Rwanda | 2016A -2017A | Irish Potato Variety Adoption Trials

Farmers First

PHASE:	(1) Research Station	(2) 50 – 500 farmers	(3) 500 – 20,000 farmers	(4) Full Scale

Introduction

Smallholders in many regions of Rwanda are increasingly interested in growing Irish potatoes, despite having little previous experience cultivating them. In a recent survey of farmers across all One Acre Fund districts in Rwanda, only 24% grew Irish potatoes during the 2016A season and 15% in 16B. However, 47% of those who did not grow potatoes stated that they would like to grow them but had difficulty doing so due to lack of quality seed at local markets and heavy disease pressure, both bacterial wilt and late blight, on existing local varieties[i].

One improved variety, Kinigi, is partially resistant to late blight and was found to have significantly higher yields, taste ranking, and farmer preference than local potato varieties in One Acre Fund phase 2 on-farm trials from 2015A-B.[ii] While this variety is common in the North of Rwanda, it has not yet become common in most of the areas where One Acre Fund works. In the same baseline survey mentioned above only 28% of clients had heard of Kinigi in the past. In 2016A One Acre Fund ran small sales trials of Kinigi potatoes in several sites (Phase "2.5" because it did not cover a full district). Then in 2016B and 2017A sales were expanded to phase 3 trials in three full districts. The goal was to test adoption, satisfaction, and feasibility of organizing supply and logistics at scale for this product. We also needed to estimate measures for a few important parameters which will heavily influence our ability to measure the impact of Kinigi potatoes: the success rate of seed saving into future seasons and the potential for lowering the purchase price for Kinigi seed in the future.

3-18%	**% of trial clients purchasing the Kinigi potato variety during the A season**
9-38%	**% of trial clients purchasing the Kinigi potato variety during the B season**
85,455	**Total kg of the Kinigi potato variety sold during 2016A-2017A trials**
147,000	**Clients who may benefit from Kinigi sales: those growing potatoes now or who would like to grow potatoes**

Objectives

- Measure adoption of Kinigi potato seed in several One Acre Fund operating areas, looking at:
  - Geographic differences in adoption
  - Adoption curve after multiple seasons of sales in the same area
  - Estimated price elasticity
- Test supplier contracting and quality control procedures as well as logistical (storage, packaging, transport) arrangements, trying to determine the best practices for a potential future full-scale roll-out.
- Measure parameters to improve the measurement of Kinigi impact, including:
  - Yields achieved vs. local potatoes when not in a controlled phase 2 plot
  - Disease levels for Kinigi potatoes, and what portion of disease could be attributed to poor rotation or management versus seed quality issues
  - Seed saving, rotting and replanting rates
  - Second-season yields of Kinigi potatoes
  - Actual sales and market prices earned for Kinigi potatoes

- Farmer satisfaction and re-purchase rates for Kinigi potatoes

Hypotheses

- Adoption will be highest in areas where past cultivation of potato is highest, based on One Acre Fund surveys.
- We will see higher adoption in B season than in A season, because generally maize is dominant in season A and potatoes are a more important crop in B season.
- Kinigi potatoes will suffer some from disease, but yields and farmer preference will still be higher than for local potatoes in phase 3, as we saw in phase 2, and various metrics of adopter satisfaction will be positive.
- Seed saving will prove feasible and successful if farmers are given adequate training and attention.

Methodology

Location Details:

Trial season and phase	District	Sites	Ag Zone(s)	Altitude (m)	Rainfall (mm/year)	pH	% Farmers ever planted Irish potato
2016A-B Phase 2.5	Rutsiro	Mbeli, Muyira, Remera Rus	Congo Nile	2,000-2,400	1,300-1,600	4.5-5.5	100%
2016A-B Phase 2.5	Nyanza	Nyamiyaga, Nyamure, Rwotso	Central Plateau	1,100-1,300	1,400-1,700	5-5.5	85%
2016A Phase 2.5	Nyamasheke	Bisumo, Rugali Cya	Congo Nile	2,000-2,500	1,600-2,200	4.5-5	45%
2016B-2017A Phase 3	Rutsiro	Full district	Congo Nile & Lake Kivu	1,400-2,500	1,100-2,200	4.5-6	75%
2016B-2017A Phase 3	Nyamagabe	Full district	Congo Nile	1,600-2,500	1,300-1,600	4.5-5.5	52%
2016B-2017A Phase 3	Nyaruguru	Full district	Congo Nile & Central Plateau	1,500-2,100	1,300-1,600	5-5.5	37%

