



Assessment of Fertilizer Distribution Systems and Opportunities for Developing Fertilizer Blends RWANDA

June 2018

Executed by:



This assessment was conducted by the International Fertilizer Development Center (IFDC) and the African Fertilizer and Agribusiness Partnership (AFAP) for the Alliance for a Green Revolution in Africa (AGRA) as part of a consultancy for Assessment of Fertilizer Distribution Systems and Opportunities for Developing Fertilizer Blends. The views, information, and opinions expressed in this assessment are those of IFDC and AFAP and do not necessarily reflect the official policy or position of AGRA.

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Acronyms & Abbreviations

AFAP	African Fertilizer and Agribusiness Partnership
AfSIS	Africa Soil Information Service
AGRA	Alliance for a Green Revolution in Africa
APTC	Agro Processing Trust Corporation
B	boron
BRD	Banque Rwandaise de Developpement
CAN	calcium ammonium nitrate
CEPAR	Coffee Exporters and Processors Association of Rwanda
CNFA	Cultivating New Frontiers in Agriculture
CNLS	Crop Nutrition Laboratory Services, Kenya
DAP	di-ammonium phosphate
DGIS	Directorate-General for International Cooperation, Netherlands
ENAS	Enterprise Nkubili Alfred & Sons
ETG	Export Trading Group
FFS	Farmer Field School
FUBC	Fertilizer Use By Crop
Ha	hectare
ICRAF	World Agroforestry Center
IFDC	International Fertilizer Development Center
IITA	International Institute for Tropical Agriculture
ISFM	integrated soil fertility management
MINAGRI	Ministry of Agriculture and Animal Resources
Mt	metric ton
NAEB	Rwanda National Agriculture Export Development Board
NGO	non governmental organization
NPK	nitrogen phosphorus potassium
OAF	One Acre Fund
OCP	Office Chérifien des Phosphates
P	phosphorus
PSF	Rwanda Private Sector Federation
RAB	Rwanda Agriculture Board
RDO	Rwanda Developmental Organisation
RFC	Rwanda Fertilizer Company
SHF	smallholder farmer
SSA	sub-Saharan Africa
SSP	single superphosphate
SWOT	Strengths, Weaknesses, Opportunities, Threats
TSP	triple super phosphate

Assessment of Fertilizer Distribution and Opportunities for Developing Fertilizer Blends in Rwanda

Introduction

IFDC and AFAP recruited a Rwandese consultant, former Permanent Secretary of Agriculture Innocent Musabyimana, to assist in gathering up-to-date information for Rwanda, as the situation is evolving rapidly here and neither organization has national staff in-country. We interviewed staff from OAF, OCP, ETG, and Yara. We reviewed data from “Evaluation of Fertilizer and Seed Delivery Systems in Sub Saharan Africa” (AGREED International, 2016), “Twigire Muhinze Reflection Paper, 2016” (Raf Somers), Republic of Rwanda AFAP/IFDC Situation Statement (2017), and the Rwandan Agrochemical Law (Official Gazette).

Available Soil Information

Soil nutrient and acidity maps were created for Rwanda in 2015, using some 1000 well-distributed sampling points (about one sample per 25 km²)—a reasonably dense sampling for a country of this size. Sampling, analysis, and mapping were undertaken by Crop Nutrition Laboratories (CNLS, Nairobi, Kenya), with sampling assistance provided by Rwanda Agricultural Board (RAB) under funding from the DGIS-funded CATALIST-2 project. Samples were analyzed for pH, total N, organic C, Mehlich-3 extractable K, Ca, Mg, S, Zn, Cu, Mn, Fe, and B. The most significant maps relating to nutrient deficiencies are shown in Appendix I.

Fertilizer Availability and Use in Rwanda

Total fertilizer use in Rwanda in 2016 is shown in Table 1. DAP is used mainly on maize, wheat, and beans, while 17:17:17 is used mainly on rice and potatoes. Compounds with nutrients in addition to NPK are gaining a foothold in Rwanda and are manufactured by Yara.

Rationale for Why Available Fertilizer Products Were Developed

Fertilizer use in Rwanda is based on commodity NPKs. However, with the establishment of two blenders, formulae are being evaluated to meet soil- and crop-specific needs. The required evaluation period is two seasons. Some Yara products are already being thus targeted.

Table 1. Fertilizers use by by product, Rwanda (source: Africafertilizer.org, 2016).

Product	Volumes (MT)
DAP	17,422
NPK 17 17 17	15,471
Urea	12,436
NPK 22 6 12 + 3S + 1MgO + 2CaO + TE	4,896
Other NPK	2,420
NPK 15 9 20 + 4S + 2MgO + TE	1,587
NPK 26 5 5	1,250
Ammonium sulfate	1,125
Others	679
NPK 23 10 5 +S +MgO +Zn	634

Types of Fertilizer Recommendations that are Available, and their Suitability for Staple Crops and Agro-Ecological Zones that are Targeted by AGRA

Table 2 shows the nutrients extracted for given yield targets we believe routinely achievable for AGRA priority crops in Rwanda, along with nutrients supplied in government and fertilizer company offerings.

Maize Recommendations and Their Suitability

The government recommendation emerged from the initiation of the subsidy program and is an NP recommendation only. It was a respectable recommendation to get farmers accustomed to using fertilizers before other nutrient deficiencies were recognized. While seemingly short on N, an extra N increment was offering little advantage, perhaps as a result of other deficiencies and soil acidity constraints prevalent in Rwanda.

The second government recommendation emerged from early research between IFDC and RAB. It employed granular sources of Zn and B and was very effective in field trials. Based on that, the government of Rwanda put out a tender for granular AS (ammonium sulfate) and granular Zn and B products. Those responding to the tender, however, sourced more dilute crystalline sources of all nutrients which could not be blended with DAP and KCl. The crystalline sources while still available, are used very infrequently by farmers, who are challenged to mix the ingredients in proper proportions. The copper sulfate can be soil-applied but is more effective as a foliar application. The recommendation was effective in field trials, but at a reduced B rate (half of that in the recommendation) for maize.

The Yara recommendation has adequate N but insufficient P. It can be viewed as their best attempt to meet maize requirements with fertilizers they have available in Rwanda, while maintaining a lower application rate that Rwanda maize farmers have become accustomed to due to the subsidy allocation. It has sufficient quantities of S, Zn and B to meet crop demands.

The OCP recommendations were derived from IFDC/RAB research. They are more balanced to maize demands, but are not yet in production, awaiting the completion of the OCP plant.

