



**FEED THE FUTURE BANGLADESH DIGITAL AGRICULTURE ACTIVITY
PLANTIX PILOT END LINE ASSESSMENT REPORT**

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Acronyms and Abbreviations

BNA	Bangladesh Nutrition Activity
DAI	DAI Global LLC
DF	Digital Frontiers
FTF	Feed the Future
GoB	Government of Bangladesh
HO	Home Office
IPs	Implementing Partners
MERL	Monitoring, Evaluation, Research, and Learning
ToC	Theory of Change
USAID	United States Agency for International Development
USG	United States Government
VCA	Value Chain Actor
ZOI	Zone of Influence
ZOR	Zone of Resilience

I Executive Summary

The FTF Bangladesh Digital Agriculture Activity (hereafter referred to as “the Activity”) supported the pilot of the digital tool Plantix, a mobile crop advisory app for farmers, extension workers and gardeners, that identifies issues associated with crop production and proposes solutions.

The pilot was conducted in partnership with three USAID Feed the Future (FTF) partner programs: Bangladesh Nutrition Activity (BNA) implemented by Abt Associates; Bangladesh Horticulture, Fruits, and Non-Food Crops Activity implemented by Chemonics; and Rice and Diversified Crops Activity (RDC) implemented by ACDI/VOCA. The pilot was conducted with value chain actors and farmers in seven districts of the FTF Zones of Influence (ZOI): Chuadanga, Jhenaidah, Jashore, Patuakhali, Khulna, Rajbari and Faridpur.

Under the Activity’s objective *to increase availability of appropriate and gender sensitive agricultural digital tools*, Plantix was identified and selected as the first tool to be piloted under the Activity. Under its pilot protocol, the Activity first conducted market research to identify promising tools in the market, then evaluated the tool based on established criteria, such as Accessibility, User Experience & Readiness of the Users, Gender and Social Inclusion, Neutrality and Multiple Chain Integration and Growth & Sustainability. Following this, the Activity created a two-page overview of Plantix to be presented during to USAID Implementing Partners (IPs) at the quarterly Digital Agriculture Working Group (DAWG) meeting facilitated and led by the Activity. As a result, 3 partners reached out to the Activity to express interest in piloting Plantix.

The main objective of the pilot was to test the feasibility and acceptability of Plantix amongst target users: farmers and other value chain actors in the FTF regions. As such, the Activity worked closely with 3 implementing partners (Bangladesh Nutrition Activity, Bangladesh Horticulture Activity, and Rice and Diversified Crops Activity) to identify users to participate in day long orientation, baseline assessment and end line assessment. The pilot engaged a total of 260 individuals, including farmers and value chain actors.

This end line report provides an overview of the pilot activities for Plantix as well as key findings from an assessment with select participants of the pilot. Quantitative surveys were conducted with a sample of 157 randomly selected participants out of 260 total pilot participants. Additionally, eight key informant interviews (KIIs), and two focus group discussions were conducted resulting in five success stories. Of the 157 participants of this end line study, 51% were value chain actors (VCAs) and 49% were farmers.

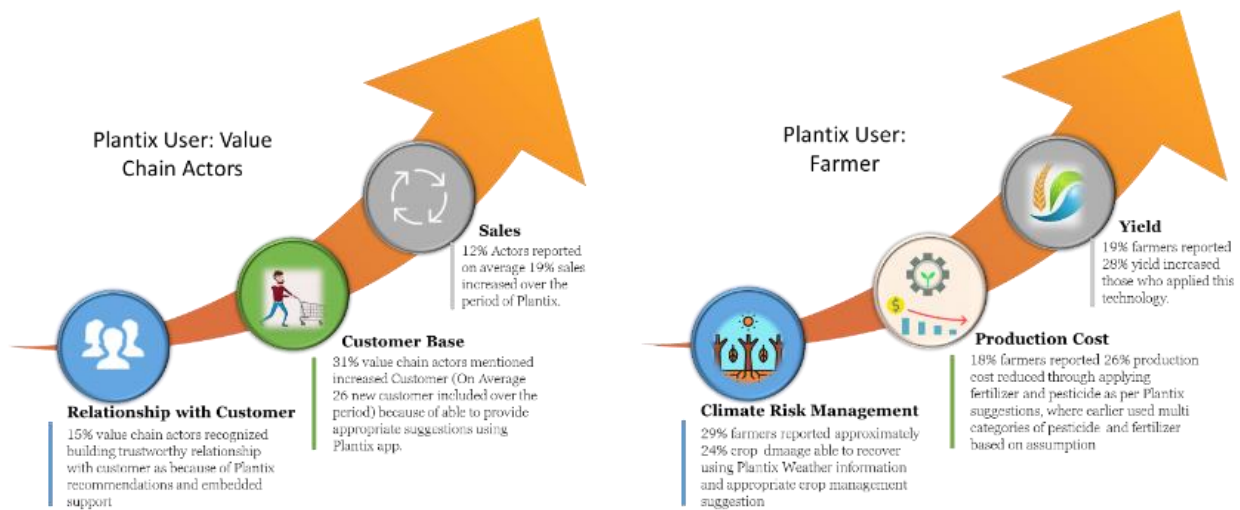


Figure 1: Benefits from adoption of Plantix suggestions

Key Findings

Almost all analysis highlights the comparative status between farmers and value chain actors, as these groups were the partners' targeted participants. Key findings of the pilot are noted below.

