cattle, goats, chickens and rabbits. Cyanika sector of Nyamagabe, which consists of six cells was selected for the project implementation. The site is accessible, crop and livestock are well integrated and terracing, due to it steep slopes, is common. Land consolidation and crop intensification are adopted. Average farm size is less than 0.5 ha. The traditional, semi-intensive and intensive farming systems are operating in the site.

In Kirehe main crops are maize, cassava, sweet potatoes, sorghum and beans. Major animal species are cattle, sheep, goat, pigs, rabbits, fish and poultry. Current farming systems are monocrop of maize-legumes, intercropping, mixed livestock and agroforestry. Average land holding 0.7 ha. The two project sites of Kirehe, Nasho and Mpanga sectors have both high population density with a population of 6,253 and 7,603 respectively, settled in the village. Majority of the farmers (80%) are smallholders and 20% farmers own medium sized farms.

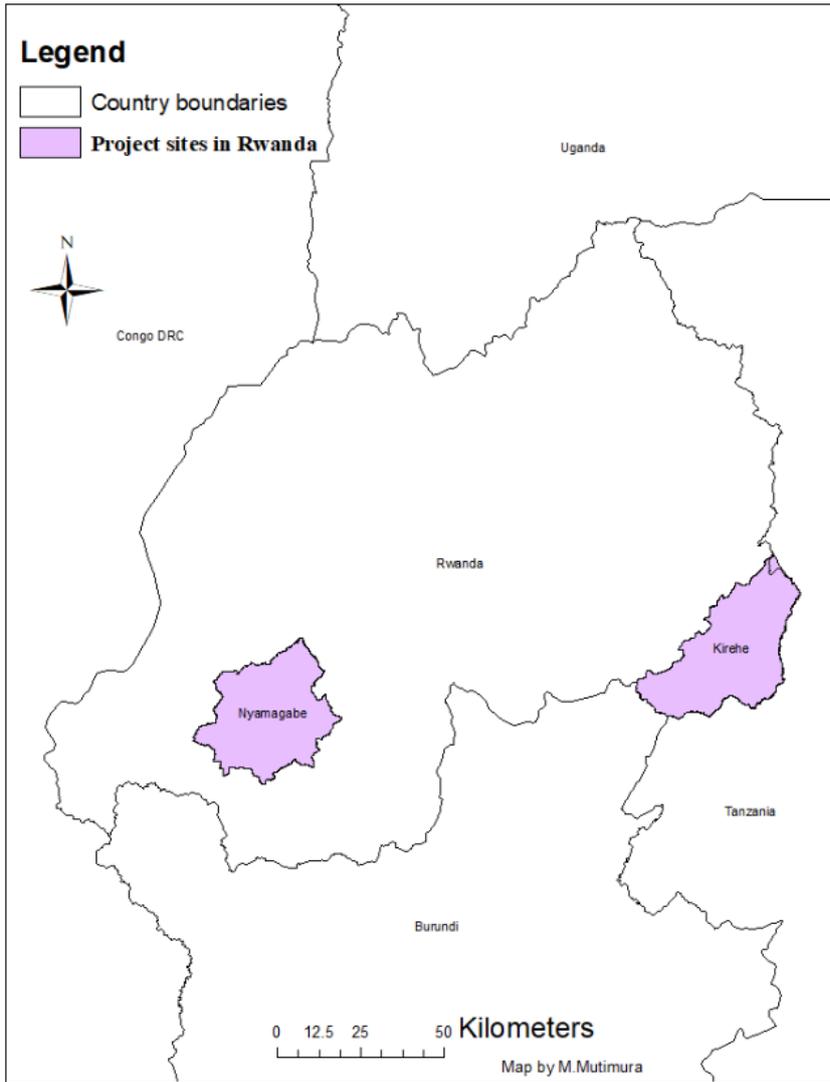


Figure 2.1: Map of Rwanda with the two selected districts for project sites

3. Challenges

The major challenges to SAI in the selected districts are less fertile soils and heavy rain negatively affect crop and livestock productivity in Nyamagabe whereas drought stress and small land holdings are the major constraints to improve crop-livestock production in Kirehe district. Other challenges include feed shortage for livestock, limited access to agricultural technologies as well as market availability.

During the Rwandan kick-off meeting, a field trip to Nasho and Mpanga sectors of Kirehe district was made (Figures 3.1 and 3.2). Here, livestock feed shortage and massive use of crop residues i.e. maize stover for mulching bananas in both sectors was observed. However, there is a niche for introducing improved forages, as well as scope for improving quality of crop residues. Both sectors are greatly in need of forage technology interventions and integration of crop-livestock farming system to maximize over all agricultural productivity.