Table 2. Nutrients removed for various AGRA priority crop yield targets, and nutrients applied in various recommendations

Crop/Recommendations	Yield Target	Application Rate		N	P ₂ O ₅	K ₂ O	CaO	MgO	S	Zn	B	Cu	Mn	Fe	
		Basal	Topdress												
Maize	Mt ha ⁻¹ 5	-----kg ha ⁻¹ -----		-----Nutrients removed in crop and residue, kg ha ⁻¹ -----											
				100	46	121	18	35	13	0.23	0.24	0.07	0.73	0.36	
			-----Nutrients supplied in recommendation, kg ha ⁻¹ -----												
	Government: 100 kg/ha DAP basal, 50 kg/ha urea topdress		100	50	41	46	0	0	0	0	0.0	0	0	0	0
	Government: per-ha basal blend: 100 kg/ha DAP, 35 kg AS, 7 kg B (14.5%), 7 kg Zn sulfate (35%), 3 kg Cu sulfate (foliar)		149	50	47	46	0	0	0	10	2.5	1.0	0	0	0
	Yara: Yara Cereals basal, Amidas topdress, 2 kg/ha BZ (foliar)		185	100	83	19	9	0	4	11	0.7	0.1	0.002	0.002	0.002
	OCP: NPK 13.5-24-16 + 6S+0.3 Zn +0.2B +0.2 Cu basal + urea topdress		150	100	66	36	24	0	0	9	0.5	0.3	0.0	225	150
OCP: NPK 18.5-33-0 + 8.5S+0.4 Zn +0.2B +0.2Cu basal, urea topdress		125	100	69	41	0	0	0	11	0.5	0.3	0.0	156	125	
Rice	Mt ha ⁻¹ 5			-----Nutrients removed in crop and residue, kg ha ⁻¹ -----											
				100	46	121	13	21	13	0.23	0.24	0.20	4.73	1.05	
			-----Nutrients supplied in recommendation, kg ha ⁻¹ -----												
	Gov't: NPK 17:17:17 basal, 100 kg/ha urea topdress		200	100	52	34	34	0	0	0	0	0	0	0	0
	Gov't.: per ha blend; 60 kg KCl, 75 kg DAP, 35 kg AS, 7 kg B (14.5%), 7 kg Zn sulfate (35%), 3 kg Cu sulfate (foliar), 112 kg/ha urea briquette topdress		184	112	65		36	0	0	8.4	2.45	1	0.75	0	0
	Yara: Yara Cereals basal, Amidas topdress, 2 kg/ha BZ (foliar)		185	100	83	19	9	0	4	11	0.7	0.1	0.002	0.002	0.002
	OCP: NPK 12:20:20 + 5S+0.3Zn +0.2B +0.2Cu		175	100	67	35	35	0	0	9	0.5	0.4	0.4	0	0
OCP: NPK 12:20:20 + 7S+0.3Zn +0.2B		175	100	67	35	35	0	0	12	0.5	0.4	0	0	0	
Irish potatoes	Mt ha ⁻¹ 30			-----Nutrients removed in crop and residue, kg ha ⁻¹ -----											
				233	69	284	48	35	40	0.23	0.19	0.10	0.21	3.10	
			-----Nutrients supplied in recommendation, kg ha ⁻¹ -----												
	Gov't: 150 kg/ha DAP basal, 75 kg/ha KCl +100 kg/ha urea topdress		150	175	73	69	60	0	0	0	0	0	0	0	0
	Gov't: 300 kg/ha NPK 17:17:17		300		51	51	51	0	0	0	0	0	0	0	0
	Yara: Winner basal, Nitroabor topdress		300	125	64	27	60	32	5	11	0.06	0.42	0	0.06	0
OCP: NPK 13:26:18 + 4.5S+0.5Zn +0.1B +0.2Cu		300	50	62	78	54	0	0	14	1.5	0.30	0	0.06	1	
Soybeans	Mt ha ⁻¹ 3			-----Nutrients removed in crop and residue, kg ha ⁻¹ -----											
				88	46	53	19	10	7	0.13	0.14	***	0.29	6.00	
			-----Nutrients supplied in recommendation, kg ha ⁻¹ -----												
Government: 100 kg/ha DAP basal		100		18	46	0	0	0	0		0	0	0	0	
Yara: Winner basal		125		19	11	25	0	2	5	0.03	0.02	0	0.06	0	

Rice Recommendations and Their Suitability

The first government rice fertilizer recommendation was designed to meet NPK demands and was fairly balanced in that respect. However, consistent removal of rice residue depleted soil K in particular. Indeed, all recommendations may be somewhat short on K, given the soil K levels in most marshlands, which were assessed by Crop Nutrition Laboratory Services some years ago.

The second government rice recommendation emerged from early research between IFDC and RAB. It employed granular sources of AS, Zn and B and was very effective in field trials. Based on that, the government of Rwanda put out a tender for granular AS (ammonium sulfate) and granular Zn and B products. Those responding to the tender, however, sourced crystalline sources of all nutrients, which were more dilute in the case of Zn and B products, which could not be blended with DAP and KCl. The crystalline sources while still available, are used very infrequently by farmers, who are challenged to mix the ingredients in proper proportions and have not been procured since the original procurement in 2015. The copper sulfate can be soil-applied but is more effective as a foliar application. Hence, the recommendation is seldom implemented. It could however be implemented by one of the blenders (ENAS), as they have the granular ingredients, but no copper source.

The recommendation includes urea briquettes. We did not assess the briquette value chain in Rwanda, though it has a relatively high number brought in under IFDC's CATALIST-2 project. Briquettes were adding about 1 MT/ha vs. unbriquetted urea, with a further MT/ha on average being realized due to the balanced formulation. Briquettes can also be employed with the government recommendation with a similar effect.

The Yara recommendation is the same as their maize recommendation, and while it may derive some benefit from its S, Zn, and B content, it is very short on K.

The OCP recommendations are based on later-stage research between IFDC and RAB, where coating the granular fertilizers with micronutrients resulted in reduced Zn and B rates. In this process, Cu is also applied in the fertilizer so that foliar application is not required. These recommendations are not yet manufactured and are pending the completion of the OCP plant.

Potato Recommendations and Their Suitability

The government has two potato recommendations, one based on 17:17:17 and one based on a mixture of DAP, KCl and urea. The 17:17:17 was the only K source in Rwanda until a few years ago and is a good NPK source for that purpose. When KCl came into the market, it was soon realized that by combining DAP, KCl, and urea, one could apply substantially more N, P and K with 17:17:17 by combining those 3 ingredients at very similar costs.