Experimental Design and Treatments:

- 2016A:
  - 4 sites in 3 districts (12 sites total) were selected based on reported farmer interest in potatoes.
  - Baseline surveys were conducted in those 12 sites to understand existing potato cultivation, preliminary farmer knowledge of Kinigi, and needs around potatoes.
  - We tried to select one area with current high potato cultivation (Rutsiro), another with high past adoption but low current adoption due to lack of seed (Nyanza) and another with low adoption both current and past (Nyamasheke).
  - Potatoes were offered in 5 kg units at a cost of 500 FRw/kg (before 19% interest, which was added afterward).
  - In 2 sites from each district One Acre Fund recruited 20 total farmers who agreed to plant their Kinigi potatoes side-by-side with their local potatoes under identical conditions, overseeing this planting and later the harvest with the farmer.

- 2016B:
  - In 2016B sales of Kinigi potatoes were extended to the full district of Rutsiro, the full districts of Nyamagabe and Nyarguru were added, and the 4 sites in Nyanza and Nyamasheke from the 2016A trial also continued to sell Kinigi potatoes.

- The unit site was still 5 kg, but the price was raised to 600 FRw/kg (before 19%, which was added later). Farmers could organize a maximum of 30 kg of potatoes.
- In Nyanza and Nyamasheke sites, 20 farmers were recruited who agreed to save their 2016A harvests of Kinigi potatoes and replant them in 2016B side-by-side with local potatoes. Innovation officers oversaw storage, planting, and later harvests of these potatoes.
- In phase 3 district, Nyamagabe, Innovation officers selected 20 farmers in 2 sites with whom they conducted side-by-side follow-up trials comparing the new Kinigi potatoes with local potatoes.
- Every site in the phase 3 districts received free inputs for demonstration "Ihuriro" parcels.
  - There were 1-3 parcels per site, for 482 total across 115 sites.
  - In each parcel Kinigi was planted side by side with local potatoes.
  - Both types of potatoes were planted with NPK 17.
  - Field Officers recruited parcel hosts and lead the planting and later the harvest of the plots.
- Several surveys were done this season related to Kinigi potatoes:
  - A satisfaction and potato health survey shortly after distribution, in response to hotline calls about potato rotting, to estimate the extent of the problem
  - Harvest surveys of the Ihuriro parcels
  - A follow-up survey with farmers from phase 2 trials in 2015A-B and phase 2.5 trials in 2016A, to learn about long-term seed savings and satisfaction with the variety

- 2017A:
  - The phase 2.5 trials in Nyanza and Nyamasheke were discontinued, but the phase 3 trials in Nyamagabe, Nyaruguru and Rutsiro continued.
  - Unit size was 5 kg again, maximum orders were capped at 30 kg, and the price was 600 FRw/kg.
  - No special side-by-side follow-up trials were organized this season, but we intend to measure impact at scale via harvest surveys, potentially augmented with additional potato harvests.
  - A large survey was conducted across all One Acre Fund districts this season as well, to better understand local potato markets, current local yields, and farmer needs around potatoes.
    - This survey also included follow-up questions about 2016B phase 2.5 and 3 potato adopters (satisfaction, seed savings, etc.).

