IMPROVING SOIL TESTING AMONG SMALLHOLDERS

Data Analytics

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AgriFin Accelerate is a six-year initiative supported by the **MasterCard Foundation**, working in Kenya, Tanzania and Zambia.

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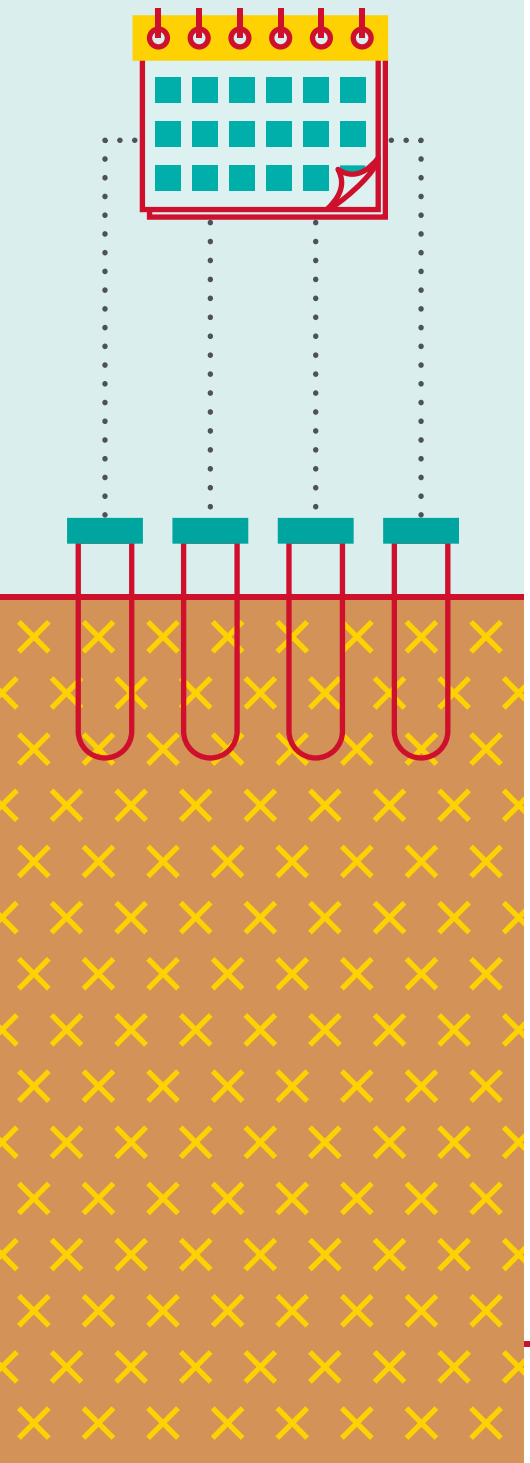
EXECUTIVE SUMMARY



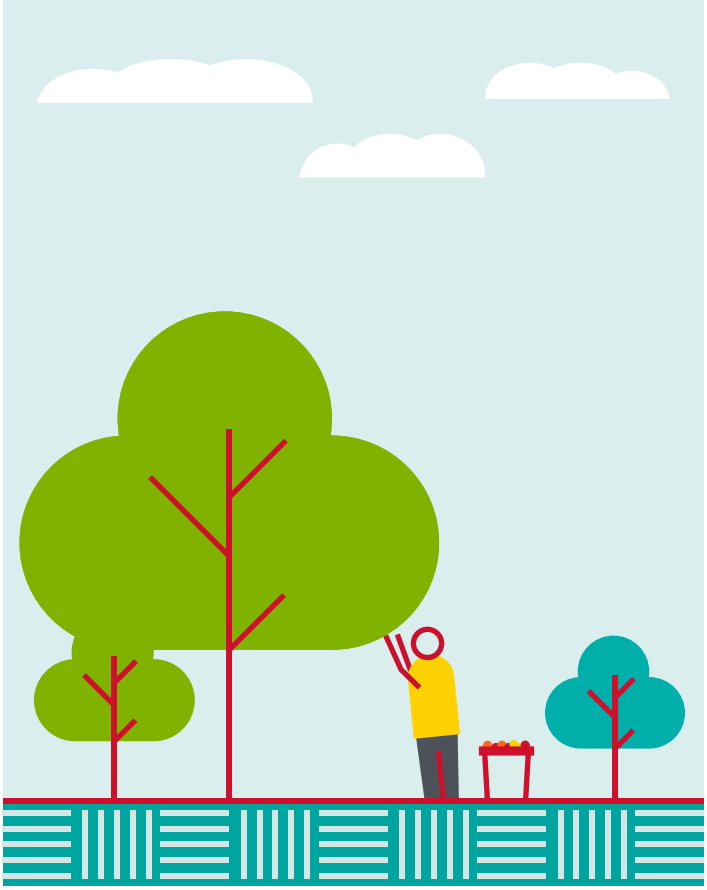
AgriFin Accelerate commissioned the Busara Center to examine the implementation of soil testing service to identify fac-tors that drive use, and devise improvements that will lead to **more take-up and adherence to recom-mendations**. Special attention was paid to evaluate the limited pilot program conducted by iProcure.
Busara conducted research in **three parts**: analysis of existing data, in-depth interviews with agents and customers, and a phone survey.

We find that:

- **Perceived value** of the service is generally high, with a net promoter score (NPS) of 9.6/10 and is correlated to the cost.
- **Human touch** is critical to the process. Farmers who were in touch with agents were **3.3 and 4.1 times more likely to implement their recommendations** and **more likely to recommend soil testing to their friends** respectively.
- Farmers are motivated to test by **fear of bad harvests** or to diagnose problems with their current practices.
- Youth are more than **1.2 times more likely to take up soil testing than older farmers** but women are **more likely to implement recommendations** than men
- Social networks and professional support services are **both important sources of information** for farmers and trust drives active use.

01

RESEARCH OVERVIEW



RESEARCH OBJECTIVES

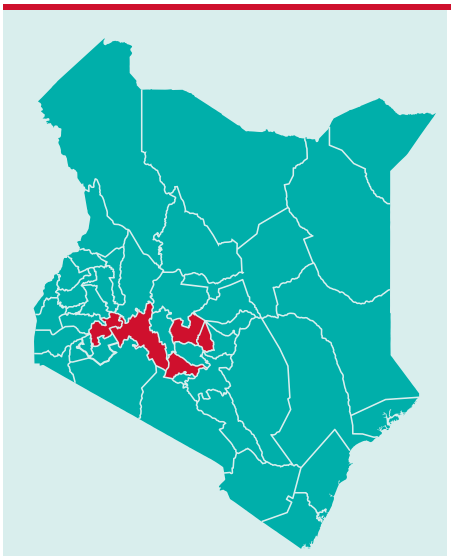
Map:
(a) The soil testing process
(b) Recommendations process
(c) Farmers' thinking at each stage

Identify the motivators and barriers to adopting:
(a) Soil testing
(b) The recommendations

Understand what farmers perceive as the benefits of adopting:
(a) Soil testing
(b) The recommendations

Design interventions to increase the adoption of:
(a) Soil testing
(b) The recommendations

APPROACH



To achieve the objectives, we laid out various activities across 5 different counties: Kericho, Nyeri, Nakuru, Kirinyaga and Kiambu.

What	Who
QUALITATIVE In-depth interviews	3 SoilCares Parters
	24 farmers
	5 agents
QUANTITATIVE Phone surveys	iProcure + other agents
	150 farmers

We engaged farmers in person and over phone surveys to explore the overarching themes.

What	Gender	Tested soil	Implemented recommendations
QUALITATIVE In-depth interviews	10 women	18/24	10
	24 farmers		
	5 agents		
QUANTITATIVE Phone surveys	30 women	105/140	70
	140 farmers		

Overarching themes

- Perceptions and misconceptions of the benefit of soil testing
- Financing
- Recommendations adherence
- Willingness to pay
- Youth & women
- Agent support Human touch
- Social network influence
- Loss aversion

Limitations - The available data biased our study largely towards soil testers.