1. Out of 157 sampled respondent, around 91% of respondents of end line assessment reported continued using Plantix after the pilot.. **A larger proportion of value chain actors (97%) reported using the app than farmer (85%).** On the other hand, 100% of farmers reported having the Plantix application on their phone compared to 97% of value chain actors.
2. For value chain actors (VCAs), following adoption of Plantix's suggestions and recommendations, around **31% of value chain actors reported their customer base increased by an average of 26 customers.** In addition, **12% of value chain actors reported an average increase of 19% in sales.** Additional benefits include 21% of value chain actors who reported being able to maintain repeat customers and 15% of value chain actors reported being able to further build trust with their customers.
3. **Following adoption of Plantix suggestions and recommendations, farmers reported tangible economic benefits:** 39% of farmers reported an increase in confidence in crop cultivation, 29% of farmers reported a reduction in crop damage from climatic hazards, pests, and diseases by an average of 24%, 19% of farmers reported an average increase of 28% in yield, and 18% of farmers reported an average reduction of 26% in production costs.
4. **Retention of knowledge of available Plantix features for farmers was found to be higher than those of value chain actors.** Main factors for this finding apart from job role could be youth and gender, impacting who had more interest in digital applications and strong digital skills.

- 5. Farmers were more capable in operating and navigating most of the features of Plantix, while most of the value chain actors were only able to operate a limited number of features.** This finding reflects that value chain actors operated features mostly required to do business, whereas farmers (especially youth and female participants) operated most of the features. However, adoption rates were low amongst youth because youth engagement in farming activities is low.

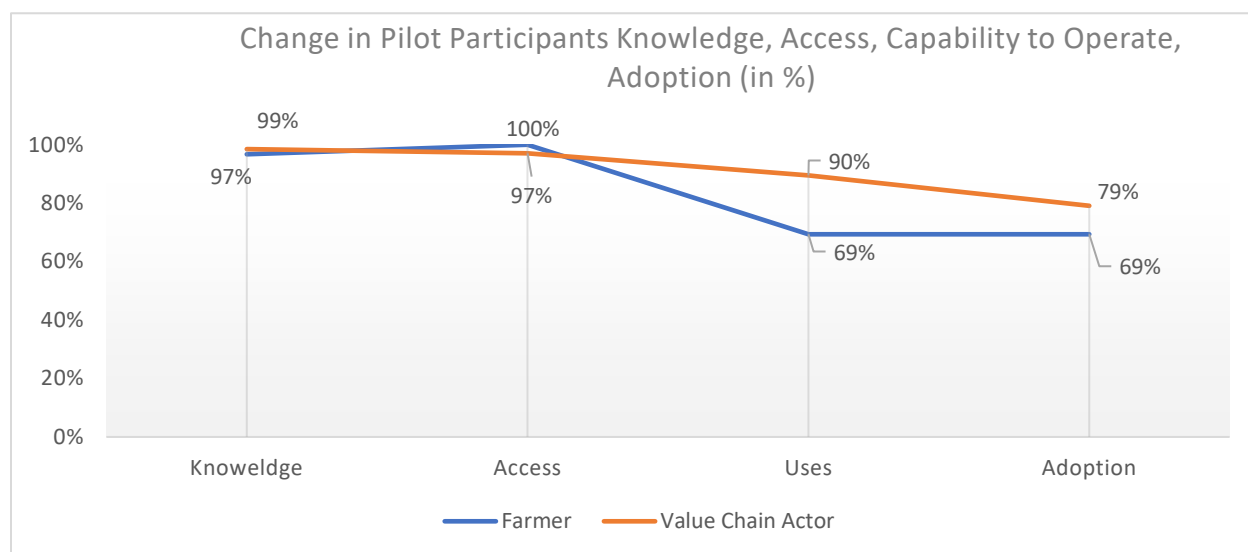


Figure 2: Change Trends from Knowledge to Utilization

- 6. Adoption of Plantix's recommendations and suggestions was lower for farmers than for value chain actors.** This is likely due to farmers feeling less confident about adopting outside suggestions and recommendations until seeing the results physically. Farmers may also be hesitant to change agricultural practices that have been passed down for generations. Additionally, behavior changes take time. Of those who reported using Plantix, reasons mentioned for using the application include support in detection and treatment of pests and diseases, and current weather information. These features on the app contributed to saved crops, reduced production costs, increased yield, reduced damage from natural disasters or pest attacks and increased confidence in crop cultivation. **On the other hands, adoption rates for value chain actors were found to be a bit higher for the limited number of features in comparison with the farmers.** The main reasons for this could be that most customers and farmers demand validation of recommended fertilizer doses and suggested pesticide/insecticide/ chemical fertilizer for pest and disease control. Therefore, value chain actors might be more focused on those specific features, rather all the features.
- 7. It is important to note that recommendations on fertilizer doses were less utilized by both the value chain actors and farmers as participants required more trust and demonstrated results before using Plantix's suggested doses.** That means for changing behaviors of users it is necessary to demonstrate results of using Plantix's suggested technologies/recommendations, that's helps to build trust among users (farmer and value chain actors) and push to increase adoption. In addition, one of the recommended fertilizers, SSP fertilizer, is not currently used in Bangladesh.

8. Finally, considering the benefits that Plantix information demonstrates for its users, such as farm productivity and value chain actors' business incentives, **there is a value proposition engaging private sector firms under a market system facilitation approach.** Only the issues could be tool owners' flexibility in customization of features through context or geographical location specific crops incorporation, measurement units of land, and recommended fertilizer and pesticide doses, carrying specific brand names.

2 Introduction

2.1 Background

The FTF Bangladesh Digital Agriculture Activity intends to promote the efficient and effective use of digital tools and technologies to build the capacity of value chain actors (farmers, input retailers/wholesalers, local service providers, and wholesale buyers encompassing crop, livestock, and aquaculture sub-sectors) under a market systems approach. The goal of the Activity is to identify and select potentially effective and market-fit digital agricultural tools and deploy them in collaboration with FTF Implementing Partners (IPs), tool owners, and other relevant private-sector actors.

In June 2021, the Activity identified a digital tool called Plantix, a mobile crop advisory app for farmers, extension workers and gardeners, developed by PEAT GmbH, to pilot under the program. This application identifies issues associated with crop production and proposes solutions. It analyzes pictures of affected crops using artificial intelligence, provides advisory services for the entire farming cycle (seed to seed), and shares farmer's experiences within communities. Farmers can access local weather, acquire trusted agricultural advice throughout the season, and receive disease alerts regarding nearby diseases spreading in their area.