Figure 3.1: Communal cowshed in Nasho sector



Figure 3.2: Consolidated land under irrigation at Nasho sector

4. Promising SAIs, IIAs, and EASs

4.1 Sustainable Agricultural Innovations

Rwanda Agriculture and Animal Resources Development Board (RAB) is involved in the field implementation of BecA-ILRI Hub led *Brachiaria* Programme in three districts of Rwanda for the past three years. The programme has identified five best bet cultivars and developed agronomic practices for different agro-ecology of Rwanda. Over 640 farmers directly benefitted from *Brachiaria* technology and some of them are assessing impacts of *Brachiaria* on livestock productivity. The findings of this current programme will be extended to other parts of the country through **InnovAfrica**.

In both districts, technological and institutional options to enhance food and nutrition security in the selected districts have been proposed during the meeting. Integrated crop-livestock was among the solution to continuing increase feed availability and soil fertility. The integration of *Brachiaria* grass options in the farming system was highly supported for increased feed year-round availability and soil fertility for increased food crop yields. Also, participants mentioned that *Chloris gayana* could be one of forage options, especially for large farmers who own grazing land. Other innovation technologies in these sites includes irrigation (only for mono-cropping maize/beans promoted by Howard Buffet project), community centre of innovation (CCI), communal cowsheds and mechanization.

A participatory platform involving 50 farmers (involving at least half of them women) will be established in each pilot study sites for pilot testing of *Brachiaria* grass. The proven technologies will be disseminated to larger farming community (250 farmers per site) within each pilot study site and one additional site to each pilot study site with similar agro-ecology. Regular field visits and farmers field days will be organised, and extension materials (leaflets and posters in local language) will be produced for a wider dissemination of the technologies. In addition, innovation demonstration will be performed in strategic places like local government offices and government agricultural research stations in different parts of the country. Results will be communicated to scientific communities through publications and seminar/conference presentations.

4.2 Institutional Innovations and Extension Advisory Services

Multi-Actor Platform (MAP)

MAP is one of the capacity building initiatives that has shown potential to contribute sustainable agriculture through wider awareness and better integration of different stakeholders in Africa (Brouwer et al., 2013). Woodhill and van Vugt, (2011) defined MAPs as a process of interactive learning, empowerment and collaborative governance that enables stakeholders with interconnected problems and ambitions, but with often-different interests, to be collectively innovative and resilient when faced with the emerging risks, crises and opportunities of a complex and changing environment.

In this case country, **InnovAfrica** project will test the MAPs as one of the IIAs that is likely to ensure long-term sustainability of the smallholder farming business in Rwanda. **InnovAfrica** project refer to the MAPs members as the expertise based on their experience in specific region. Moreover, MAPs will be engaged at all the project stages to maximize impacts of the results such as addressing production and marketing constraints and identifying opportunities to generate innovative product value chain pathways (WP4), ii) developing policy frameworks

(WP5), and iii) dissemination and upscaling suitable SAI systems (WP6). Furthermore, the different stakeholders will be involved through a multi-dimensional approach such as demonstrations, workshops, seminars and farmers' information days. Involving related stakeholders will reduce vulnerability, enhance resilience of smallholder farmers and increase their adaptive capacity while sustaining their environment since they will be directly involved in the development, validation and selection of the SAI systems.

The MAP members who attended the case country kick-off meeting in Rwanda mentioned that they will continue to contribute to initiatives of the **InnovAfrica** project by sharing knowledge and experience related to SAI, IIAs, and extension and advisory services (EAS). MAPs will help in validation and up-scaling of project results.

In Nyamagabe district, possible MAP members include representative from World vision, community saving scheme (SACCO), milk collection centre (MCC), SACCO, BPR (Bank), cooperatives, churches, etc. Extension and advisory services are provided through farmer field schools (FFS), RAB, Caritas and African Evangelistic Enterprise (AEE). Various organizations/groups operating in Kirehe region includes: Dairy farmer cooperative of Nasho, SACCO, MCC and others, and representative from these organizations are potential members for multi actor platform (MAP). Extension and advisory services active in the sites are from RAB, District, Howard Buffet Foundation Nasho II, APENA, Post-harvest and Agribusiness project (PASP) and Heifer Project International (HPI). Institutions that can influence policy includes RAB, District, ministry of defence (MINADEF), Banks (Bank of Kigali, Popular Bank of Rwanda-BPR, SACCO) and organisation involved for technology dissemination and knowledge sharing are RAB, District, community centre of innovation (CCI), animal health workers, Girinka Committee, farmer field school (FFS), cooperatives, Radio Izuba, communal work (Umuganda local language) and parents 'evening (Umugoroba w'ababyeyi local language), community group organisation (Amasibo local language).