Process	Limitations
In-depth interviews Generate overarching themes that influence the efficacy of the process leading to (repeated) use and adherence to recommendations	**Few non-adopters were included in this analysis** Providers kept no record of non-adopters to allow direct follow-up with them.
Phone surveys Quantify themes and determine key predictive variables that influence adoption, repeated use and adherence to recommendations	**Phone survey attrition** Initial sample targeted was 300 farmers, however as a result of outdated phone records, unavailable respondents and few failed consents, the final sample was almost halved.
	Phone survey sample selection iProcure farmers (90) were matched to characteristically similar farmers from other providers (undefined). It sought to determine success of iProcure soil testing process.

TARGET SAMPLE

Phone survey

The phone survey targeted farmers who had previously tested their soil but also gathered self-report of soil testing experience.

88.1%[1]
Tested their soil

67%[2]
Implemented recommendations

61.4%
Switched crops

9%
Tested soil more than once

9.6
Average net promoter score

1 This is a self report based on farmer recall despite entire sample being drawn from AgroCares i.e. past soil testers.
2 This is based on those who reported having tested their soil (88.1%).

The farmers were largely small scale farmers who grew 1-2 crops and had been farming for about 1 year on average.

67%
of farmers have been farming for >10 years

21% 10-19 years
26% 20-29 years
20% 30-39 years

89%
of farmers grow more than 1 crop

30% grow 2 crops
37.9% grow 3 crops
22% grow 4 crops

63%
of farmers have 1-5 acres of land

PROVIDER MODEL

Based on the engaged partners, there were 2 primary models through which suppliers offered the services.

Agent finds farmer

Farmer is contacted by agent at institutional level (agrovet/cooperative) and visited at their household to have their soil tested

Pro:

+ Strong relationships developed that sustains adoption and active use
+ Follow up by either farmer or agent is made easier

Con:

- Time consuming
- Heavy human touch needed to sustain
- Difficult to scale - agents have limited capacity

Farmer finds agent

Farmer seeks out agent to get their soil tested (bring their soil to a more central location and they would receive results at a later date)

Pro:

Based off of established formal networks hence:

+ Trust is already established
+ Feedback loop secured
+ Cost effective for the supplier

Con:

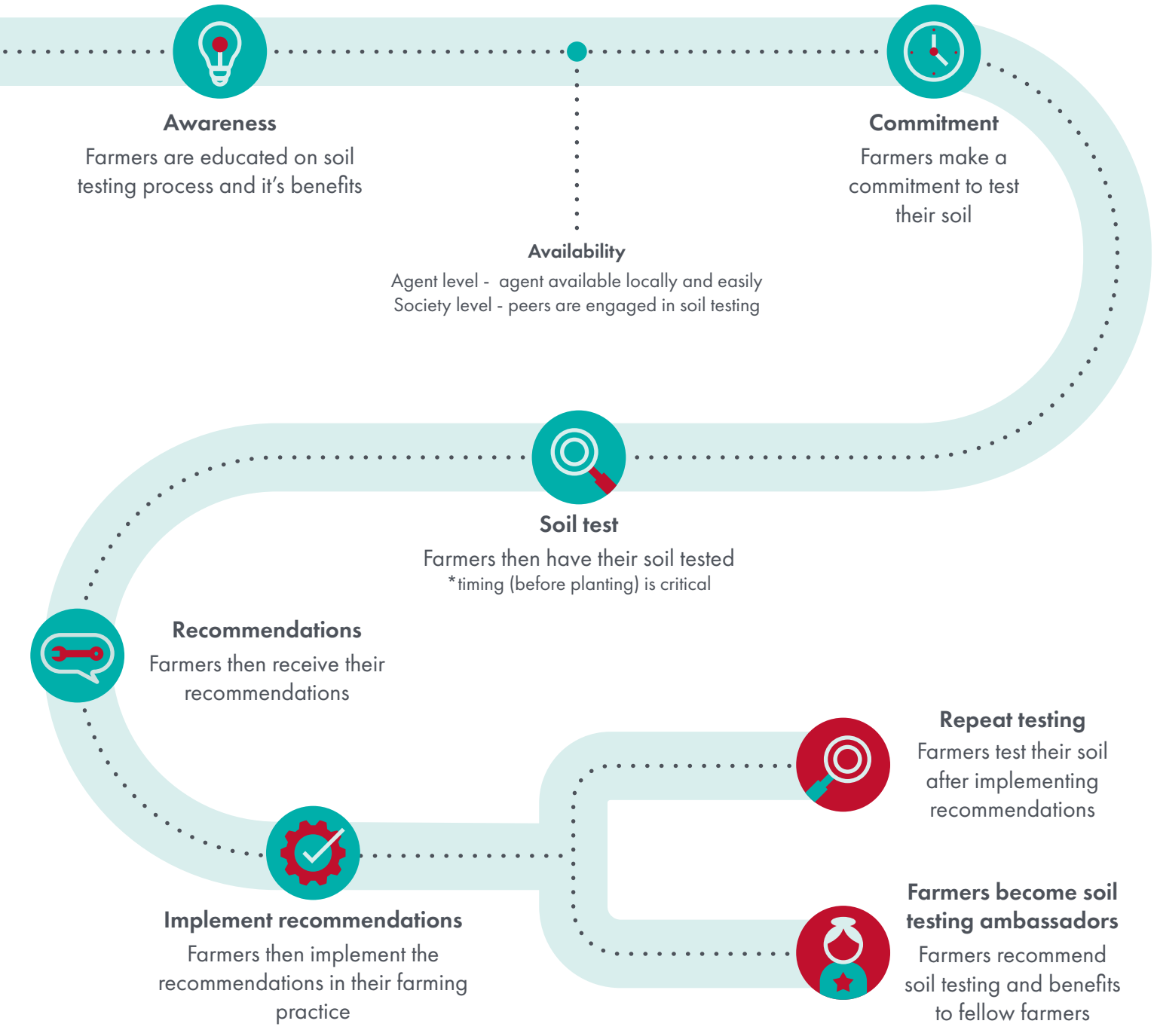
- Delay in receipt of recommendations
- Additional effort required on the farmer side
- Lack of personal touch and access to follow up