In partnership with FTF Bangladesh Nutrition Activity (BNA), FTF Bangladesh Horticulture Activity (Horticulture Activity), and FTF Rice and Diversified Crops Activity (RDC), the Activity piloted Plantix with value chain actors (primarily Agri Input Retailers or AIRs) and farmers in seven districts of Bangladesh in the FTF Zone of Influence (ZOI): Chuadanga, Jhenaidah, Jashore, Patuakhali, Khulna, Rajbari and Faridpur. Each partner had a private sector partner for the pilot: BNA piloted with Konika Seeds and Babylon Agro; Horticulture Activity piloted with Society Development Committee Agro Ltd (SDC Agro); and RDC piloted with Xplore Business Solution Limited (Xplore).

The pilot engaged 260 farmers and value chain actors for a cropping season in 2021 which lasted for 4-5 months. The Activity prepared capacity building resources for pilot users as well as promotional materials to encourage the uptake of the application, conducted user testing and evaluations, and led the baseline and end line evaluations to determine the impact of the tool.

2.2 Objectives of the End line Study

To understand the feasibility and acceptability of Plantix following the pilot, the Activity conducted an end line study with sample participants who participated in the orientation training (around 260 individuals). The specific objectives were:

- To understand factors influencing the adoption of the Plantix application by participants
- To understand which features of Plantix were most valuable
- To understand which groups could be considered early adopters of the tool

3 Study Methodology

The end line study used a mixed methods approach consisting of a quantitative survey and qualitative inquiries such as key informant interviews (KII) and focus group discussions (FGD) to understand the factors that influenced to uptake of the digital tool or potential for sustained use. Through KIIs and FGDs, the Activity captured intended and unintended outcomes. Results and lessons learned were communicated with the Activity team to inform management decisions and tool developers to improve the tool.

The pilot started with a tri-party agreement among PEAT, BNA and the Activity in September 2021. A total of 260 direct participants including Agricultural Inputs Retailers, Regional Sales Agents, and farmers were selected for the pilot. Immediately after conducting the baseline and user testing, the Activity provided training to the participants on the Plantix application and digital literacy. To understand the impact of the pilot, the Activity conducted an end line study from March-April 2022.

3.1 Sampling Plan

The Activity conducted the pilot directly with 260 value chain actors. A sample of 157 participants were drawn from the direct 260 participants to conduct the end line survey. Given the small number of women who participated in the pilot, all the female participants were selected for the end line survey to ensure that their experience and perspectives were represented.

For the quantitative survey, the Activity considered single-stage design with systemic selection of participants, as the Activity has a comprehensive, complete, and up-to-date participants sampling frame. In systematic sampling, the complete list of participants is ordered by cluster and a subset of the participants is selected using a fixed interval across the entire list. A one-stage design with systematic selection of participants is used for determining the sample size.

Sample size for finite population

$$SS = \frac{SS}{[1 + \{(SS - 1)/Pop\}]}$$

$$SS = \frac{[Z^2 p(1-p)]}{c^2}$$

Where,

- SS = Sample size
- p = Percentage of population
- Pop = Population
- C = Confidence level
- Z = Given Z value

Table 1. Sample distribution and methods

Pilot	Locations	Data Source	Population (N)	Projected Sample (n)	Actual Respondent	Methods
FTF Bangladesh Nutrition Activity (BNA)	Patuakhali, Khulna, Faridpur	Direct Participants ¹ : Agri Inputs Retailer and Sales Agent	60	57 (1 female, 56 male)	46 (1 female, 45 male)	Questionnaire Survey Key Informant Interview: 6 Focus Group Discussion: 2 Success Story: 5
Xplore Business Solution Limited (Xplore)	Jhenaidah, Chuadanga, Jashore	Direct Participants: Farmers	100	59 (1 female, 58 male)	45 (1 female, 44 male)	Questionnaire Survey Key Informant Interview: 1
SDC Agro Ltd (SDC)	Faridpur, Rajbari	Direct Participants: Farmers	100	41 (12 female, 29 male)	38 (12 female, 26 male)	Questionnaire Survey Key Informant Interview: 1

1. Direct participants were trained directly by the Activity on using Plantix. They are mostly input retailers, sales agents, and lead farmers.

For an in-depth understanding on what did and did not work well, the Activity conducted eight KIIs and two FGDs with 6-7 direct participants per FGD.

A total of eight KIIs were conducted. Five participants, all of whom were AIRs, used most of the features and disseminated knowledge or helped others to adopt Plantix were selected for KIIs. All KII interviewees were from the seven districts (Patuakhali, Jashore, Jhenaidah, Rajbari, Faridpur, Khulna, Chuadanga) where the pilot occurred.

Two FGDs were held with around 12-14 direct users. Participants were selected from two different districts, Faridpur and Patuakhali, from clusters with 5-8 Plantix users. Priority was given to those areas to reduce transportation, timing, and cost. Participants from the Khulna region were not selected to participate in FGDs because the locations of the participants were quite far apart, requiring additional resources and travel time.

4 Key Findings

4.1 End line Participant Demographics

Three partners were engaged for the end line evaluation, including Bangladesh Nutrition Activity (BNA, a USAID IP), Society Development Committee Agro (SDC Agro, a private sector organization) and Xplore Business Solution Limited (Xplore, a private sector organization) in multiple districts within the FTF ZOI. Out of 260 direct participants who received orientation from Activity, 157 participants were considered for the survey. Of the 157 participants, 129 respondents (82%) agreed to participate in the survey. The rest of the participants (18%) were not available during the survey period.

Most (89%) of the respondents were males and 11% of respondents were female. The majority (71%) of the respondents were adults; 29% were youths.

Of the 14 female participants, one was a VCA and 13 were farmers. Of the 115 male participants, 66 were VCAs and 49 were farmers.