Similar to maize and rice, the government has an additional potato recommendation, which includes AS and sources of Zn, and B, which could be blended if ingredients are provided in a granular form. The blender ENAS should be capable of this currently.

The Yara recommendation, while requiring more fertilizer, uses a calcium nitrate topdress containing B, which substantially supplies necessary Ca. It seems to have inadequate P. It is well-balanced for S, Zn, and B, which are deficient in most potato-growing areas.

The potato blend OCP is intending to make are the best-balanced of the recommendations, but lacks Ca and Mg. In one trial run in Rwanda, potato responded substantially to foliar Mg application, which is not expensive and is available in Rwanda as MgSO₄. The blend contains balanced quantities of S, Zn, and B, and we anticipate it will perform well based on previous trial work in Rwanda.

With the entrance of polysulfate onto the market in Africa, the potential exists to add both Ca and Mg to blends; polysulfate contains S, K, Ca, and Mg. Potatoes could benefit from this product.

Soybean Recommendations and Their Suitability

Government recommendations for soybean is DAP, which supplies sufficient P but nothing else. The Yara recommendation by contrast has too little P but sufficient quantities of K, S, Mg, and several micronutrients. Both recommendations are lacking and can be improved upon. Soybean does not tolerate soil acidity well. A blend based on TSP or other Ca sources, containing K, S, Zn and a small amount of B, would be more appropriate for Rwanda conditions.

Gaps that Need to be Addressed to Come Up with Area and Crop Specific Blends

With detailed soils information, a research basis for rice, maize, and potato blends, and two blenders in country, Rwanda is off to a good start, but needs to actualize the blending, get products to the market, and clear subsidy hurdles (discussed below). In the formulations developed by RAB/IFDC, micronutrients can be either blended in as granulars or coated. These products are not on the market yet. It is apparent from the OCP formulations that they are intending to coat micronutrients, but we do not know if they are aware of the correct micronutrient sources used in coating. While the coating process is ultimately less expensive, it requires some knowledge of specific coatings and coating ingredients, particularly for Zn. As OCP will begin operations in 2019, it needs to prepare now for correct ingredients stock.

Rwanda needs support in developing a soybean blend. This could be accomplished with some best-bet trials. We believe that Yara could expand its product line to better address deficiencies in maize, potato and rice; its current recommendations are too low in K for potato, and too low for P in rice and maize. Yara has better fertilizers in Tanzania and Kenya for these crops.

Fertilizer Companies and/or SME Blenders Existing in the Country and the Geographies Targeted by AGRA

Enterprise Nkubili Alfred & Sons (ENAS) has a modern line blender in Kigali, operating since 2015. A second blending operation, the Rwanda Fertilizer Company (RFC), jointly owned by OCP, API Ltd and the Government of Rwanda, is under construction in Kigali and will be operational in 2019. Either of these blenders is capable of meeting all of Rwanda's foreseeable blending demand.

Inventory of Partners and Ongoing Efforts or Investments that are Promoting the Availability of Appropriate Blended Fertilizers that AGRA can Leverage in the Target Countries

A list of potential partners and key country contacts is in Appendix I.

Recommendations and Interventions that AGRA could Implement to Address the Availability of Quality Fertilizers

1. **Blender technical support:** ENAS is the only blender as yet operating. Its products are not yet available to smallholders. We are not clear if this is due to product registration issues, but it is clear that the Rwanda government has recommendations for maize, rice and potato (as shown in Fig. 2 and described in the below text) that could be blended by ENAS. Once the OCP/API operation begins, assuming that they will be making the products in Table 2, they will likely require support in the coating processes and ingredients, which are somewhat unique. We experienced operational challenges while implementing this coating process elsewhere but were able to resolve them. Both ENAS and RFC will have different approaches to multi-nutrient formulation development, and independent support should be provided to both to develop and evaluate new products.
2. **Blender and research support:** Rwanda has Ca and Mg deficiencies that are not addressed in the blends that could further improve them. While Ca deficiencies can be addressed through liming, Rwanda lime sources are non-dolomitic (i.e., do not contain Mg) and getting Mg into blends is difficult due to compatibility issues of MgSO₄ monohydrate with other ingredients. The recent addition of polysulfate into the market is one way to supply blends with levels of Mg similar to Yara products, while additionally supplying Ca, S, and K, but as polysulfate is a new product on the market, no trials have been run in Rwanda incorporating it into blends. Deficiencies of Mg can also be addressed through inexpensive foliar application; this proved successful in potato trials in Rwanda but is not an official recommendation. Physically speaking, it is a very compatible blending ingredient. Some of the realities of substituting cuprous oxide in blends to replace copper sulfate foliar sprays need specific research.

We suggest an advanced training in blends formulation to address these issues, and to increase both government and blending personnel capacity in principles of formulation and trial design. We also advise external support in trial design and implementation, and specific AGRA support to RAB for blended fertilizer trials.

3. **Formulation and evaluation of a soybean blends for Rwanda.** Currently, Rwanda does not have good options for soybean. Given the acidic nature of Rwanda soils and the specific nutrient requirements of soybeans, development and evaluation of a basket of best-bet options to evaluate is required. This can leverage knowledge of soybean formulations in other countries such as Kenya, where TSP-based soybean blends in combination with inoculant have proven successful.

Bottlenecks in Fertilizer Distribution Systems, and Interventions that AGRA and Its Partners can Implement to Help Farmers Access Quality Fertilizers

The fertilizer market structure and SWOT analysis of the market are shown in Figures 1 and 2 respectively.

Market Characteristics

The Rwandan fertilizer market is characterized by the following components:

- High population density; 70% of population (11.6 million) derive their livelihood from agriculture, or 1.625 million farm families.
- Average farm size of 0.6 ha. Total arable land 1.15 million ha (39 kg fertilizer/ha). These metrics require high productivity.
- Productivity data (Figure 3) suggests gains were made in the early days of subsidy program/extension service, although these have been challenged by some analysts.
- Long logistical lines (1400 km from Dar es Salaam to Kigali, adding \$120/t in transport costs).
- Limited cash markets for outputs. ROI estimates on cereals 1: 1.75 (poor).
- A unique Extension Model (Twigire Muhinze) that is delivering to 50% of farm households. As per RAB, “Twigire Muhinzi is the home-grown decentralized farmer-oriented national agricultural extension and advisory services delivery model of the Rwanda government. The idea is that, if one farmer in a village is empowered with better skills to improve his/her yield, neighbors too will or can learn from him or her. Thus, the Farmer Promoters program was born with the Motto, “Seeing is Believing”. At the same time, it was recognized that farmers also need to get in-depth knowledge to understand why certain technologies work better than others. And so, the Farmer Field Schools (FFS) approach was born, with the tagline “The plant is the teacher”. The objective of these trainings was to improve farmer promoters’ knowledge in that they can as well train their fellow farmers and to follow up the implementation of Twigire Muhinzi program during the preparation of season 2017A. These trainings are taking place in more than 150 sectors (5 sectors per District). Farmers are sensitized to join groups so that they can support each other as well as easily access support from the government.”