02

CUSTOMER JOURNEY

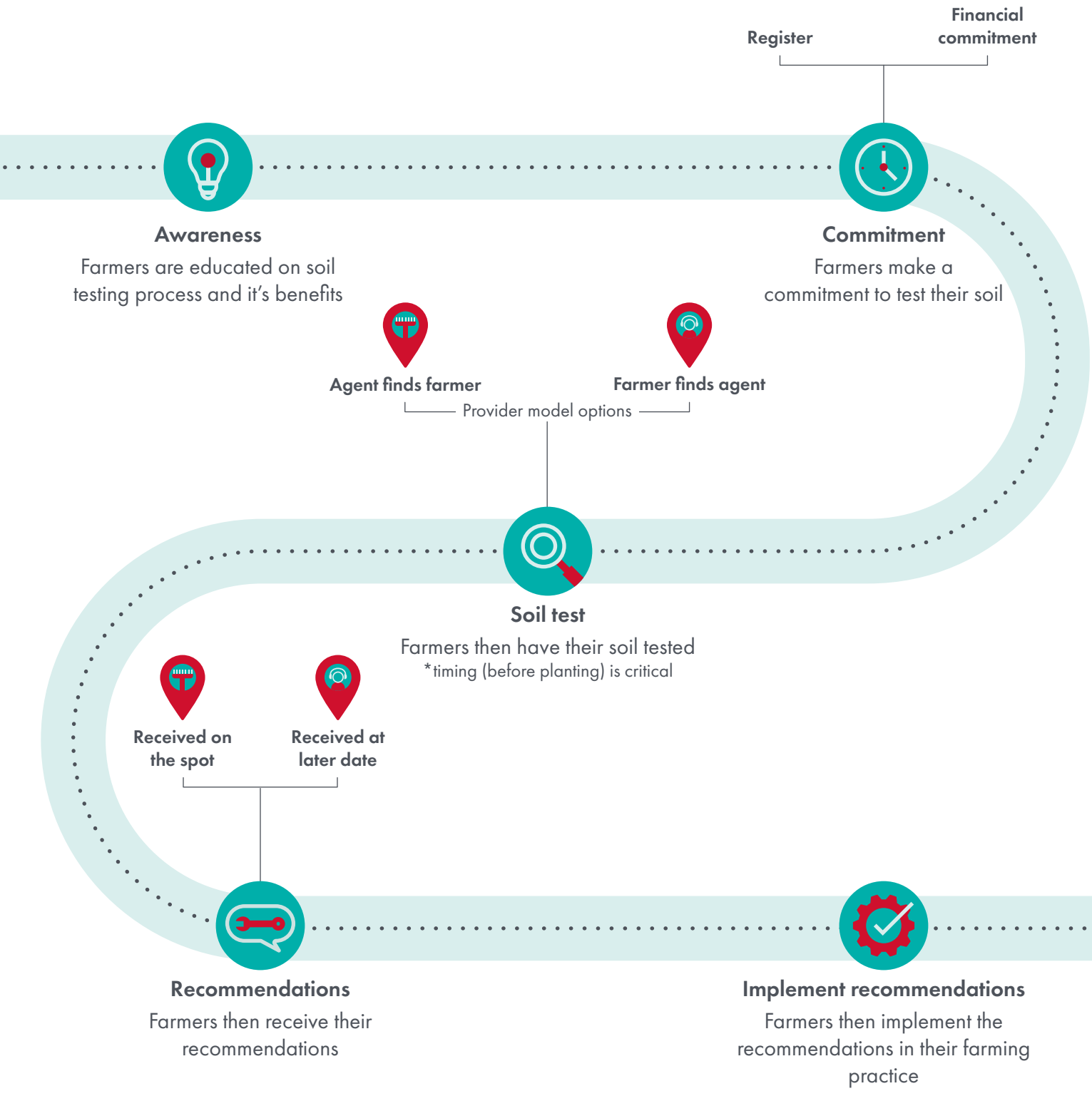
IDEAL CUSTOMER JOURNEY

A simple layout of the farmer customer journey from the point of learning about the product to implementing the recommendations.



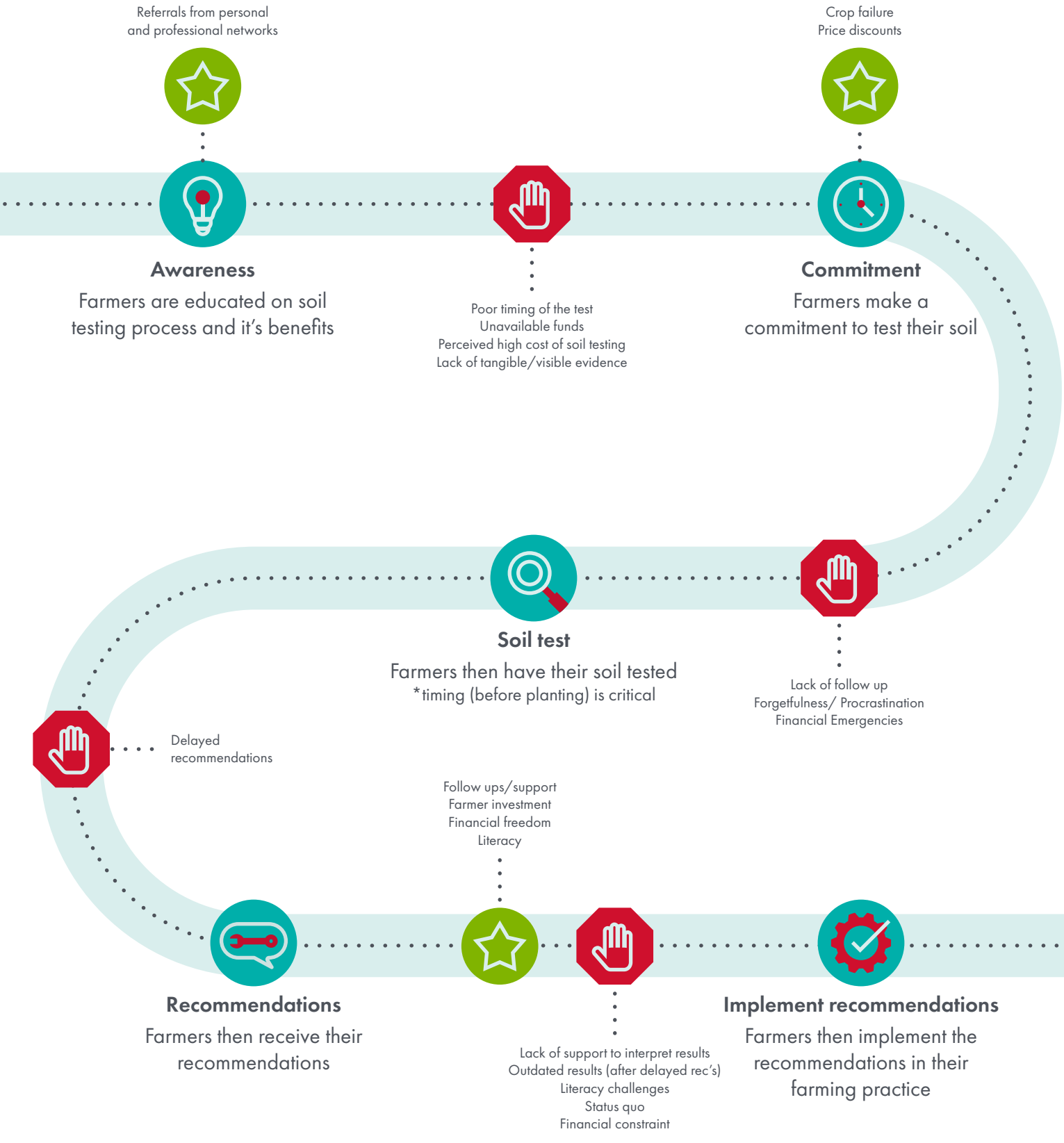
ALTERNATIVE CUSTOMER JOURNEYS

Different agents had different customer journeys towards soil testing.



OPPORTUNITIES & BARRIERS

Opportunities and **barriers** may propagate or hinder farmers moving across the customer journey.



03

FARMER AND AGENT PROFILES

Meet Farmer Richard, Model Farmer

The farmer who tested his soil and benefited from his implementing his recommendations

A 48-year-old maize and beans farmer from Nakuru who earns his livelihood from farming. He is open to testing new farming practices and gets information from his agrovet agent.

Based on the recommendation, beyond his usual fertilizer share, he applied organic manure and top dressed before and after flowering. He was able to get 10 more bags of maize over his standard harvest.

The test was offered as a complimentary service by a local cooperative. He was willing to pay more than Ksh. 1000 despite it being offered free of charge the first time. He believes that the testing should be done every season. He hopes to try a new crop in the next season.