Nearly 52% of respondents were VCAs and 48% were farmers. Most of the VCA respondents were male (99%). Female participants in the agriculture business are very uncommon in Bangladesh, which is reflected in the pilot participation

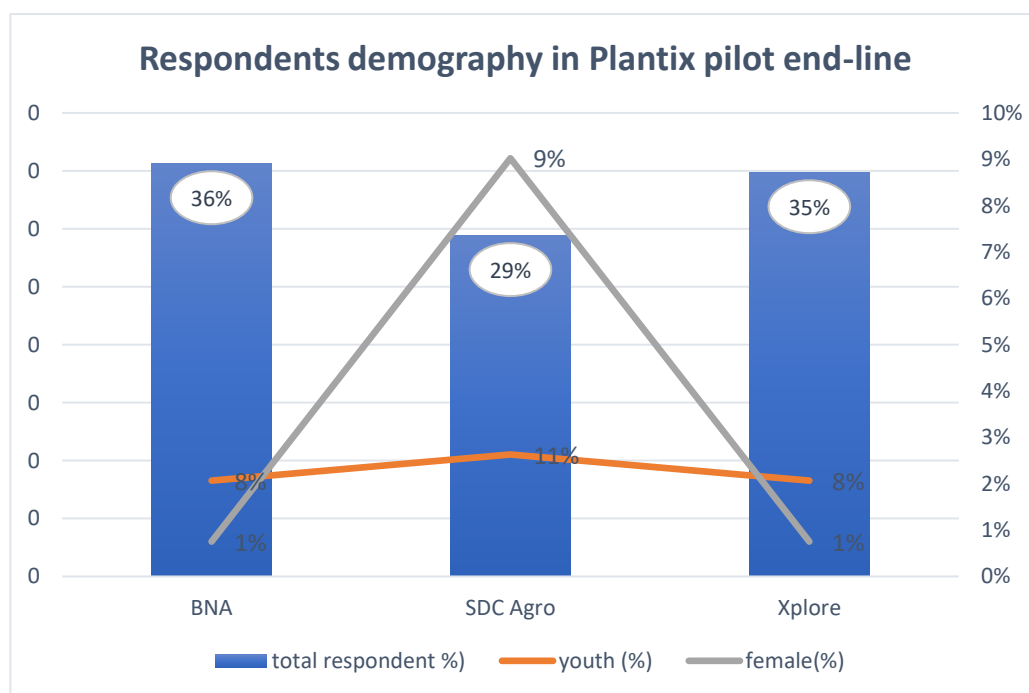
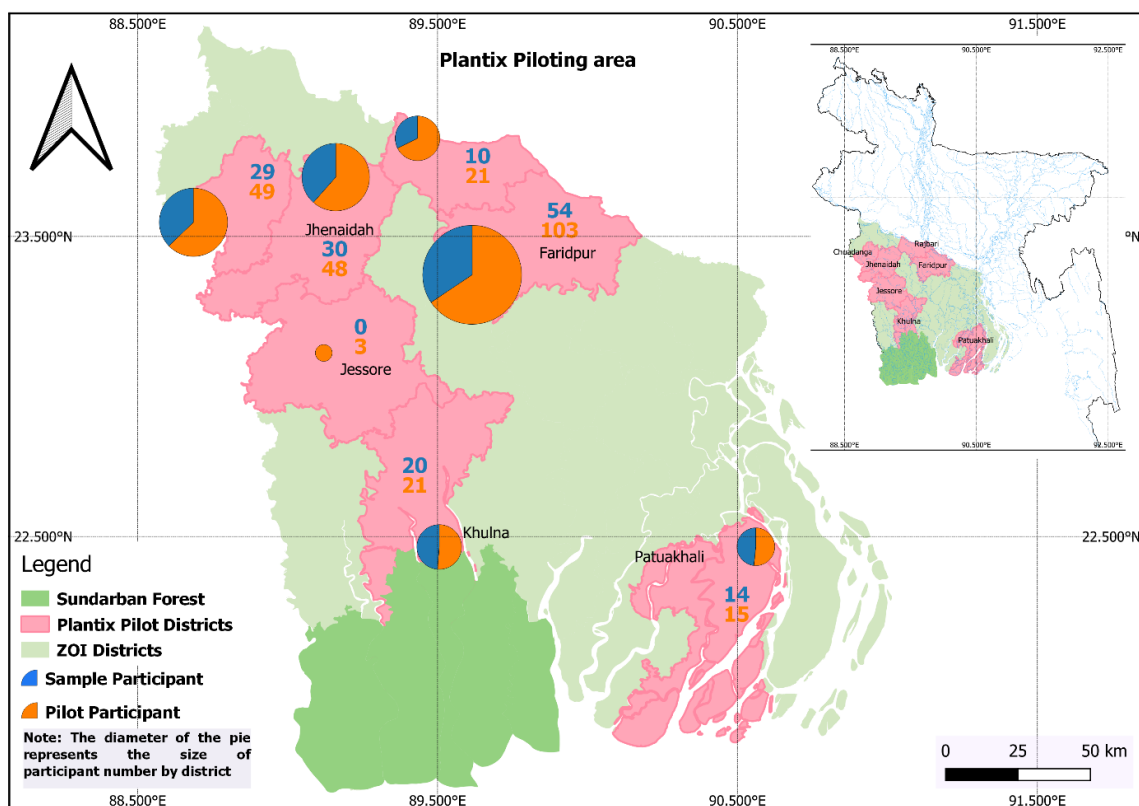


Figure 3: Sample Respondent Percentage by Partners, Age and Gender

demographics. On the other hand, female participation in agriculture farming was found significantly high in comparison to the agriculture business.

From the standpoint of age², 21% of youth were VCAs, and 34% of youth were farmers. As per the above graph, youth and female participation was found to be relatively high in the pilot with SDC Agro, which targeted farming communities. On the other hand, the other two partners targeted primarily value chain actors, where youth and female representation is comparatively low.

The type and number of respondents varied from pilot to pilot. 36% of the respondents were from BNA, 35% were from Xplore and 29% from SDC Agro. From the SDC Agro pilot, 100% of participants were farmers, while the pilot with BNA had 100% of participants as value chain actors. The Xplore pilot had a 50%-50% representation of farmers and value chain actors.