Fertilizer Supply Side

The government subsidizes 67% of the imported product (all non-estate product) targeting SHF. In 2017, 45,000 MT of fertilizers were imported, and the government estimates imports for 2018 at 50,000 MT. Fertilizers imported for SHF use currently require a contract with the Rwanda Agriculture Board (RAB) and a contract to distribute with the Agro Processing Trust Corporation (APTC), who has sole control of fertilizer distribution. APTC claims to have 1300 agro-dealer distribution points. In 2017 the main suppliers to APTC were Agro Processing Industries, ETG, ENAS, One Acre Fund (OAF) and Yara.

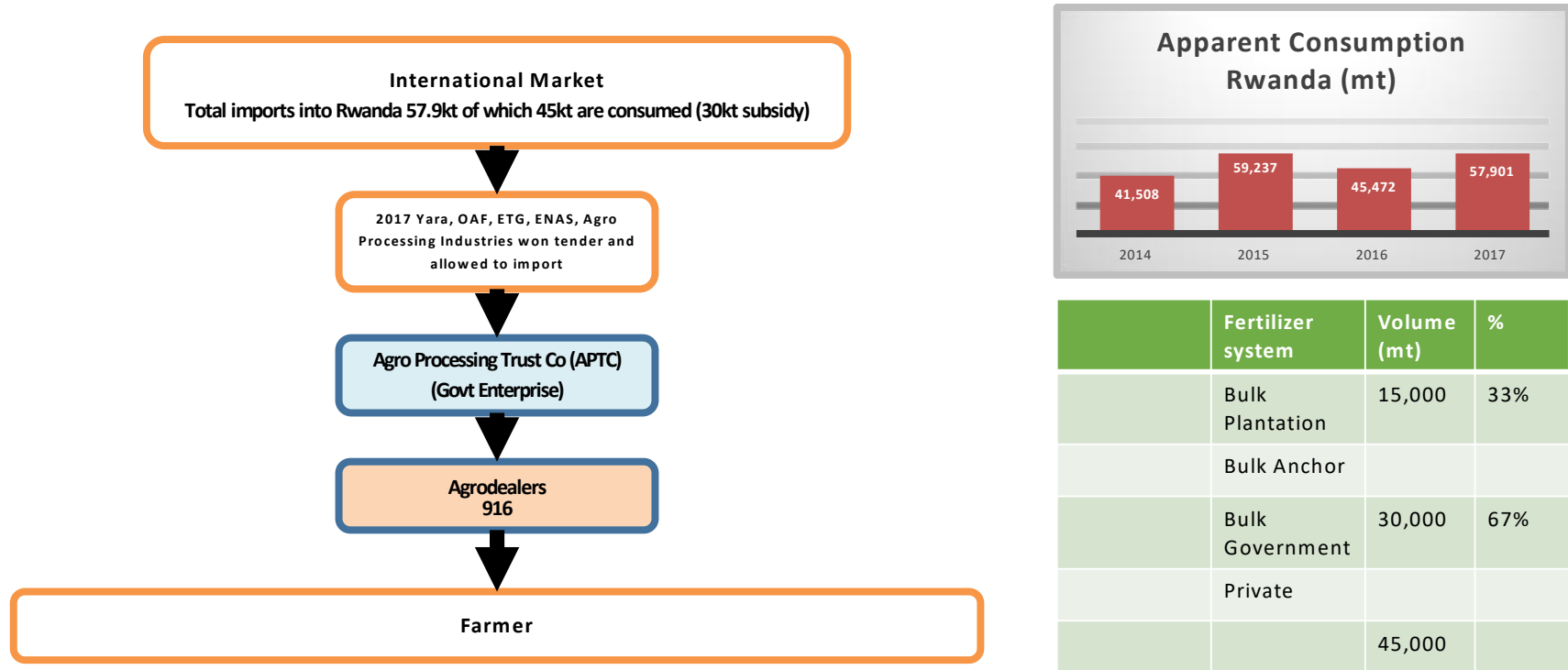


Figure 1. Rwanda fertilizer distribution, system, apparent fertilizer consumption, and distribution volumes through various fertilizer systems

	Strengths	Weaknesses	Opportunities	Threats
Manufacturer				
Importer	<ul style="list-style-type: none"> • APTC (government entity) select and supervise, importers and distributors of subsidy (66%) and non subsidy product • Lever off large importers into Mombasa • Some providing training to Twigire Muhinze 	<ul style="list-style-type: none"> • Quota system • Uncertainty of continual right to operate and volume allocated 	<ul style="list-style-type: none"> • Lever off international experience to expedite product choice, formulations and best practice in fertilizer use • Support RAB to develop crop/soil specific blends. • Mandate best bet formulations for supply 	
Blender	<ul style="list-style-type: none"> • One current blender (ENAS), one proposed to be built this year (OCP) • Government approved 	<ul style="list-style-type: none"> • Formulations are not tied to initial RAB trial work • No one to drive research/Commercialization. • Cash constraints at the farm level • Two season formulation testing requirement 	<ul style="list-style-type: none"> • Develop soil critical levels by crops and soil types • Support blenders and govt staff on training in fertilizer matters • Support regulations that allow flexibility in formulations based on know n science 	<ul style="list-style-type: none"> • Stronger quality regulations that ensure best product and process. • Unfavourable subsidy support
Distributor	<ul style="list-style-type: none"> • Supply fixed volume of subsidized product to targeted beneficiaries –900 distribution points 	<ul style="list-style-type: none"> • Service provider paid fixed margin agreed with APTC. This may not be a weakness if the other demand creation activities (Twigire Muhinze) are being addressed. 	<ul style="list-style-type: none"> • Government and blender/importer demand creation activities to “pull “ product through. • Develop finance instruments that can provide flexible terms. 	
Farmer	<ul style="list-style-type: none"> • Rely on subsidy • Strong extension/farmer training programs 	<ul style="list-style-type: none"> • Small plot size • Cash constrained, output market constrained. 	<ul style="list-style-type: none"> • Credit instruments • Create demand (Govt/blender/importer) for cash crops 	<ul style="list-style-type: none"> • Removal of subsidy