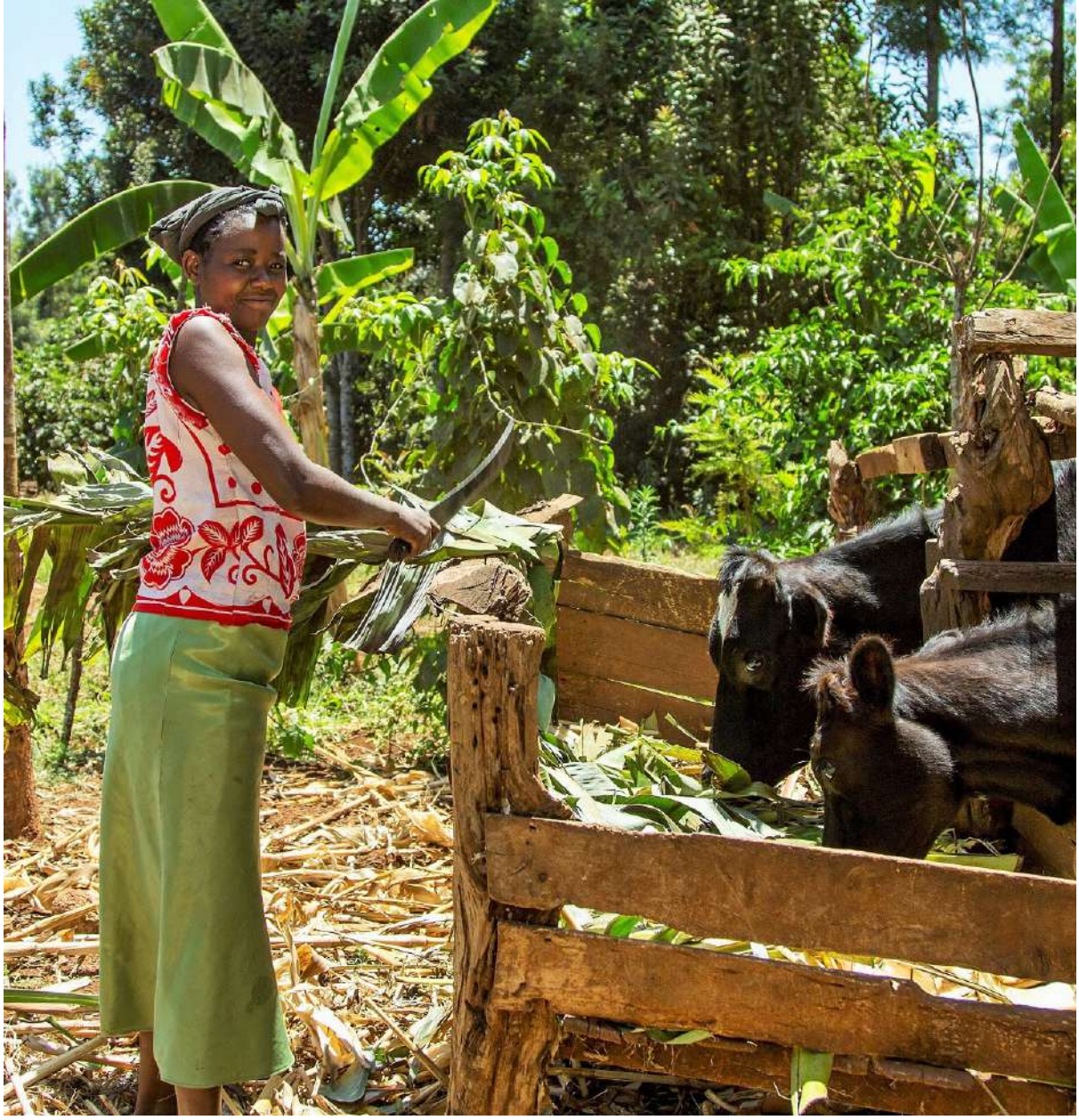
Meet Farmer Gerald, Determined Farmer

The farmer who tested his soil and is yet to benefit since he didn't implement the recommendations

A 60-year-old coffee farmer from central Kenya who is a retired teacher. He also farms cabbage and tea. Although he had known of soil testing for a long time he did not use the services until he started experiencing lower yield in his coffee harvest.

He did the test and the recommendation was to adjust the quantities and intervals of application and adopt a new fertilizer.

Because the test was done after planting season - when the recommendations would be actionable, he is committed to applying the results in the next season. He felt a price of Ksh. 1500 was fair. He believes to improve the process, having proper follow up will support farmers implement the recommendations better.



Meet Farmer Vivian, Cautious Farmer

The farmer who did not test her soil at all

A 32-year-old potato farmer from Kericho who earns her livelihood from farming. She is the primary caretaker of the land though she consults her husband occasionally to make decisions about the farm. She heard about soil testing from a friend but was yet to take up the service. She is waiting to see results from her friend's crop before taking it up. The price slightly deterred her as she prioritizes other inputs to soil testing but if benefits can be seen she would be willing to pay up to 600 KShs.

She hopes to expand her farming business someday in the future. She is comfortable with her existing farming practices as they work for her so far.

Meet Agent Sheila, Star Agent

The "star" soil testing agent

Sheila is a 22-year-old soil testing expert who is inspired by making farmers more productive. She approaches farmers at tea buying centers as well as farmer training forums.

She is often persistent with farmers: she will reschedule and set time with farmers to whenever they are available for soil testing. She believes establishing relationships with the farmer to the point they trust you as an expert is key to ensure adoption of soil testing and repeated testing in the long run. This allows easy following up to support farmers implement their recommendations.

04

THEMATIC INSIGHTS

MAIN THEMES

Based on the findings, the following themes were the most relevant to adoption of and active use of soil testing among farmers.

Willingness to pay | Human touch | Social network influence | Bundled products | Loss aversion | Timing

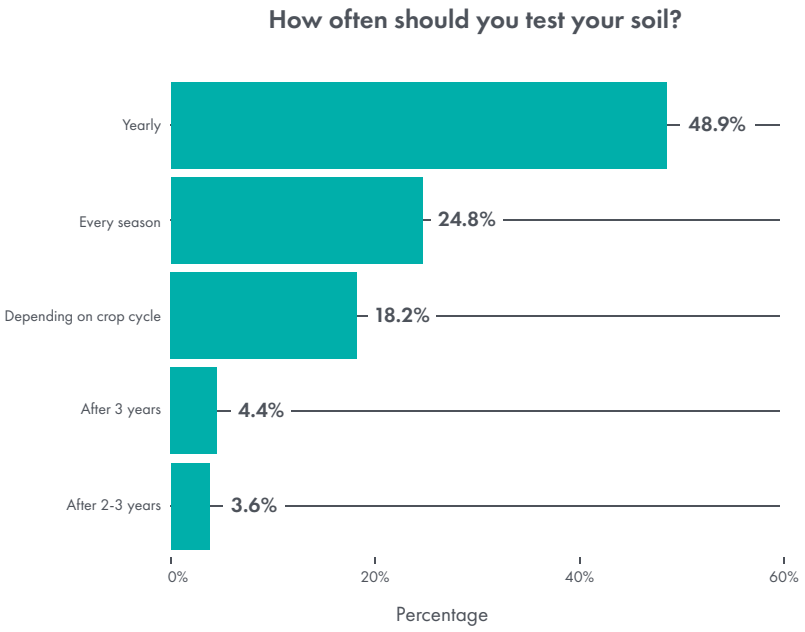
INSIGHT 1

Benefits of soil testing are well understood but frequency of testing is varied

Farmers are generally aware of the benefits of soil testing.

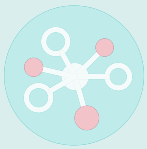
On average more than **70% of the farmers agree** that soil testing increases productivity, yield and knowledge of alternative crops to grow.

However, the frequency of testing received varied responses with only farmers who had implemented recommendations strongly agreeing in testing every season.




Willingness to pay


Human touch


Social network influence


Bundled products


Loss aversion


Timing

INSIGHT 2

Cost of soil testing is directly related to its perceived value

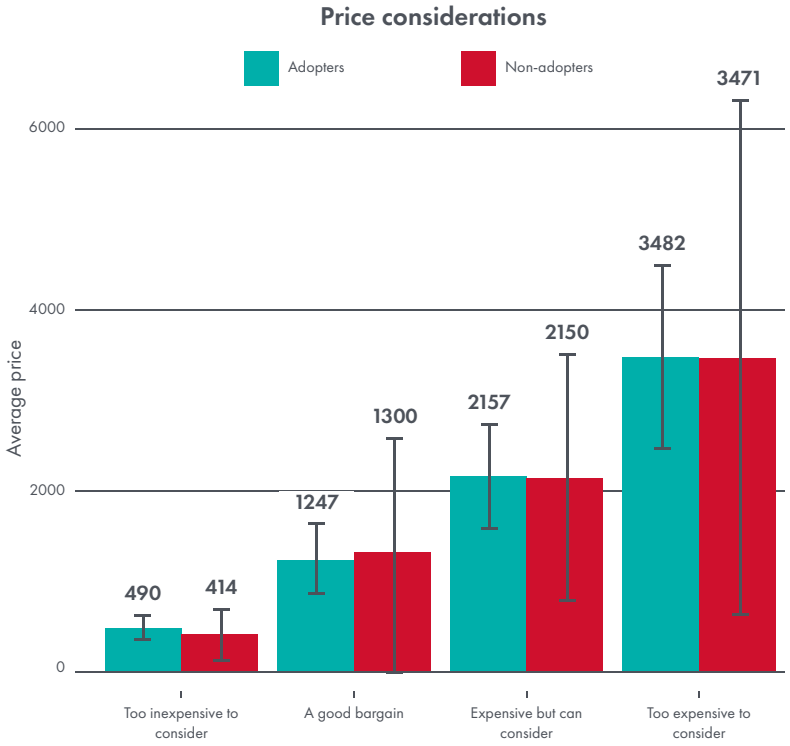
Farmers on average are comfortable with the price charged for soil testing, though value seems to vary with investment required.