Map 1: Plantix Piloting area

The majority (43%) of the end line respondents were from Faridpur region, followed by 35% from Chuadanga region, 12% from Khulna, and 10% from the Patuakhali region. In the case of Patuakhali, around 53% of respondents were engaged in field crop cultivation (rice, maize, sugarcane), while the rest of the participants (47%) used Plantix for vegetable cultivation and tree gardening. In the other three areas, vegetable cultivation was found to be significantly higher than field crop cultivation (75% in Faridpur, 66% in Khulna and 70% in Chuadanga with field crops).

² Age group: Youth (15-29 Yrs.), Adult (30+ Yrs.)

Respondents' education level varied from primary to post-graduation for both farmers and VCAs. Most respondents are educated. Only 1% of farmers and 2% of VCAs did not receive any formal education. 10% of farmers and 3% of VCAs completed primary education. 64% of farmers and 68% of VCAs completed high school education. 25% of farmers and 27% of VCAs completed a bachelor's degree or above.

4.2 Participants' Knowledge, and Capability to Navigate

The survey assessed the pilot participants' knowledge on Plantix features, and capability to operate and navigate the application. This included whether the app was still installed on the participant's smartphone at the end of the pilot, how skillful they were in navigating the app, and how many/how often features were used. In addition, the survey asked participants how likely they were to promote the app and asked for feedback on how to improve Plantix.

4.2.1 Knowledge on Plantix Features

The end line survey asked sampled respondents (157) about their awareness of five features: cultivation tips, pest and disease detection, fertilizer doses, weather information, and posting in a community platform.

Respondents' knowledge on Plantix features retained at the end of the pilot is shown below. Although both types of respondents received a day-long orientation from the Activity staff, farmers retained more

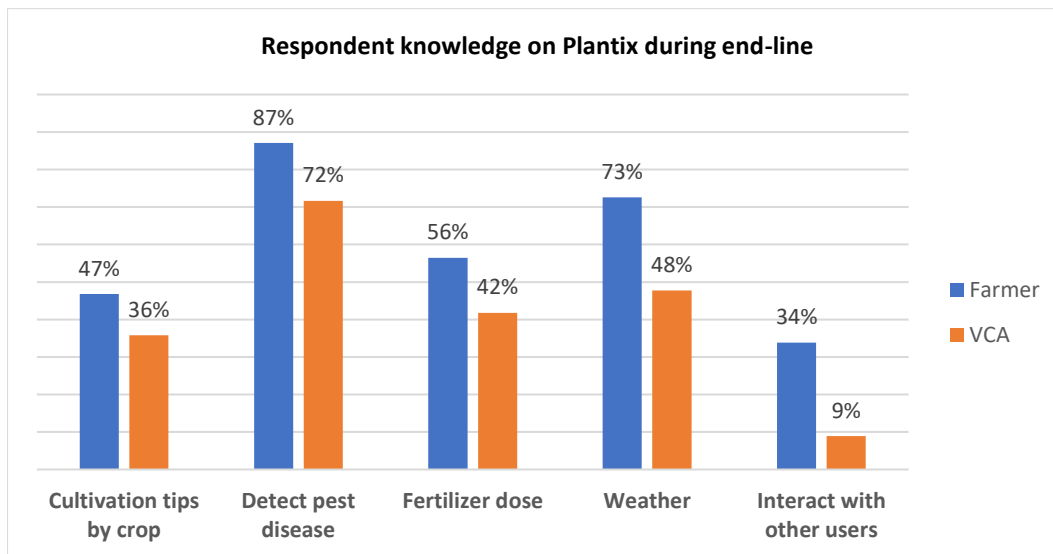


Figure 4: Respondent Knowledge on Plantix Features

knowledge than the VCAs did. This implies that farmers knew more about the application features than the VCAs did.

Of respondents with knowledge on an individual feature, farmer knowledge was found to be comparatively better than the VCA's knowledge. Measuring knowledge by the number of features

participants were able to operate, around 19% farmers said they could operate all the features, for value chain actors the percentage found slightly low (13%). Considering knowledge on 3-4 features, again farmers' respondent (44%) found better than value chain actors (37%), but in case

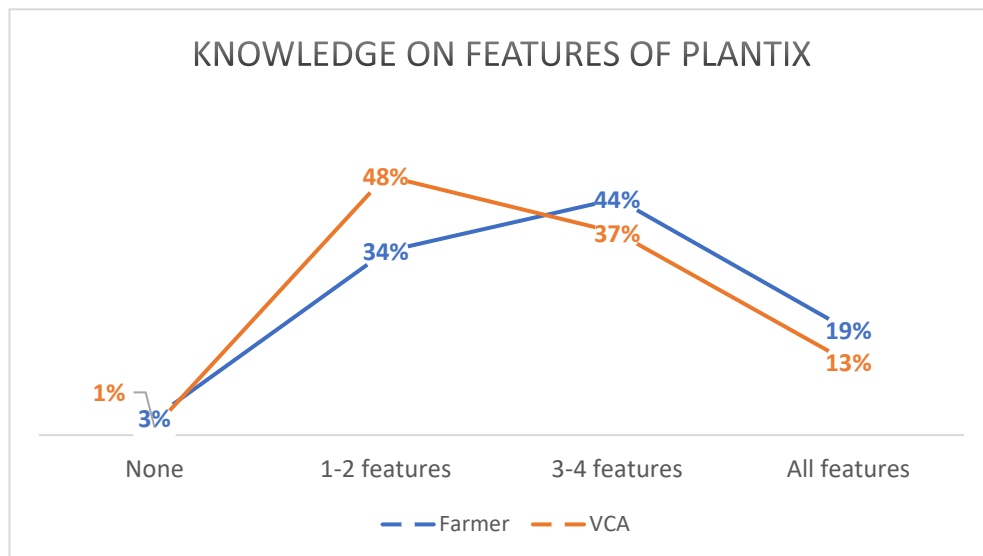


Figure 5: Participants Knowledge on Plantix Features

of knowledge on 1-2 features, value chain actors knowledge found better (48%), whereas farmer knowledge found little bit low here (34%). Female respondents are significantly more knowledgeable on Plantix features, in comparison to male respondents.