Extension services

For the innovative EASs, besides the existing extension approaches, the Integrated Farm Planning (PIP: French acronym) and Farmer Participatory Research (FPR) will be used while mainstreaming gender in the processes. The PIP approach is a visionary farm plan that is developed by all family members to transform smallholder farmers into more productive and sustainable farms (Kessler et al., 2016). Therefore, PIP approach is all about changing farmers' mind-sets, motivating and empowering them to transform their reality by conscious collective action. **InnovAfrica** project will test PIP approach as one of the promising EASs that is currently successfully being implemented in Burundi.

The MINAGRI's National Agricultural Extension Strategy document highlights the commitment of Government of Rwanda (GoR) in developing a pluralistic agricultural extension system that captures the strengths of top-down approaches, as well as the strengths of bottom-up approaches (MINAGRI, 2009). The RAB is an apex body for both agriculture research and extension in Rwanda. RAB partners with local governments, NGOs and private sectors to provide extension services to farmers. Agricultural extension directly contributes to national development strategies such as Vision 2020, economic development plan of poverty reduction phase II (EDPRS II) and strategic plan for agricultural transformation (SPAT III) phase III that consider agricultural sector as the main source of economic growth of the country. To achieve the desired impacts, these extension strategies are based on six guiding principles: (i) be participatory extension (ii) utilise multiple approaches and multiple methods, (iii) be demand driven and market oriented, (iv) be process and result oriented, (v) involve multiple

actors in delivering extension education, information and services, and (vi) Build on already existing initiatives.

5. Main VC actors/stakeholders, markets for the products

Most important value chains identified in Kirehe district are dairy (MCC, Milk points), maize (military camp, market), sorghum, banana, soybean, bean, fish and coffee. In Nyamagabe the common values chain includes *Brachiaria*, *Chloris gayana*, Napier grass, sorghum, beans, coffee, cassava and forest products.

Relevant end-users and local stakeholder groups:

- *Farmer Cooperatives:* IAKIB-Cooperative, Milk Collection Centres from three districts (iii) Women network for agriculture development of Nyamagabe
- *Non-Governmental Organizations:* (i) Heifer Project International's Partners in Health Project (ii) Send a Cow Rwanda (iii) Catholic Relief Service (iv) World vision.
- *Government Entities:* (i) Ministry of Agriculture- Extensional service (at all level in a district level) (ii) Ministry of local government (districts, sector- sub-district and cell- sub sector) (iii) Department of natural resource management at district level.
- *Private Sector:* Agricultural input dealers including seeds and fertilisers suppliers.

Involvement in the case studies

The members of multi-actor platform that includes representative from IAKIB Cooperative, Rwanda Farmer organization (IMBARAGA), women group, farmer and Ministry of Agriculture and Animal Resources will be directly involved in the case studies.

6. Policies and Institutional mechanisms

Livestock and livestock feed are high priority of Rwandan government, and RAB is responsible for the development and dissemination of livestock and forage technologies in the country. The EDPRS II defines a large number of programs in the agriculture sector including the intensification of sustainable production systems in crop cultivation and animal husbandry; building the technical and organizational capacity of farmers; promoting commodity chains and agribusiness, and strengthening the institutional framework of the sector at central and local level (MINECOFIN, 2013). Different policies have been put in place in regard to agricultural development and environmental protection including One Cow per Poor Family Programme (GIRINKA), Land Consolidation Policy, Crop Intensification Programme and Vision 2020 Umurenge Programme (VUP). Most of these agriculture policies are reviewed and updated under SPAT. While SPAT I and II were based on production, SPAT III (2013-2018) is more on market and value chains, professionalization of farmers, research market oriented, access to finance and agriculture mechanisation base. The SPAT III comprises different programmes where research, technology transfer and professionalization of farmers are described as programme II of the policy (MINAGRI, 2013). In the past decades, agriculture technologies transfer was top-down model but with this policy, the research is being done at farmers' field so as to foster technology transfer because of farmers' participation in the beginning of the technology generation.

Both field sites have land consolidation programs, grow food crops under the scheme and farmers are adopting communal feedlot to raise livestock. Farmers are well supported by the Rwandan government and other institutions. One site (Nasho sector, Kirehe district) has substantial investment of Howard G. Buffet Foundation on communal farming using overhead irrigation. The foundation aims to use its experience and funds to support a government project to irrigate more than 380 square miles of land held by small farmers. Under the Big Idea and Rwanda Plan, the Foundation plan to support agricultural development in Rwanda to become a development standout, characterised by strong economic growth and good governance.

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