Key Takeaways:

1. Small market with predominantly cash constrained client base, strong Government controls and subsidy program
2. Strong distribution system. Strong farmer training programs.
3. Two operational blenders by end of year. . RAB has history of working with balanced fertilizers but these haven’t translated into adoption. Soils are mapped and blend formulations know for major crops-easy transition to implement with some support. Require support to commercialize the work that has been done in the structure available— support RAB to develop fertilizer program

Figure 2. SWOT analysis of the Rwandan fertilizer value chain

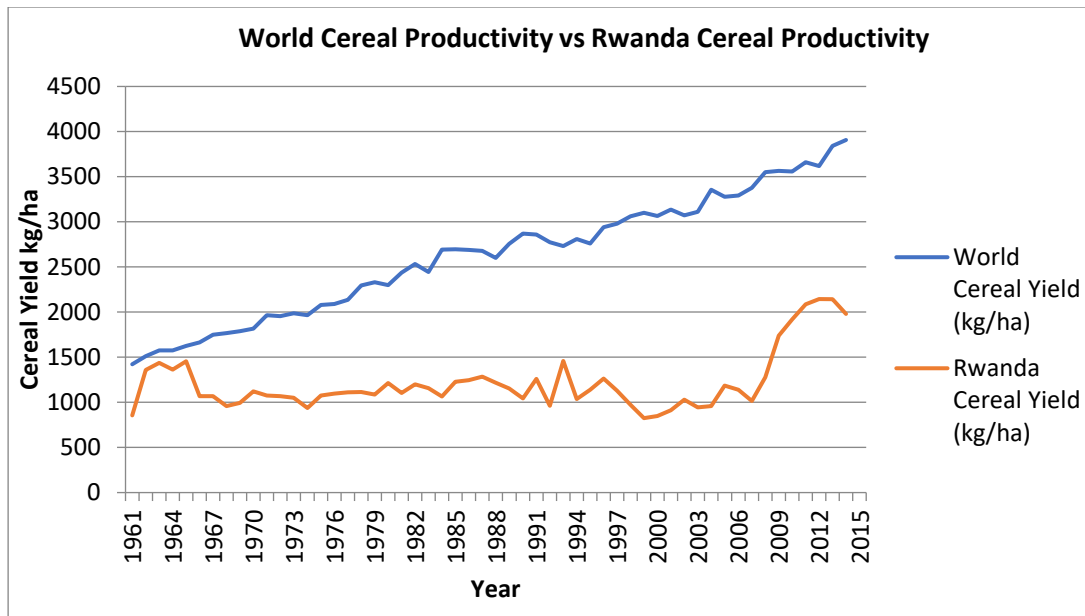


Figure 3. Cereal Productivity over time in Rwanda

Fertilizer use is estimated at approximately 30-40% of potential demand (approximately 140,000 MT), and this is mainly attributed to farmers' low purchasing power. Often, crops for which fertilizers have a subsidy allocation have not been profitable, and fertilizers are instead used for more profitable cash crops.

In the distribution system, Ministry of Agriculture and APTC have made significant changes this last season:

- They reduced agro-dealer margins to RWF 30/kg of fertilizer (USD1.75/50kg), making it unattractive to stock fertilizers.
- The joint procurement/distribution through agro-dealer cooperative ceased, and now permitted only through APTC
- No supplier credit is extended to agro-dealers

There is currently one blender (50 ton/hour EMT) operating in Rwanda (ENAS). This was closed initially but is now operational. The Rwanda Fertilizer Company (RFC) (57.4% OCP, 30% APTC and 12.6% Government of Rwanda) formally announced in May 2018 their plans to build a \$6 Million blending facility in Rwanda, to be operational in 2019. This was agreed between the two Heads of State of Morocco and Rwanda, in 2016.

While it is not the role of this study to analyze the subsidy program, the strong public-sector control in the distribution system, where the focus is on delivering low cost product and preventing fraud in the system may impact delivery/performance in the future.

Fertilizer Demand Side

The latent demand for fertilizers in Rwanda is likely to be in the order of 140,000 MT, but market issues such as small farm size and sizeable need for on-farm consumption for food security restrict cash availability and fertilizer demand.

RAB and IFDC undertook detailed work in Rwanda in 2012 to 2014 that demonstrated yield responses on most crops of greater than 25% to blended fertilizers. Soil nutrient maps were well developed, critical levels and fertilizer formulations for most crops are well developed or

at advanced stages of development. These were not commercialized because of changes in both RAB and the fertilizer distribution controls in Rwanda, during which the only operational blender was temporarily prevented from blending. The IFDC project activities also ceased in Rwanda in 2016.

There is a strong history in balanced fertilizer research in Rwanda that should not take a lot to convert to commercial practice, particularly with the new blending facilities, the controls on distribution, and proven responses to improved fertilizer formulations done by RAB and IFDC. A multipronged approach is required that:

- Supports subsidies on proven multi-nutrient fertilizer products to keep them competitive.
- Supports a RAB/private sector/Twigire Muhinze sensitization program with new products.
- Supports farm level finance options. Strong internal support exists to evaluate and support different collective models that would improve the purchasing capacity of farmers.
- Supports the evaluation of the viability of a small-scale nitrogen plant. The technology has progressed to such a point that 100 ton/day plants are possible in remote locations where logistics are major drivers of cost. These are being evaluated (early stage) for a number of East African countries.
- Assures a functional briquette chain in Rwanda. The benefits of urea briquettes are widely appreciated in Rwanda, and they were adopted by farmers exposed to them. The extra 1 MT/ha yield increase that they afford in rice merits attention to the briquette value chain, as most rice farmers still do not have briquette access due to the physical location of the briquette machines.