Results

Phase 2.5 Adoption Results

District	% Adoption		Kg/adopter		% 2016A Adopters who also ordered in 2016B
	2016A	2016B	2016A	2016B	
Nyamasheke	8%	10%	13.2	15.6	14%
Nyanza	21%	9%	12.5	9.8	1%
Rutsiro	15%	39%	14.7	10.1	12%
TOTAL	16%	20%	13.5	10.6	7%

Phase 3 Adoption Results

District	% Adoption		Kg/adopter		Total kg sold		% 2016B Adopters who also ordered in 2017A
	2016B	2017A	2016B	2017A	2016B	2017A	
Nyamagabe	38%	10%	12.4	18.1	14,335	22,725	7%
Nyaruguru	27%	18%	11.4	14.1	6,610	23,275	11%
Rutsiro	9%	3%	10.7	14.4	6,395	5,430	10%

TOTAL	19%	10%	11.7	15.6	27,340	51,430	8%

- As per our hypothesis, the percent adoption was higher in B season than in A in all areas with the phase 3 trial, though this was not the case in the phase 2.5 trials in Nyamasheke and Nyanza.
  - The possible explanation for this difference is that Nyamasheke and Nyanza are not traditional potato areas like the three districts in the phase 3 trial, and farmers are not yet accustomed to the use of fungicides, which is necessary for successful cultivation of potatoes in B season.
- Also kg/adopter was higher during the A season than during the B season. This suggests that the lower number of farmers who do cultivate potatoes during the A season may be more serious potato farmers; perhaps they live in areas where maize production in A season is less successful.
- Nyamagabe and Nyaruguru had much higher adoption than Rutsiro in both seasons of the phase 3 trial, despite the fact that all 3 districts have a high proportion of potato growers.
  - This difference is likely because around half of Rutsiro is the Lake Kivu ag zone instead of Congo Nile, whereas Nyamagabe and Nyaruguru are primarily within the Congo Nile ag zone, and Congo Nile is a more appropriate region for potato cultivation.
  - The Rutsiro sites chosen for the phase 2.5 trial were all in Congo Nile and had a high interest in potatoes, as reported by their Field Officer, which explains why adoption was much higher for those sites than for the full district.
- A lower portion, only 7-8%, of farmers who bought seed during the 2016B season also bought seed during the 2017A season. This suggests either that farmers are saving their seed and do not need to purchase again, or that satisfaction is low.

2016B Ihuriro Parcel Harvest Results

District	Parcels harvested	Kinigi kg/are	Local kg/are	Kinigi tuber size (g)	Local potato tuber size (g)	% Hosts who prefer Kinigi	% Hosts who prefer Local
Nyamagabe	10	28.3 a	23.2 a	50 a	31 a	30% a	10% a
Nyaruguru	8	40.3 a	51 a	33 a	27 a	43% a	33% a
Rutsiro	34	55.2 a	43.1 a	47 a	40 a	60% a	12% b
TOTAL	52	48.0 a	40.6 a	46 a	36 a	52% a	15% b

Significance level used: 95%

Side-by-Side Follow-up Plot Harvests

District	2016A				2016B			
	Parcels harvested	Kinigi kg/are	Local kg/are	Will plant Kinigi again	Parcels harvested	Kinigi kg/are	Local kg/are	Will plant Kinigi again
Nyamasheke	19	88.2 a	35.8 b	100%	16	119.1 a	93.0 b	100%
Nyanza	20	43.9 a	30.8 b	85%	4	39.0 a	43.0 a	100%
Rutsiro	20	76.3 a	59.9 b	100%	20	95.6 a	64.8 b	48%
Nyaruguru	n/a	n/a	n/a	n/a	10	45.4 a	34.2 a	30%
Nyamagabe	n/a	n/a	n/a	n/a	11	62.5 a	28.7 b	73%
TOTAL	59	69.2 a	42.3 b	95%	61	72.5 a	50.1 b	66%

Significance level used: 95%
Note: Results in pink used saved, re-planted seed, not new seed

Side-by-Side Follow-up Plot Post-harvest Results

District	Trial participants in follow-up survey	% satisfied with Kinigi	Participants who saved seed (16A or 16B)	kg Kinigi saved for replanting	Rotting of saved seed	Participants who will save Kinigi seed in the future	Participants who will buy Kinigi in the future
Nyamasheke	20	33%	N/A	0.0	N/A	25%	50%
Nyanza	15	80%	4	19.0	55%	40%	93%
Rutsiro	20	90%	5	27.5	49%	53%	75%
Nyaruguru	42	30%	4	2.0	9%	45%	79%
Nyamagabe	83	81%	5	21.7	47%	18%	43%
TOTAL	180	60%	18	13.0	41%	30%	60%