Farmers recorded an average price of **Ksh. 1207 as a bargain for soil testing**.

Current price being offered by iProcure is Ksh. 1000.

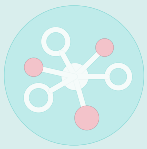
Non-adopter had slightly **higher averages** but with larger variance.

Farmers who did not pay were more likely to **not implement** the recommendations. The precedent caused then to default to a low perceived value of the process.




Willingness to pay


Human touch


Social network influence


Bundled products


Loss aversion


Timing

INSIGHT 3

Borrowing is the least preferred option of financing soil testing

Harvest income and savings are higher likely facilitation methods by most of the farmers.

92% of the farmers believe the price is fair. 60% are not likely to borrow to finance the soil test.

Primary reasons that farmers would not take loan for soil testing was:

1) The amount (Ksh1000-1500) was too low to take out a loan and
2) There is general fear of high interest rates with loans.

Harvest income
85.7%
Likely/Very likely

Savings
70%
Likely/Very likely

Borrow from friends
58.6%
Not likely at all/ Slightly likely

Borrow from formal institution
59.3%
Not likely at all/ Slightly likely

"Loan is for emergency and serious things of soil test is not that serious and can wait for post harvest"
-Farmer

INSIGHT 4

Human touch is required for comprehension and conversion

Farmers are more likely to take up soil testing and ultimately implement recommendations with sufficient follow ups. However these points also present potential failure points if not well implemented or defined.

41%
of farmers have not been in touch with the soil testing agents since after the soil test was carried out

98%
of interactions with the agents are initiated by the farmer

Follow up most requested by farmers was for agents to support

- Interpretation of recommendations
- Check in on adherence to recommendations

Farmers who have been in touch with agents are:

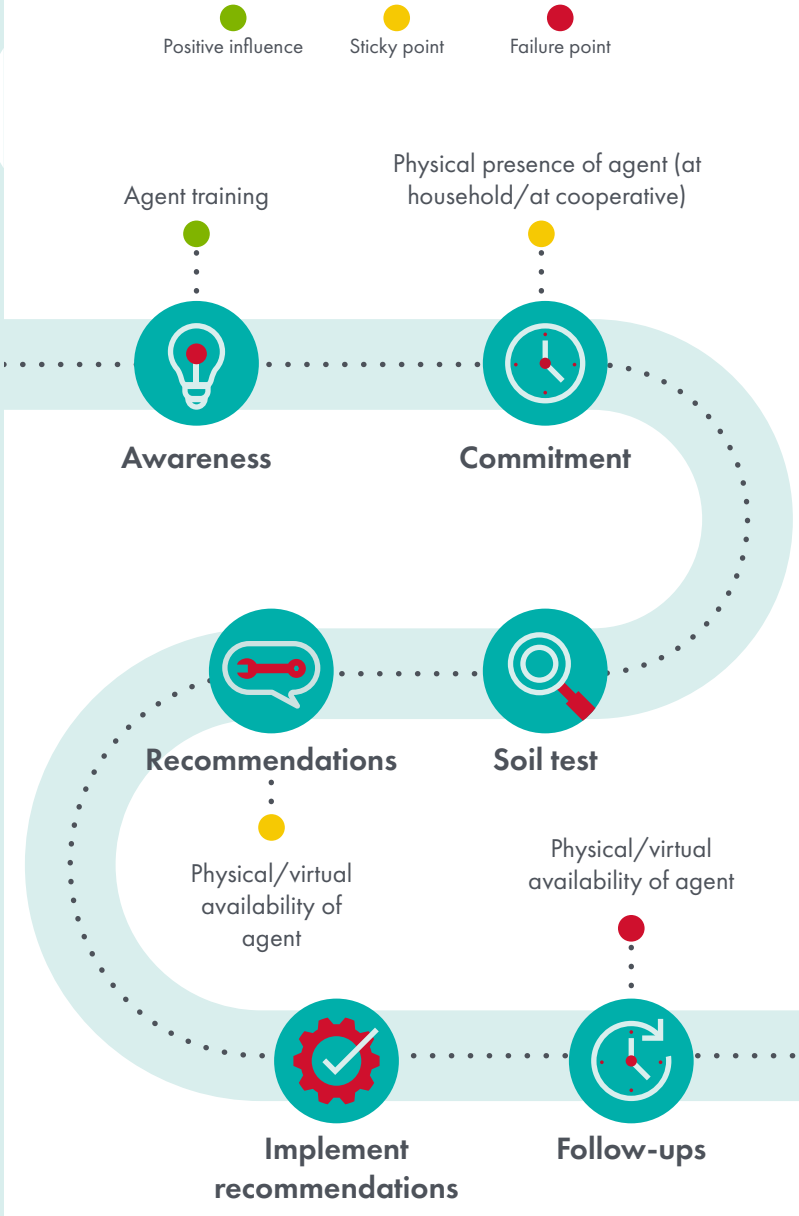
1.9x
more likely to test their soil next season

4.1x*
more likely recommend soil testing to other farmers

3.3x*
more likely implement recommendations

*Statistically significant at 95% confidence level

Human touch points along the customer journey



INSIGHT 5

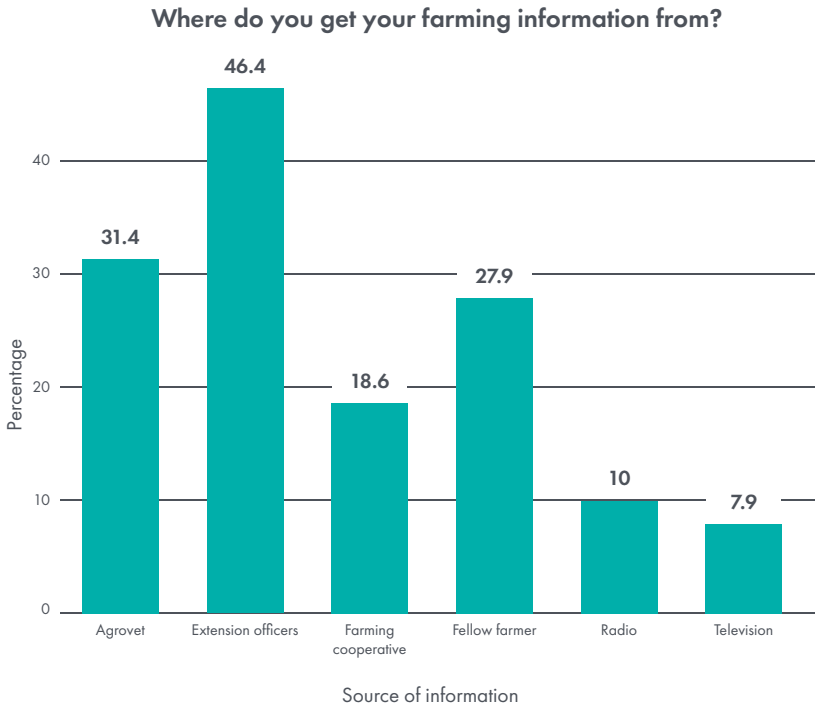
Social influence is crucial in driving adoption and active use

Farmers hearing and seeing evidence from their fellow farmers goes a long way in sparking interest and encouraging recommendations adherence.