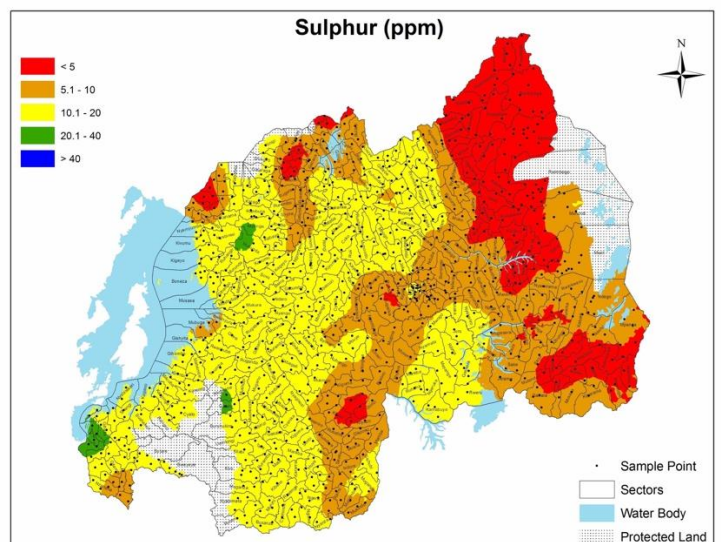
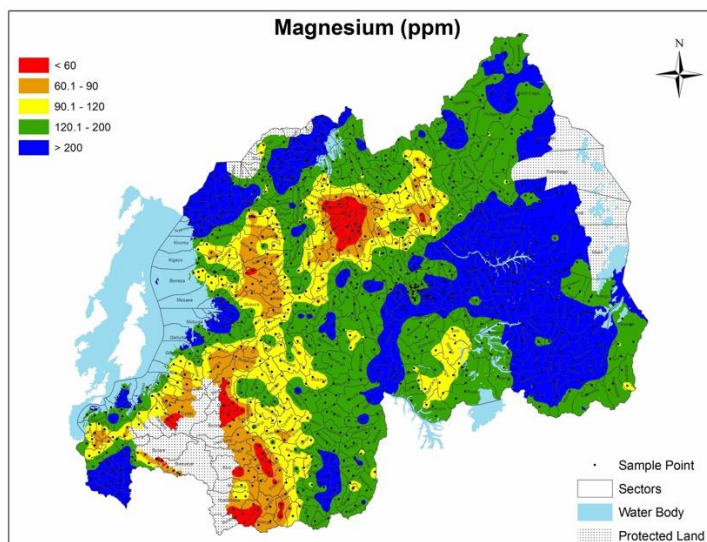
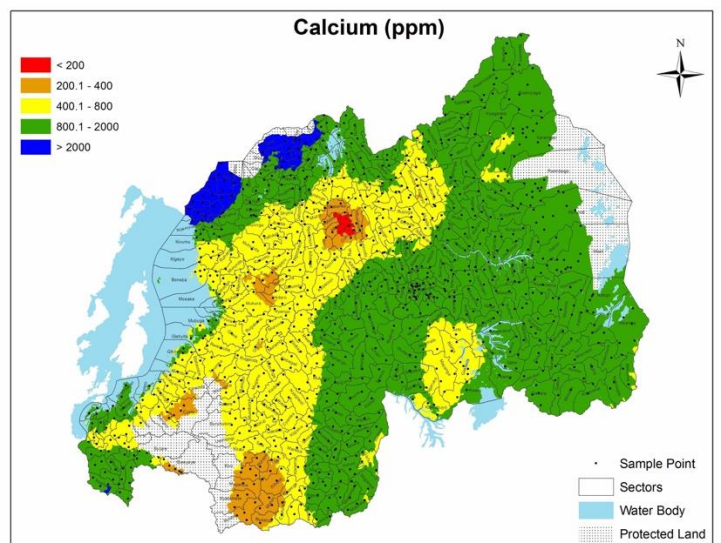
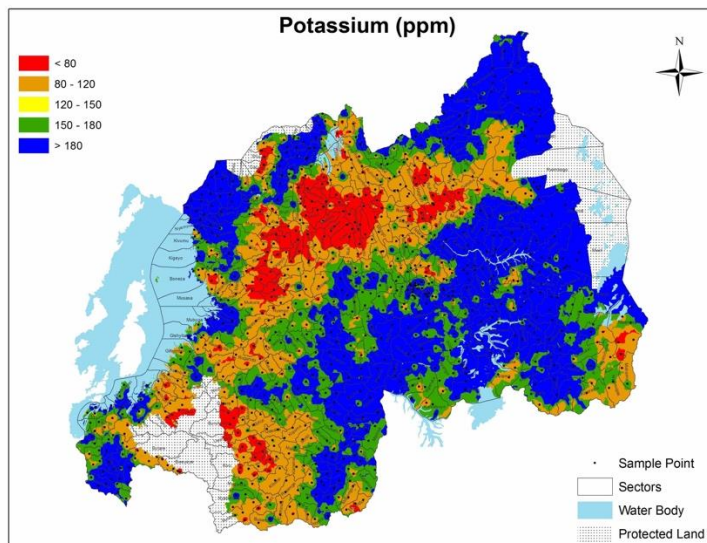
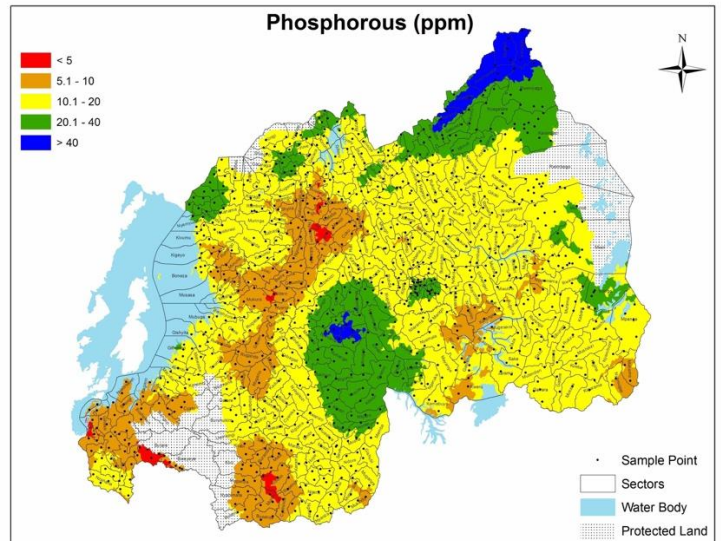
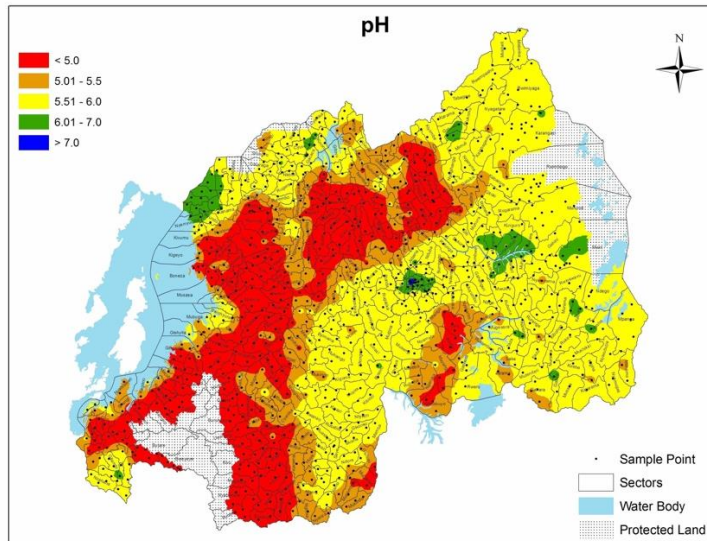
Policy Bottlenecks Affecting the Availability of Blended Fertilizers, and Interventions that AGRA and Its Partners could Design and Advocate for to Help Farmers Access Appropriate Blends