- Kinigi yields were almost always higher than local yields in all districts, both for Ihuriro parcels and for the side-by-side follow up plots planted with a sub-sample of trial farmers.
  - The only exception was Nyanza in 16B, where local seed outperformed saved Kinigi seed, though not to a statistically significant extent.
  - Side-by-side follow-up fields had significant differences in 16A for all districts, and in 16B in all districts except Nyaruguru and Nyanza.
  - Ihuriro parcels did not show a statistically significant difference.
- Our hypothesis that Kinigi would be attacked by disease but still outperform local potatoes was supported:
  - In 16B Ihuriro parcels, the yields of both local and Kinigi potatoes were fairly low. This was largely due to bacterial wilt losses.
  - However, at harvest farmers still saw higher yields for Kinigi and much larger tuber sizes.
  - Kinigi thus was also preferred over local varieties, though by a much lower margin in Nyamagabe and Nyaruguru, where bacterial wilt losses were higher.
- Seed saving for Kinigi potatoes is difficult, and not all farmers are able to do it successfully:
  - 16A trial participants were relatively ambitious with their plans to save seed: 95% intended to save and replant.
  - However, very few actually saved and replanted after 16A, and in later surveys only 30% of farmers said that they planned to save Kinigi in the future.
  - Of those who did save in 16A, they saw rotting rates of 41% and only replanted about 7 kg of seed.
  - Farmers in Nyanza had a particularly difficult time with seed saving.
    - We pushed them to save in order to participate in the 16B trial with replanted seed, but of 20 target farmers only 4 successfully saved, replanted, and were able to harvest.
    - Aside from rotting, the major problem was that Kinigi sprouted late, and by the time they were actually sprouted and planted the rains had stopped and many of the potato plants died.
  - Farmers in Nyamasheke were more successful with seed saving.
    - There, too, we pushed 20 farmers to save seed for the 16B re-planting trial.
    - 20 successfully managed to plant and 16 went all the way through to harvest.
    - Farmers found that they were more successful with seed saving and sprouting the plants quickly if they left the potatoes in the field for 1 month after the 3-month maturity period before harvesting; this made the potatoes stronger and helped them break dormancy faster.
    - Nyamasheke also had more rain in 2016B than Nyanza, so planting later was not a problem for them.
- Because of the seed saving difficulties, there are two possible interventions we must consider in the future if the impact of Kinigi potatoes is to be positive:

- Work out a better system for seed saving and train farmers on it—we did not give this proper focus, even in the phase 2.5 trials.
- Find a way to sell potatoes at a lower price, closer to 250-300 FRw/kg, so that even if farmers must repurchase seed each year it is still profitable.

October 2016 Irish Potato Baseline Survey

Summary Statistics

Farmers surveyed	16A local potato yields low	16B local potato yields low	% with severe 16B late blight problem	% with severe 16B bacterial wilt problem	% with difficulty finding local seed	% potato seed purchased in past	% potato seed saved in past	Aware of Kinigi before the survey
1,761	27%	58%	16%	42%	78%	42%	42%	28%

Farmer Reported Interest in ordering, after being shown Kinigi Catalog

% of farmers who say they would buy Kinigi at given price (B season)			Average kg Kinigi farmers would order at given price (B season)			Calculated price elasticity
500 F	600 F	700 F	500 F	600 F	700 F	
45%	30%	21%	11.8	4.1	2.8	-11.3