Formal channels are trusted to be knowledgeable while media's lags significantly behind other information sources especially in times of challenges.

70% of the farmers know other farmers who have tested their soil.

However, **farmers more likely to adopt soil testing when advised by familiar social anchors**.



"The rest of the group members were doing it so I decide also to do it."
-Farmer

INSIGHT 6

Bundling value added products/services drives repeated interest and use

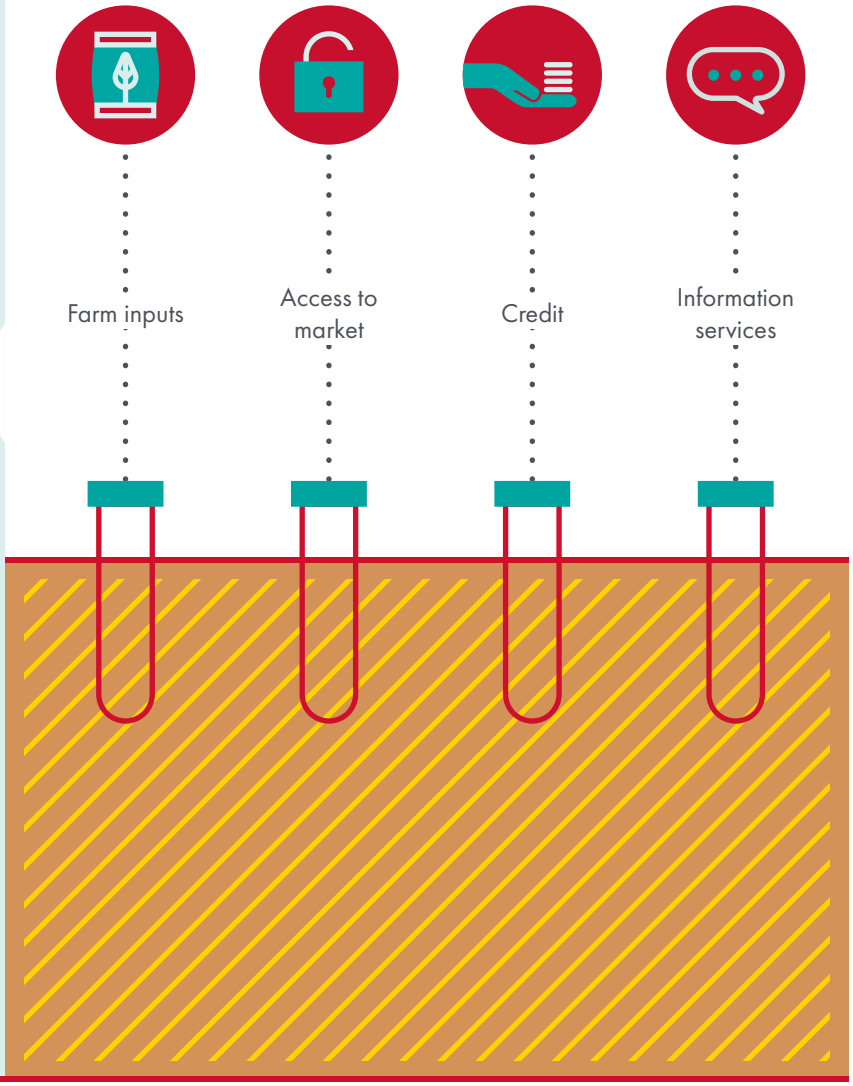
Beyond offering the test independently, to increase the perceived value of the test, offer the test alongside other services/product.

From the qualitative interviews, offering soil testing as a complimentary service to other products and services seemed to drive adoption.

This should be tested as we cannot tell for sure based on the small sample size in this study.

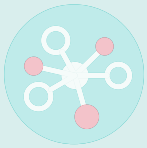
48%
of farmers believe that they should test their soil yearly

Bundled product options offered with soil testing




Willingness to pay


Human touch


Social network influence


Bundled products


Loss aversion


Timing

INSIGHT 7

Losses more than future gains nudged farmer to test their soils

Why fix it if it's not broken? Farmers would not take up recommendations if it went against their longstanding practices.

100%
of farmers who reported having suffered a reduced productivity/loss despite positive environmental factors in the past season were keen to take a soil test and open to implementing the recommendations

0%
of farmers who did not implement recommendations felt that the recommendations contradicted their own practices. There is general trust and acceptance of the recommendations being consistent to farmer knowledge.

"They were clear though I did not follow them because even before soil testing I have been getting a good harvest so why incur an extra cost by adopting a new method while the old one is still working."
-Farmer

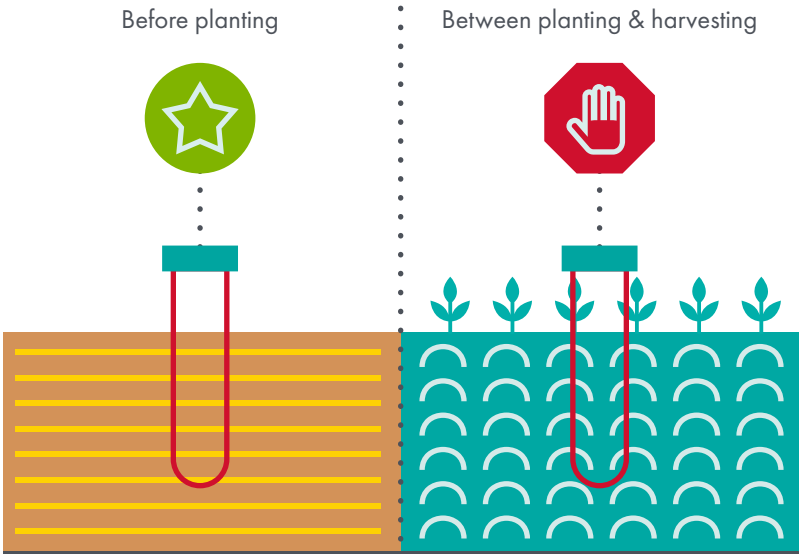
INSIGHT 8

Timing of the test can make or break

Scheduling outreach and actual soil testing to match the farmer season cycle to lock in positive decision making.

Leveraging farmers present bias to target optimal times can accelerate uptake of the product.

Farmers tended to **procrastinate** implementing the recommendations waiting for the next planting season due to **poor timing of receiving the recommendations** - which poses a risk of forgetfulness.



85%
of farmers believe the best time to test their soil is before planting

Thursday
has the highest number of soil tests across all partners

S M T W **T** F S

"I had already planted my crop so asked the agent to come back before the next season starts"
-Farmer

05

RECOMMENDATIONS ADHERENCE

INSIGHT 9

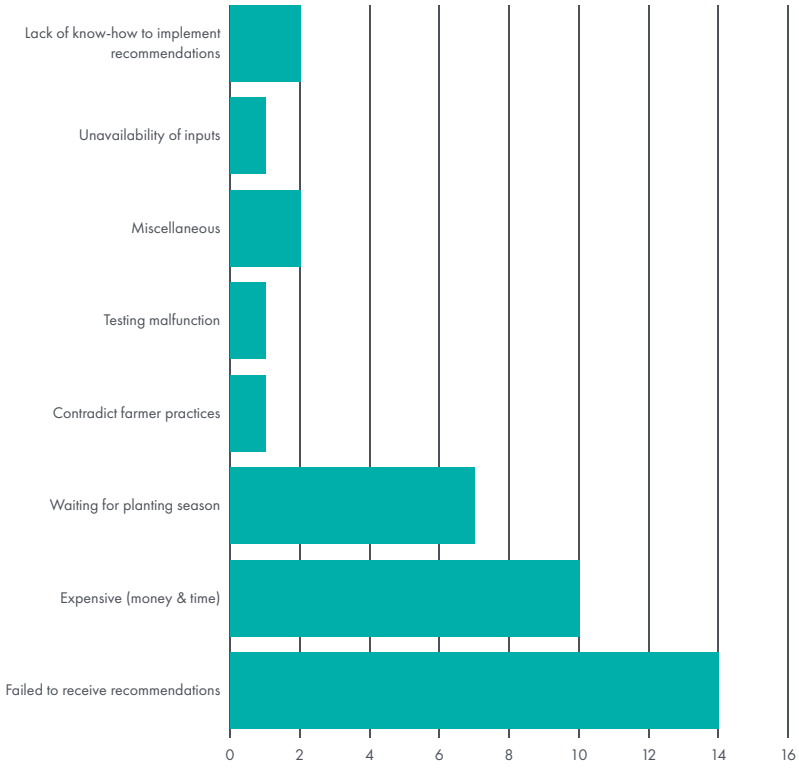
Delay in receipt of recommendations was the leading challenge in implementation

33% of the farmers did not implement the recommendations overall.