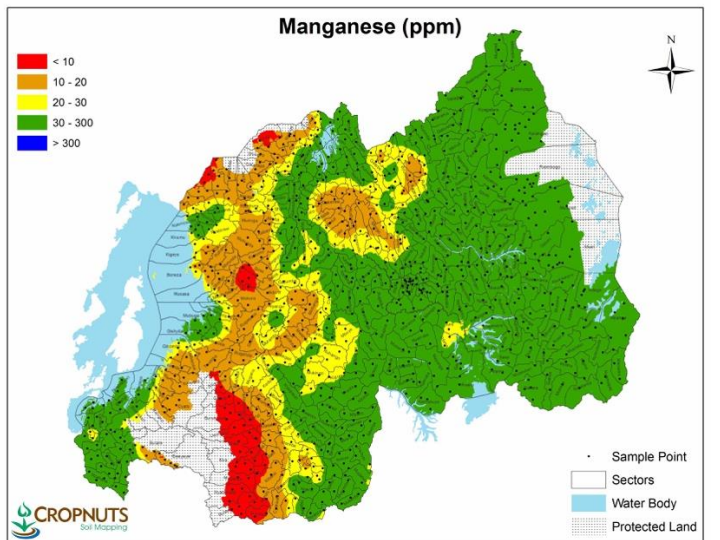
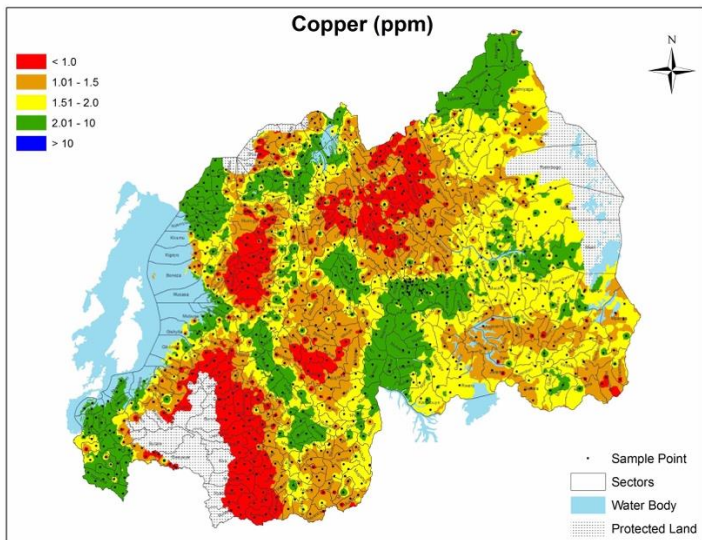
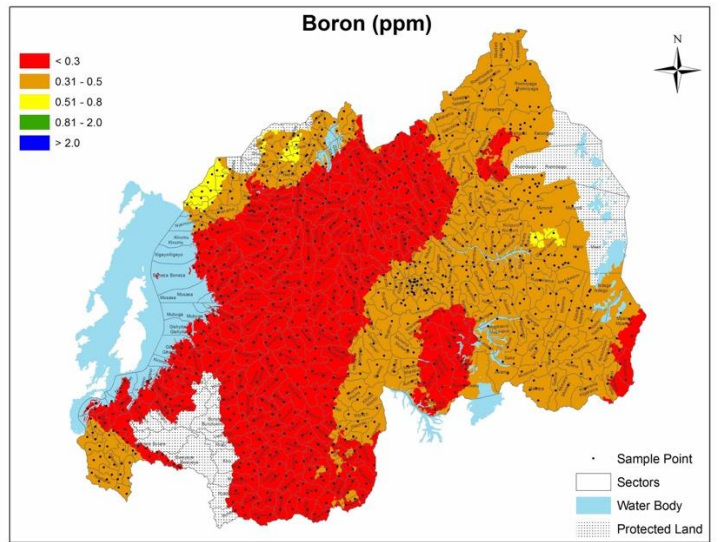
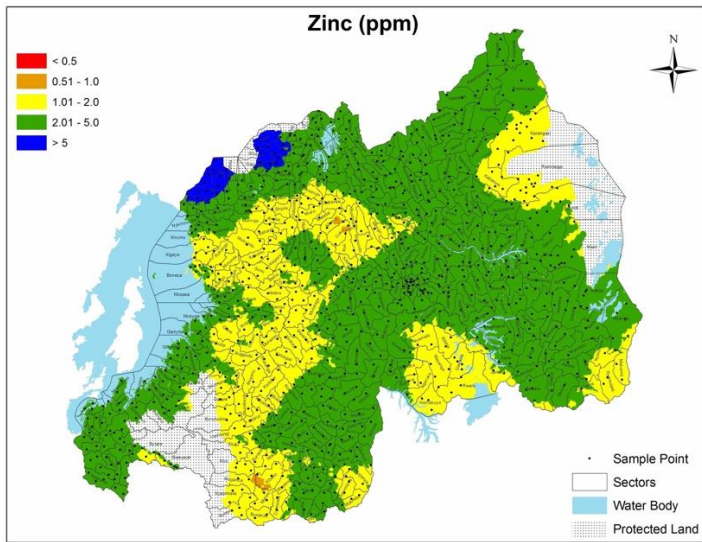
The identified policy issues relate to public-sector control of the distribution system and have been expressed previously. This should be looked at and supported as a tool to drive change as discussed above.