- The charts above come from broader survey data on potato needs for farmers across the full One Acre Fund program, not just trial sites. District-level data are shown in the Appendix.
- We see that farmers do report high difficulty finding local seed (78%), and that they need more support to increase yields in the B season, when 58% have lower than acceptable yields.
- Bacterial wilt is a bigger problem (42%) then late blight (16%).
- Roughly the same proportion of seed is currently saved and purchased (42%). The remaining quantity is acquired free from neighbors or other sources.
- At the 700 FRw/kg price, the average order for 2017B is reported at 2.8 kg/client and adoption is 21%
  - This is fairly close to what we saw in phase 2 trials for 2016B, when the price was around 700 FRw/kg after including 19% (nominally it was 600 FRw/kg).
  - It's actually a bit surprising that these survey numbers line up so well with actual adoption numbers, considering that usually farmers vastly overstate their orders in surveys.
  - If we can trust the figures, it suggests that demand in phase 4 trials will be relatively similar, per client, to the figures we are seeing now at phase 3, despite the expansion of districts.
  - In any case, it provides a good baseline for calculating price elasticity.
- We see that potatoes are highly price elastic (with an elasticity of -11.3). Demand dramatically increases as the price decreases. If we could find a way to sell potatoes for 500 FRw/kg, by lowering production costs, we could greatly increase orders.
- We ran regressions on the reported adoption and other baseline data to determine what the significant factors affecting adoption are.
  - We found that factors significantly correlated with planned kg Kinigi to order (at 500 FRw/kg price, in B season) were:
    - Location, when compared to a baseline of Rutsiro, including: Mugonero, Nyamasheke, Rubengera and Karongi.
    - Having saved seed in the past for planting or bought seed in the past
    - Being aware of Kinigi before the survey
    - Being male: female farmers had lower orders
    - Age: every year of increase decreases the average order size
  - We found that many of these same factors did not correlate with likelihood of adoption, in a separate logistic regression on the dummy variable of saying one would buy any Kinigi or not (at 500 FRw/kg, during the B season). Variables that were significant included:
    - Age: an increase in age decreased the likelihood of adopting

        - Some districts; when compared to the baseline of Rutsiro, all the following had higher likelihood of adoption: Gatsibo, Giheke, Karongi, Ngoma, Nyamasheke, Nyaruguru, Rubengera
    - Some factors included in both regressions which did not prove significant were : household size, land size owned, difficulty of finding local seed.
    - Full results are shown in the Appendix.

Supply and Logistics Commentary:

Throughout the sales trial in 2016A-2017A we have worked on ways to improve our potato seed supply, including assuring adequate quantity of sprouted seed at the right time and assuring good quality of that seed.

- 2016A:
    - Seed for this trial was purchased from a single supplier in Musanze.
    - Packaging was done in polypropylene sacks after delivery to the warehouse. We sorted out very large and rotten tubers at that time.
    - We had no major reported quality complaints with seed in this season.
- 2016B:
    - We first tried to purchase from only one supplier in Musanze (a different supplier than the one for 2016A)
    - Packaging for all seed was done in polypropylene sacks, as in 2016A, at the supplier's warehouse, then shipped to the One Acre Fund warehouses.
    - We built wooden shelves to help facilitate storage of potatoes and reduce weight from stacking many bags directly on top of one another, but we did not store the potatoes loose inside the shelves, as is done in many other warehouses. Instead, the potatoes were stored in the shelves inside their polypropylene bags.
    - In the warehouse we saw about 20% rotting of potatoes during the storage process.
    - At the distribution sites we helped farmers open their bags, sort out any tubers that they found to be rotten and replace them with tubers from the excess bags loaded on the truck.
        - Sites where we did not have time to do this are the sites where we had the highest volume of complaints right after distribution, and many farmers in those sites were given re-distributions of 30% of their potatoes.
    - After distribution we also had some significant complaints about potato seed quality:
        - Sites that received the potatoes from the second supplier had very low complaints compared to the first supplier, so we concluded that the problem was related to the first supplier's quality.
        - We decided that in future we should never accept a lot with 10% or more bacterial wilt symptoms, even if we do sort out those bad tubers.
        - We also saw that farmers were not opening their polypropylene sacks, sometimes for several weeks after distribution and before planting. This increased the level of rotting of the plants compared to farmers who did open the sacks.
        - We ended up issuing a reimbursement for all farmers who received the Kinigi potatoes from the first supplier.

- 2017A:
    - We made several major changes to our potato sourcing to deal with 2016B problems:
        - We sourced potatoes from many different suppliers instead of relying on only 1-2: in the end we bought from six suppliers in Musanze and three suppliers in Nyamagabe.
        - In the case of the three Nyamagabe suppliers, we bought the seed un-sprouted, treated it with a solution of 5 ppm Giberellic acid, and let it sit for a week before distributing. By the time of distribution around 20% of the tubers had already started to sprout.