Around 16% (21) of respondents reported being able to express knowledge on all five features offered within Plantix. 98% (126) of respondents reported being able to name at least one feature from Plantix. The remaining respondents, 2% (3), can mention the name of any feature. In terms of respondent type, 99% VCAs and 97% farmers could name at least one feature. The survey revealed that 100% of female respondents and 97% of male respondents could name at least one feature within Plantix.

Our analysis showed a considerable difference in knowledge of Plantix when it came to age group. 99% of adult respondents could name at least one feature, while for youth respondents, the number was slightly lower, at 92%. During the field visit, it was also observed that adult respondents were slightly more knowledgeable than youth group when it came to direct farming experience, which could have influenced this statistic.

4.2.2 Adoptability of Plantix

At the end of the pilot, nearly all the direct participants (98%) had Plantix on their phones. 65 out of 67 VCAs (97%) reported having the Plantix app on their phone, while for farmers, all 62 (100%) reported having the Plantix app on their phone. The remaining two respondents (4%) reported not using or having uninstalled the Plantix app from their phone. The key reasons for uninstalling the app included unwillingness to use the application, phone loss, or lack of clarity on the application features.

In terms of gender and age, there was no significant difference observed from the data.

4.2.3 Capability to Navigate/Operate

Plantix's basic features are cultivation tips, pest and disease detection, fertilizer dosage, weather information, community features, adding or removing crops, language settings, and posting on community platforms. The end line survey assessed the respondent's skills in navigating through these

features in Plantix. 90% (116) of respondents reported being able to navigate at least one feature in Plantix. The rest of the respondents, or 10% (13), could not navigate any features in Plantix. Features like pest and disease detection, weather information and cultivation tips appeared to be easy to navigate for both type of participants. On the other hand, respondents reported that the community feature, posting in the community, and language settings were difficult to navigate in the application.

Within our evaluation, 96% of VCAs were able to operate at least one feature, while for farmers it was 84%, that means around 16% farmers not able to operate any features, which is significantly higher than VCAs (only 4%). Considering being able to navigate all features, farmers fared slightly better at 31%, in comparison to with VCA at 25%. With this in mind, the ratio farmers to VCAs in the given pilot influenced the results.

Around 28% (36) of respondents reported being able to navigate all eight features offered by Plantix. Overall, VCA respondents were more skillful in navigating the application than the farmers were.

There was no significant difference found in navigation skills by youth or gender.

Who can operate the app: Of 91% (118) respondents who confirmed being able to operate the application during the pilot period, 80% of respondents could use the application by themselves. The remaining 12% used the app with the help of a family member, such as their child, or with the help of other VCAs. 90% of VCAs were able to use the app by themselves compared to 69% of farmer participants. 88% of youth were able to use the app by themselves compared to 76% of adult participants. Additionally, 81% of males and 77% of females used the application by themselves.

Sixty (60%) of respondents mentioned that they faced at least one challenge while using Plantix. Major challenge areas included bad network and internet issues (21%), not finding expected crops in the application (13%), difficulty navigating (11%), an overwhelming amount of information (5%) and other issues such as phone malfunction, and irrelevant information in their local context (4%). On the other hand, 40% of

respondents reported that they did not face any challenges while using Plantix. Noting that 55% of youths did not experience any issue, youth respondents experienced less challenges than adults. 35% of adults do not experience any issues. This may be due to a higher education rate

for youths, with 34% graduated, on while in comparison only 24% of adults had graduated. From a gender perspective, 15% of female users faced challenges due to bad network, and another 15% reported not finding expected crops, while around 23% reported other issues.

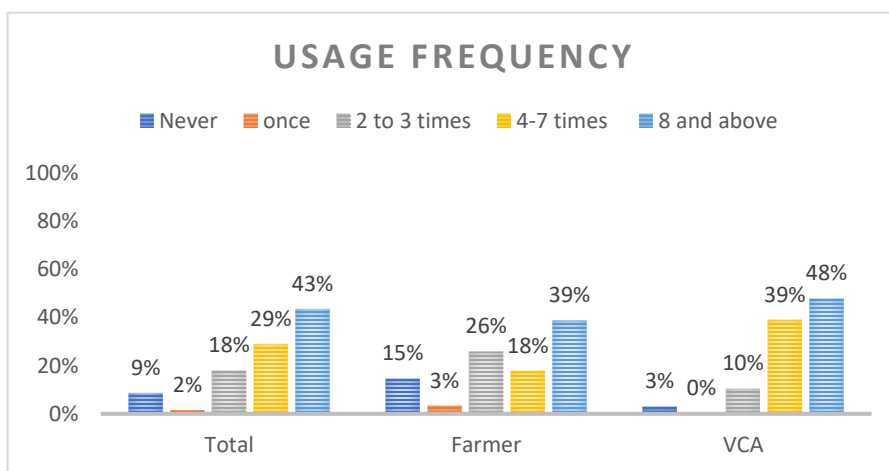


Figure 6: Application usage frequency among respondents

Frequency of use: The end line assessment asked respondents how frequently they used the app. Overall, 91% of respondents used the Plantix application during the assessment period and 9% did not use it at all after receiving the orientation. In terms of respondent type, VCA usage frequency was better than farmer usage frequency, as shown in the figure above. From an implementing partner point of view, Xplore and BNA respondents used the application consistently at a higher frequency (8 times or higher) than SDC respondents. Insignificant differences were found among gender or age group disaggregation.