Currently, Rwanda requires two-year testing for new products. Even small changes in formulation currently require an additional two seasons evaluation. This severely impacts the blending industry from quickly evolving new products in the Rwanda context and making them available to smallholders. These regulations have been in existence from the time of commodity fertilizers. Rwanda has been fairly agile in policy adjustment when presented with a rationale, and one such rationale could be conforming to regional best practice, with reference to Uganda, Kenya, and Tanzania. Another such rationale is facilitation of new blended products development to meet diverse soil and crop circumstances. AGRA should support alteration of this legislation to fit the Rwandese context.

While not technically a “bottleneck”, no regulations currently exist regarding the quality of blended fertilizers such as physical properties and tolerance limits on micronutrient concentrations. Rwanda should be encouraged to develop such regulations, in line with international best practices.

Appendix I. Soil nutrient and pH maps, Rwanda.





Appendix II. List of Potential Contacts and Partners for AGRA Implementation

Organization and contact details of key personnel	Province or districts of activities	Organization type	Brief description of activities as related to AGRA priority crops
Rwanda Agriculture Board (RAB) Egide Gatari Inputs Subsidy manager +250788215435 gatariegide@gmail.com Cyamweshi Rusanganwa Athanase Soil Scientist Tel. +250 788609918/ 0732800168 Email. rusacyamweshi@gmail.com	Countrywide	Government	Rwanda Agriculture Board manages subsidized fertilizers, both macro and micronutrients for maize, rice, Irish potatoes and soybean. They organize the tender to supply the inputs and distribution system. RAB Does also research on fertilizer use through different trials in different agro-climatic zones. They also Mobilize farmers on fertilizer use.
Beatrice Uwumukiza Director General of Rwanda Agricultural and Livestock Inspection and Certification Services +250788848410 buwumukiza@gmail.com		Government	
Ministry of Agriculture and Animal Resources (MINAGRI) Dr Charles Murekezi Director General for Agriculture Deveopment +250783008453 charlesmurekezi@yaoo.co.uk	Countrywide		MINAGRI works on the policy regulating fertilizer import and export. The Ministry has already developed the fertilizer policy with the aim to catalyze the fertilizer use to meet the Abuja declaration.
One Acre Fund/Tubura Eric Pohlman Rwanda Rwanda Country Director / Co-Founder +250788741343 eric.pohlman@oneacrefund.org	Western Province: Nyamasheke, Karongi, Rutsiro, Rusizi; Southern Province: Nyanza, Huye, Nyamagabe, Nyaruguru, Gisagara and Ruhango ; Eastern Province: Rwamagana, Gatsibo, Kayonza	Development	Tubura is involved in extension services throughout the trials Farm field schools for increasing the fertilizer use in the targeted districts. They focus on beans, maize, Irish potatoes and soybean.
Coffee Exporters and Processors Association of Rwanda (CEPAR) Valens Nkeshimana CEPAR Fertilizer fund Manager +250788444960	Nyagatare, Gatsibo, Kayonza, Rwamagana, Bugesera, Ngoma and Kirehe in Eastern Province; Kamonyi, Muhanga, Nyanza, Ruhango, Huye, Gisagara, Nyamagabe, Nyaruguru in Southern Province; Rusizi, Nyamasheke, Karongi, Ngororero, Nyabihu, Rutsiro, Rubavu in Western Province; Gicumbi, Rulindo in Northern Province and Gasabo in Kigali City.	Coffee Value chain	CEPAR fertilizer fund manages fertilizer for coffee plantation in Rwanda.
CNFA/Hinga Weze Project Daniel Gies Chief of Party Innovation dgies@cnfa.org hingaweze@cnfarwanda.org 782636696	Gatsibo, Kayonza, Bugesera, Ngoma (Eastern Province); Nyabihu, Rutsiro, Ngororero Nyamasheke, Karongi (Western Province); and Nyamagabe (Southern Province)		The Project works on increasing productivity of staple crops like maize, fortified beans, Irish potatoes and horticulture value chains to fight against malnutrition

Organization and contact details of key personnel	Province or districts of activities	Organization type	Brief description of activities as related to AGRA priority crops
Rwanda Standard Board Mukeshiyaremye Athanasie Acting Division Manager +250788483488	Countrywide	Government	RSB develops and specifies the requirements, methods of sampling and testing of fertilizers in Rwanda to make sure that the fertilizers fulfill specified requirements.
Banque Rwandaise de Developpement (BRD)	Countrywide	Government	The BRD supports the fertilizers imports by providing to them a credit line or loan
Rwanda Agro-dealers Association	Countrywide	Association	Rwanda Agro-dealers Association is an umbrella of 30 agro-dealers cooperatives based in 30 districts of Rwanda and which groups more than 800 agro-dealers based in countrywide and who provide the inputs to more than 350 thousand farmers.
Rwanda Agriculture Export Development Board (NAEB) Issa Nkurunziza Tea Division Manager +2504500010 baissa27@gmail.com - - -	Rulindo, Gicumbi, Burera, Ngororero, Nyabihu, Rubavu, Rutsiro, Karongi, Nyamasheke, Rusizi, Nyamagabe, Nyaruguru	Government	Rwanda Agriculture Export Development Board works on the Export of Coffee, Tea and other emerging crops. However, the institution works on the production side to make sure that the production of the raw material is enough to produce enough export products. This is the case of tea production, whereby a fertilizer fund is put in place to ensure enough quantity of made tea for export.
URUGAGA IMBARAGA (Syndicat des Agri-Eleveurs Gafaranga Joseph (250)788626228 gafaranga@yahoo.fr		NGO	Urugaga Imbaraga/ Rwanda Farmers Federation, mobilises farmers on fertilizers use through famers cooperatives
Rwanda Private Sector Federation (PSF) Mukunde Eugenie (250)788540376 anstasiem@psf.org Rwanda Developmental Organisation (RDO) Rwibasira Eugene (250)788301740 rwibasirae@yahoo.com		Private Sector	PSF plays a major role in advocacy for fertilizer importers especially access to finance and setting up enabling environment for fertilizer business in Rwanda
		NGO	RDO provides Training Farmers on agriculture techniques to increase crop productivity, including fertilizer use. It also organizes dialogue on fertilizer distribution in Rwanda
Land Husbandry and Hillside Irrigation Program-Minagri Esdras Byiringiro-Project Coordinator esdras.byiringiro@gmail.com (250)788743422		Government	LHW does the soil tests and fertilizer trials in its area of intervention. Farmers mobilisation on fertilizers use.