- We accepted only lots with 10% or less tubers with bacterial wilt symptoms. Most of the lots that we took had less than 5% of these symptoms at sorting.
- We sent potato seed samples for disease testing at Crop Nutrition Laboratory Services (CNLS) in Kenya.
- We worked only with RAB-registered potato suppliers.
- Instead of polypropylene bags we used mesh breathable sacks for packaging the potatoes.
- We identified a multiplier in Nyamagabe who was highly recommended by RAB and had disease-free fields to do contract multiplication with us.

o Observations from this distribution:
- Every potato lot sent to CNLS tested positive for bacterial wilt, even one basic quality lot that we sent, indicating that this problem is very severe in Rwanda.
- Warehouse losses were far lower—around 4%, compared to 20% in 2016B.
- Complaints from farmers in the field were also lower after planting.
- Some farmers still called in to complain about rotting potatoes, but those complaints were highly concentrated in the sites that received potatoes on a day when an exceptionally large quantity of potatoes (6 tons or more) was being distributed.
- Through observations and a debriefing meeting it became clear that on days when the casual workers had to bag a large quantity of potatoes, the quality of sorting suffered.
- Universally, everyone preferred the mesh sacks.
  - The field team found them helpful because it was possible to look for any problem potatoes without opening the bag, reducing the time spent on verification on distribution day.
  - Farmers felt more confidence when they took the potatoes and reported less rotting before planting.
- The seed that we picked up un-sprouted and treated with giberellic acid had the highest quality levels and highest reported satisfaction.

Next Steps

- 2017A follow-up:
  - Do crop-health visits to check on the level of bacterial wilt in the fields of Kinigi adopters early in the season and after flowering; consider reimbursements, if needed, based on the results.
  - Do supplementary harvest surveys to better measure impact at scale.
  - Offer a training to all potato clients on seed harvest, selection, and good storage practices to try to increase the level of success farmers have in seed storage.
    - During the saving period and at the beginning of the following season, do visits and surveys to check on the success of this training in pushing behavior change and in increasing impact for adopters of the method.
- 2017B:
  - Continue the phase 3 trial in the same districts (Nyamagabe, Nyaruguru, Rutsiro) to continue refining supply, storage, and logistics. This time we will sell at 750 FRw/kg (without 19% interest).
  - We are currently working on sourcing for 2017B and are implementing the following guidelines:
    - Work closely with RAB prior to harvests by potato multipliers to identify fields that have low disease problems and will get certified.
    - Attend harvests and post-harvest visits with the supplier and RAB inspector to check quality and ensure certification is achieved.
    - Test all potato lots for bacterial wilt before purchasing and reject any with 2% or more bacterial wilt found in the full lot.
    - Cast a wide net again, learning about all certified potato fields early on and then taking those from the best fields closer to pick-up.
    - Plan to pick up unsprouted seed and treat with giberellic acid in a few cases.
  - We plan to do the following to improve storage and logistics:

- Use mesh bags again, but do a better job of marking them by lot and tracking the lots sent to each specific site.
- Continue sorting and packaging the day before distribution, but in the case of very large orders start packaging 2-3 days in advance, hire more casuals, and have a strong employee designated to be their supervisor, who will do thorough quality control.
- Because of the spacing constraints at the warehouse, through which the majority of seed passes (for Nyamagabe and Nyaruguru distributions), rent a separate facility in 2017B and consider constructing a special space for potatoes by 2018A.

o Complete the contracted multiplier project and consider expanding:
- We will distribute the seed from the contracted multiplier during the 2017B season and will follow-up to compare quality to other seed.
- By 2018B or 2019A we should be able to purchase Kinigi potatoes from Bramin farm, and irrigated, 350 ha farm in the East. They currently are planting tissue culture Kinigi plants and will move through the different generations (mini-tubers, pre-basic, basic, certified seed). We expect those to be very high quality seed.

o 2018A:
- Depending on the results of the 2017B trial, and the numbers we see in a revised impact assessment, we will consider an expansion of the phase 3 trial to more districts.
  - Prioritize the western districts that have very high demand—Mugonero, Karongi, Rubengera, Nyamasheke.
  - Also consider at least one eastern district since disease pressure is low there and demand is fairly high in Gatsibo and Ngoma.
- In future years, lower the sales price of Kinigi, perhaps as low as 400-500 FRw/kg, depending on the success of the contracted multiplier trial.