Plantix Suggestions/ Recommendations Apply/ Adopt:

Most of the respondents from the three pilots reported applying suggestions and recommendations in Plantix, with around 74% pilot participants adopting Plantix suggestions/recommendations either in crops cultivation or in providing embedded services to customers during business. The adoption rate was found to be 85% for BNA participants, 76% for Xplore participants and 61% for SDC Agro participants. Considering participant types, 79% of value chain actors reported adopting suggestions or recommendations during business or providing embedded service to farmers, whereas 69% of farmers reported adopting Plantix suggestions or recommendations in crop or vegetable cultivation.

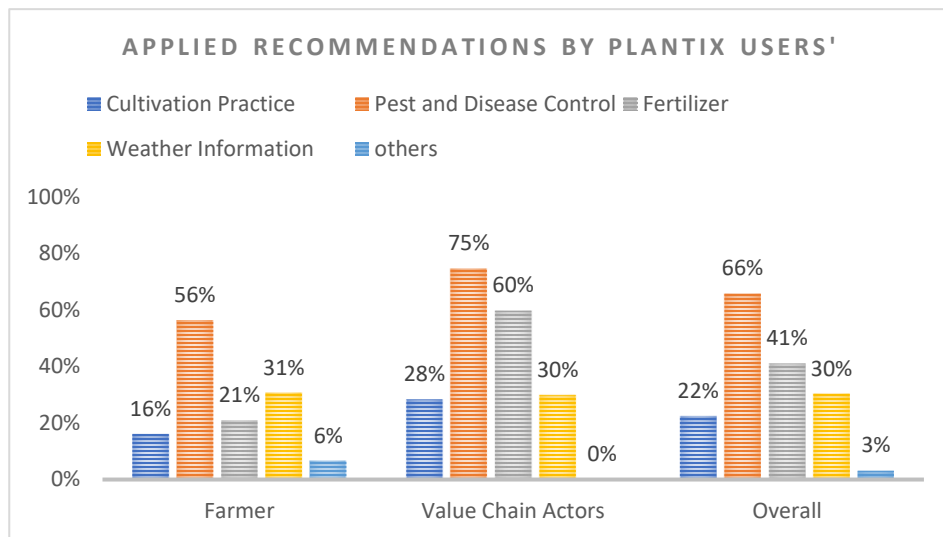


Figure 7: Percentage of Users Applied Recommendations

The Plantix application offered several features as advisory services related to cultivation practice, pest and disease detection, fertilizer dose, weather information, and others. Farmer mostly applied advice from the Plantix app related to pest and disease control (56%), followed by weather information (31%), fertilizer dosages (21%) and cultivation management (16%). The VCAs mostly applied recommendations or suggestions related to pest and diseases and health diagnosis (75%), followed by fertilizer dosages (60%), weather information (30%), and other features such as management practices or the community platform, etc. (28%).

4.2.4 Likelihood to Recommend Plantix

This section lays out participant's eagerness to spread the use of this application to neighbors or peers. The below graph illustrates the user's intention to recommend the application to neighbors or other actors. Value chain actors are more likely to share about this application with competitors and farmers, in comparison to farmers.

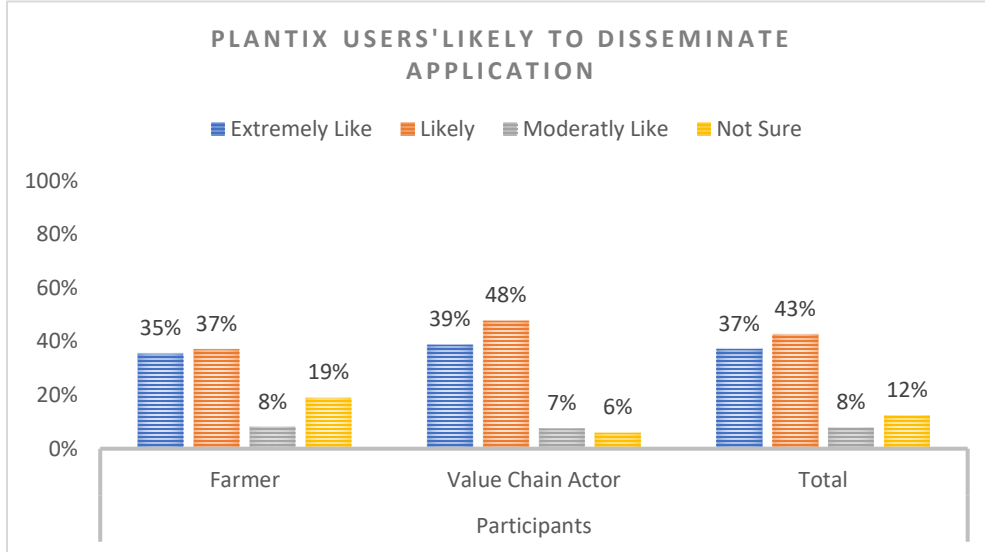


Figure 8: Participants Likely to Disseminate (in %)

Based on analysis, an average of 7 add-on participants received demonstration orientation support from each direct participant, so the expansion ratio of the Plantix application was found to be 1:7. On the other hand, among demonstration recipients, on average of 52% add-on participants adopted Plantix application suggestions or recommendations in crop cultivation. According to participant responds, it was found that 70% of add-on participants adopted Plantix advice, whereas, for SDC and Xplore it was found to only be 41%.

Challenges faced in training others: According to the direct participants who trained other farmers or peers, they faced some difficulties in transferring knowledge to others, because of respondents reported lower digital literacy levels (40%), lower education (29%), no access to a smartphone (40%), and being less willing to adopt the application (11%).

4.3 Factors Leading to Adoption of this Application

Under this section, the Activity aimed to get reflections from users regarding the suggestions or recommendations they received through using the Plantix app features, and how relevant and useful those suggestions were for their crop cultivation and management.