Farmers often prefer and refer to **physical copies** of results. Close to zero referred to the soft versions availed.

Cost of implementing the recommendations was a secondary challenge.

The highest cause of farmers not implementing the recommendations was **not receiving the recommendations**. This was in the case of farmers who brought the samples to cooperatives for testing and required to pick results at a later date.

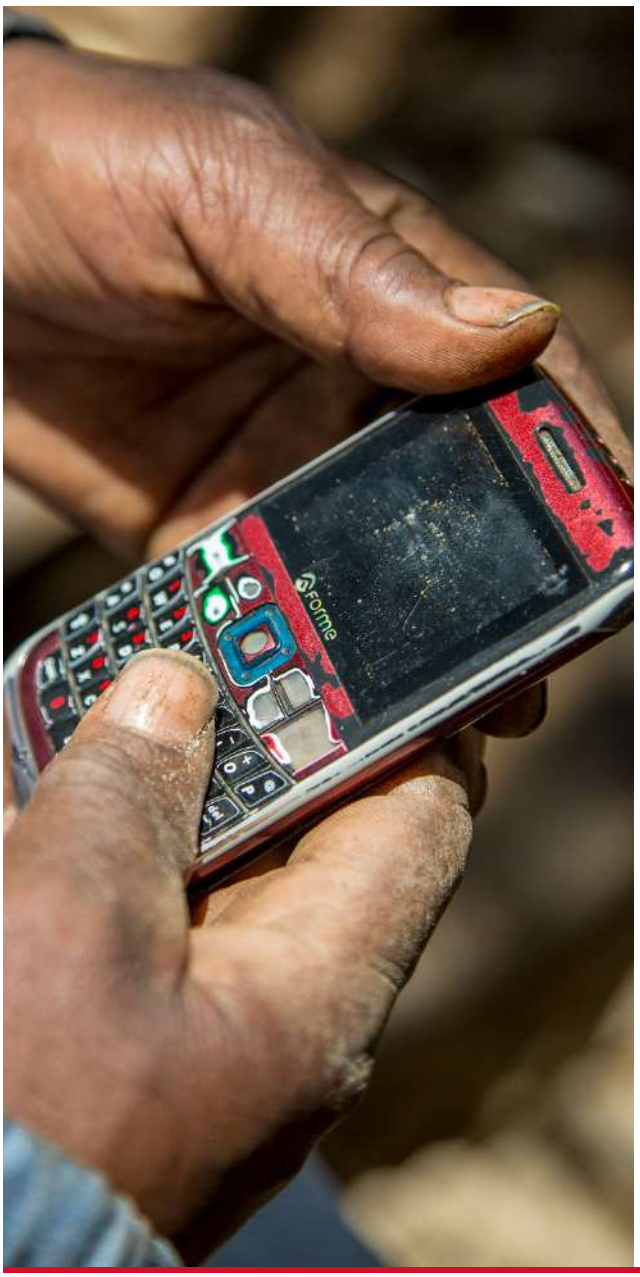


"Some farmers are not from the region so it is hard for us to follow up with them to ensure they are implementing the recommendations."
-Agent

INSIGHT 10

Perceived high cost may be a result of erroneous farmer input

The process required farmers to input average output which is often overstated



- Recommendations appear expensive (large amounts of fertilizer recommended) due to overstated farmer self-reported harvest outcomes. This is input into the soil testing machine at the time soil is being tested.
- This results in recommendations being overstated and hence becoming expensive beyond their average input budget.
- Calibrating the recommendations based on farmer acreage will ensure realistic estimates for recommendations.
- Limitations on existing input and crop details on the system has been a challenge.
- Farmers have suspected that the agents have been marketing specific fertilizers.

INSIGHT 11

Younger farmers seem to be more likely to test their soil

We considered factors that likely predict the "self-reported" likelihood of testing the next season.

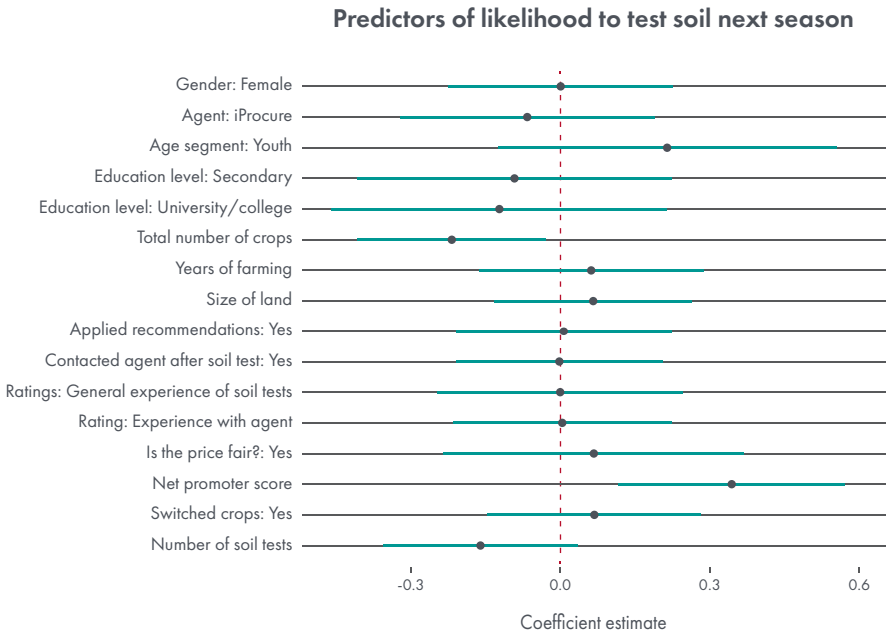
Younger farmers are almost **twice** as likely to test their soil.

There is no significant difference between men and women.

The **fewer crops** a farmer keeps, the **more likely** they are to test their soil.

The longer a farmer has been farming and the larger their acreage the more likely they are to test their soil.

NB: The sample is small hence we are cautious about calling these relationships causal.



INSIGHT 12

Recommendations adherence relies on agent support and timing

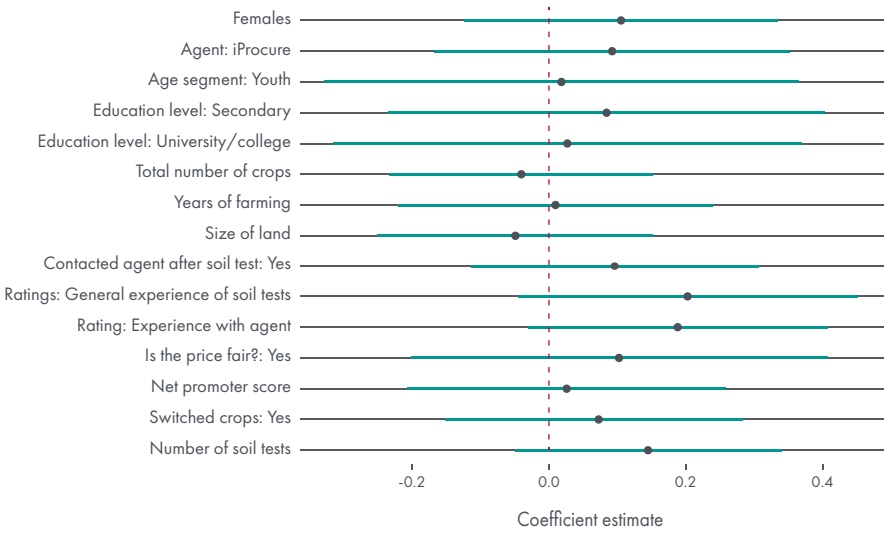
This was based on recommendation adherence self-report.