Appendix

October 2016 Irish Potato Baseline Survey

District	Farmers surveyed	16B local potato yields low	% with severe 16B bacterial wilt problem	% with difficulty finding local seed	% potato seed purchased in past	% potato seed saved in past	kg/client planned Kinigi purchases at 700 FRw/kg	% who would buy potato at 700 FRw/kg in B season
Bugarama	90	25%	0%	95%	33%	38%	1.3	14%
Gatsibo	107	52%	9%	37%	58%	27%	7.6	54%
Giheke	89	42%	65%	85%	7%	49%	4.1	16%
Gisagara	69	80%	17%	76%	33%	24%	4.2	36%
Huye	76	60%	39%	84%	30%	56%	0.4	3%
Karongi	101	35%	44%	98%	100%	0%	9.4	57%
Kayonza	101	88%	29%	80%	46%	80%	5.8	28%
Kiboora	98	N/A	N/A	N/A	N/A	N/A	2.0	22%
Mugonero	100	71%	0%	94%	78%	11%	2.0	8%
Ngoma	93	49%	25%	56%	12%	90%	3.3	48%
Ngororero	101	86%	67%	69%	85%	8%	1.1	15%
Nyagatare	81	75%	0%	86%	66%	20%	0.8	12%
Nyamagabe	75	89%	100%	95%	83%	5%	3.0	3%
Nyamasheke	102	83%	50%	85%	38%	15%	1.4	19%
Nyanza	100	46%	25%	93%	31%	51%	1.3	8%
Nyaruguru	53	62%	58%	69%	35%	38%	5.6	26%
Rubengera	115	82%	0%	81%	17%	11%	0.0	1%
Rusizi	123	40%	80%	93%	11%	85%	0.4	7%
Rutsiro	87	66%	58%	75%	67%	48%	2.0	13%
TOTAL	1,761	58%	42%	78%	42%	42%	2.8	21%

Regressions on Adoption, from Baseline Data

Regression Type: Linear (OLS)
Dependent Variable: kg Kinigi would purchase at 500 F/kg

Factor Variable	Coefficient	p-value	Significance (90%*, 95%**, 99%***)
Female	-4.9	0.031	**
Age	-0.21	0.012	**
Saved potato seed in the past	10.9	0.001	***
Purchased potato seed in the past	7.9	0.008	***
Aware of Kinigi before the survey	8.7	0.001	***
Karongi (vs. Rutsiro)	11.0	0.074	*
Nyamasheke (vs. Rutsiro)	19.6	0.032	**
Mugonero (vs. Rutsiro)	57.6	0.001	***
Rubengera (vs. Rutsiro)	17.8	0.005	***
Non-significant variables also included in the regression: Household size, ares owned, difficulty finding local seed, other districts			

Regression Type: Logistic
Dependent variable: Farmer would buy Kinigi at 500 F/kg

Factor Variable	Odds-ratio	p-value	Significance (90%*, 95%**, 99%***)
Age	0.988	0.056	*
Gatsibo (vs. Rutsiro)	3.1	0.014	**
Giheke (vs. Rutsiro)	2.97	0.016	**
Karongi (vs. Rutsiro)	7.03	0.001	***
Ngoma (vs. Rutsiro)	6.8	0.001	***
Nyamasheke (vs. Rutsiro)	9.2	0.013	***
Nyaruguru (vs. Rutsiro)	2.23	0.071	*
Rubengera (vs. Rutsiro)	6.1	0.001	***
Non-significant variables also included in the regression: Female, saved potato seed in past, purchased potato seed in past, aware Kinigi before survey, household size, ares owned, difficulty finding local seed, other districts			

References

[i] "Sweet Potato and Potato Baseline Survey." TUBURA Integration Team. October-November 2016.
[ii] "Improved Potato Varieties- Rwanda (2015A-B)." One Acre Fund. November 2015.