Farmers who got in touch with the agent are **3.3 times more likely to implement recommendations** from soil testing, as compared to those who did not[3].

Women are more likely to implement the recommendations than men.

From agents perceptions, farmers in farming for business are considered more likely to implement the recommendations.

Predictors of likelihood to apply recommendations



3 The sample is small hence we are cautious to infer pure causality.

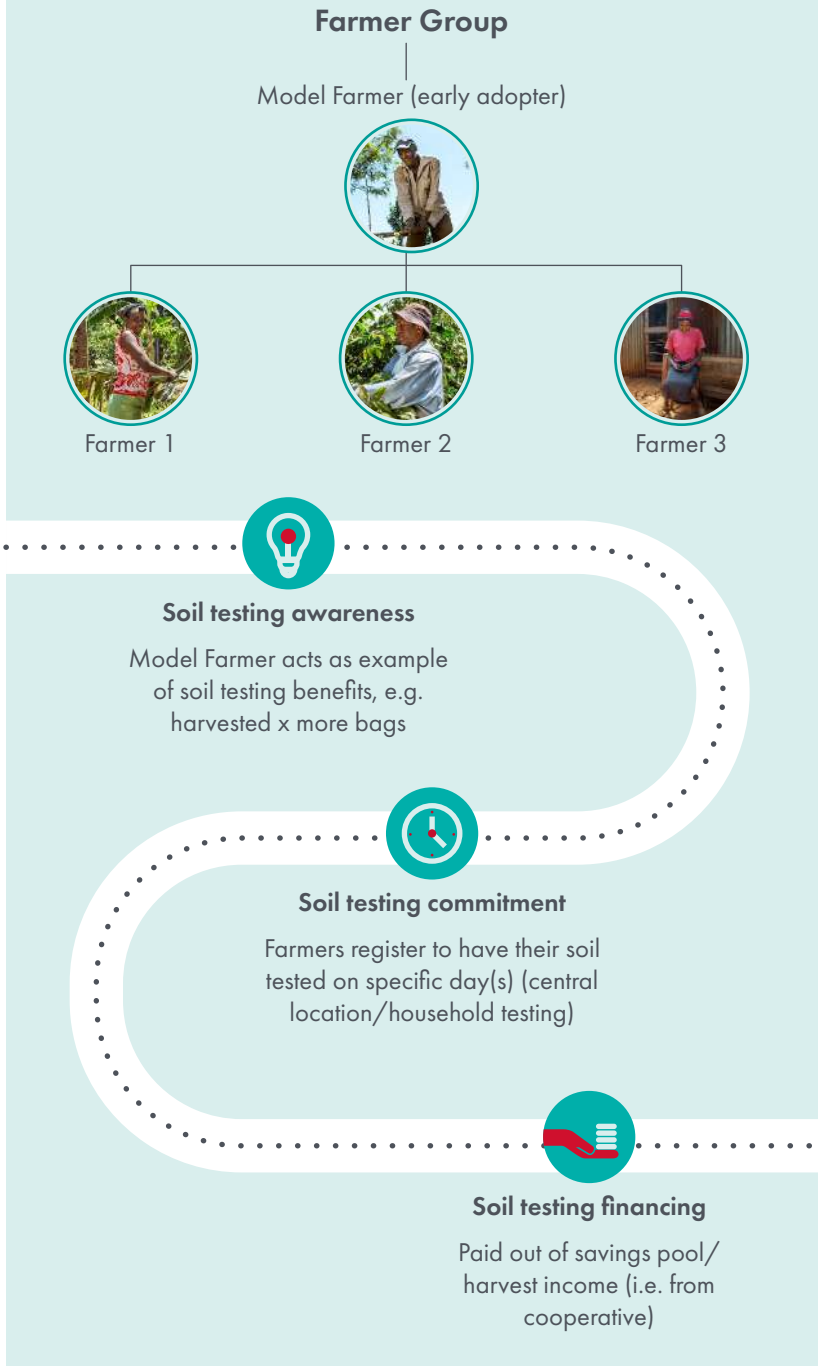
NB: Recommendation implementation was self report, there exists a gap in accurate data to track this

06

LEARNINGS & OPPORTUNITIES

1

Aggregate farmer groups to organize financing and soil testing scheduling



- Leveraging formal and informal networks (e.g. cooperatives and chamas to raise awareness and finance soil testing could drive adoption).

- Model farmers could be used to provide real examples of the benefits of soil testing to more cautious farmers.
  - This structure could come within cooperative organizations.

2

Providers' model should be structured towards immediate results printing and bringing agents to support farmers at crucial time (recommendation implementation)

Provider Alternative Models

Scheduled household visits model

Farmers register their soil testing household visits to specific times that the agent can efficiently coordinate tests over multiple locations

Aggregated central location model

Farmers bring their soil for testing on a scheduled day to an agreed central location (DVAs/communal centre) where the agent will be present to test the soil and provide immediate print outs

- Utilization of scheduling and reminders for visibility and to keep up interest will be important.

- Getting support right is key! Given the high cost of engaging agents and farmers, focusing contact to post- recommendations will drive likelihood of recommendations implementations within effective costs.

3

Digital precision agriculture techniques or at POS will increase likelihood of farmers adhering to recommendations

- Including DVAs into the process to reference specific farmers recommendations.
- Digital messaging can help understanding and application of recommendations.
- Particularly, communicating the specific recommendations around the planting period can drive implementation.
- Poor/declining yield vs higher yield messaging to drive adoption could be useful to test.

Engagement Propositions

DVA record keeping of farmer recommendations

Farmers will have their recommendations stored with the DVA and will be referenced in the next season's purchases for planting

SMS Reminders

Farmers receive concise recommendation details (based on their most recent test) towards the planting expense period.

This could be coupled with general best practices advise can improve farmer practices generally

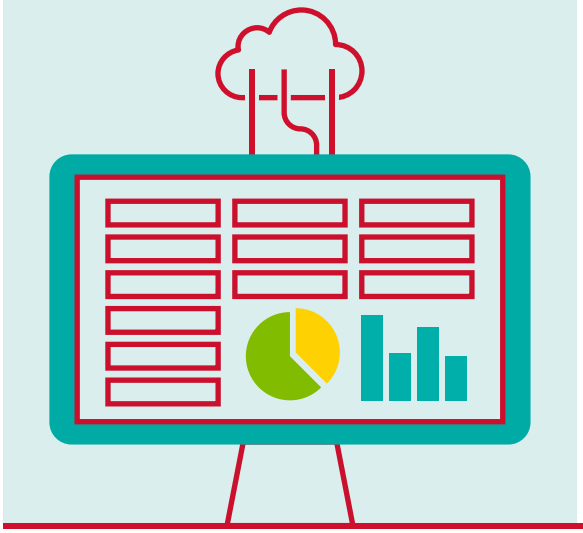
4

Bundling of soil testing with other services to drive adoption and repeated use

- Coupling soil testing with other crucial services e.g. information or input supply or water tank provision could drive adoption
- Tests could be carried out to identify the optimal bundled services based on specific contexts

5

Setting up comprehensive data systems to better estimate adoption & recommendations adherence



- Providers should capture data on non-adopters to dig into non-adoption factors that are controllable e.g. timing
- Create feedback loop with DVAs to allow tracking of recommendation adherence based on purchase of inputs
- Calibrating recommendations on acreage rather than harvest self-reports to fix erroneous high costs of inputs and eliminate cost as a barrier

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