4.3.1 Relevance and usefulness of information

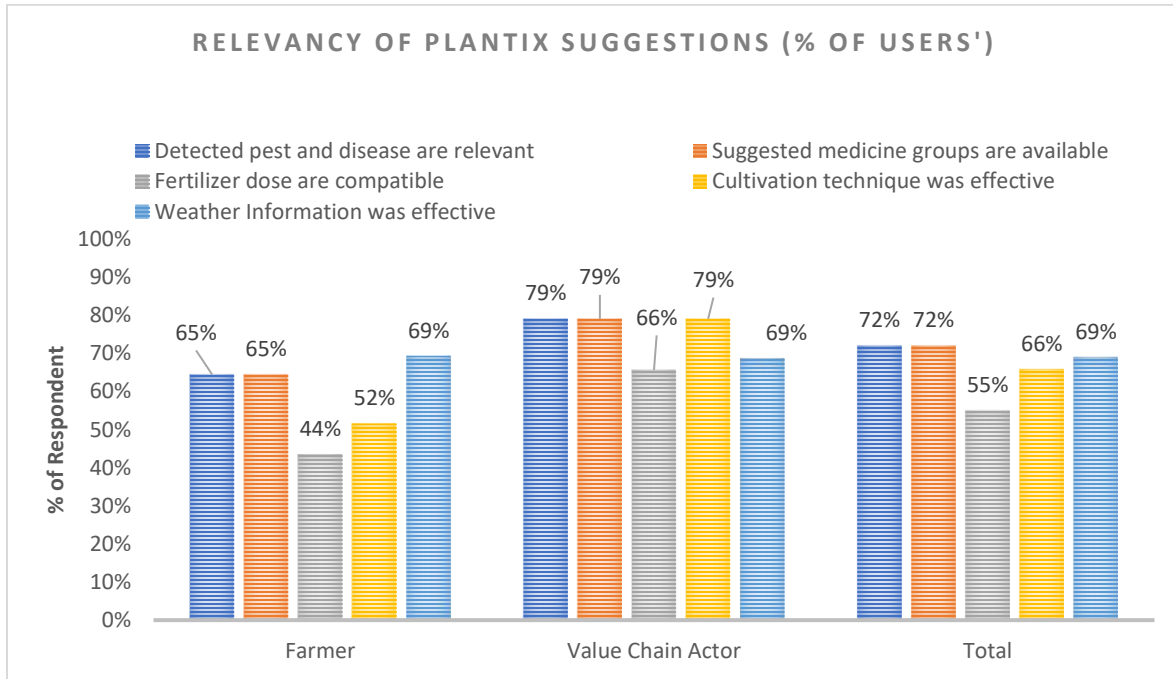


Figure 9: Relevancy of Plantix suggestions

As illustrated in **Error! Reference source not found.9**, the majority of farmers prioritized three features in terms of relevancy and effectiveness/ These features were weather information (69%), pest and disease detection (65%), and recommended pesticides/insecticides/chemical fertilizer groups for pest and disease control (65%). Value chain actors expressed interest in a wider range of features, such as pest and disease control suggestions (79%), suggested pesticide/insecticide/ chemical fertilizer groups (79%), cultivation tips (79%), weather information relevancy (69%) and recommended fertilizer dosages (66%).

4.3.2 Benefits of Adopting Plantix Recommendations

Initially, farmer knowledge and accessibility were found to be comparatively higher than VCAs, but in terms of capability to navigate/operate and adoption of Plantix suggestions, it was comparatively lower than with VCAs.

As the Plantix application was disseminated through implementing partners with two different group of actors, farmers and VCAs, benefits were recorded separately.

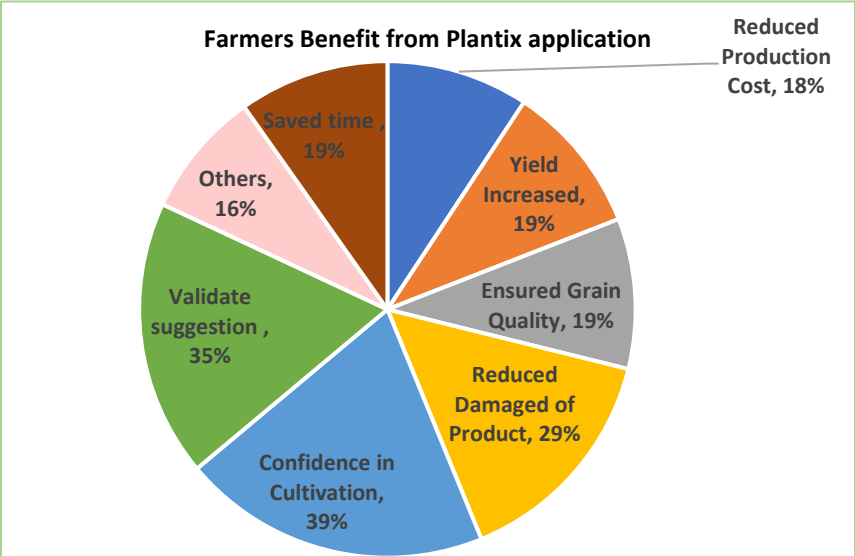


Figure 10: Farmers' Benefit from Plantix

Around 39% of farmers reported that they gained confidence in crop cultivation after using the Plantix application, meaning that Plantix’s suggestions guided them to cultivate crops. Around 35% of farmers reported that they were able to validate their understanding of Plantix suggestions with VCAs in regard to fertilizer doses, pest and disease detection, and suggested pesticide/insecticide/chemical fertilizer application. Around 29% reported to be able to

save crops (in quantity 24% of crops) from natural disasters and pests, and control disease in a timely manner. Around 19% reported on grain quality, yield increases (by 28%), reduced production costs (by around 26%), and saved time after use of the Plantix application.

“

A farmer from Patuakhali

Before I had to go several times to the market which is 30 minutes away from my place to get different pesticides or fertilizers but now, I can know in an instance which pesticide or fertilizer is required for my crop and get it from the market at once which saved me time.

”

On the other hand, VCAs gathered benefits in different ways to farmers. For example, 31% of VCAs claimed that because of the app, their new customer number had increased. 24% of VCA participants said that this app saved their time in identifying pests and disease and 21% participants reported that their repeat customers

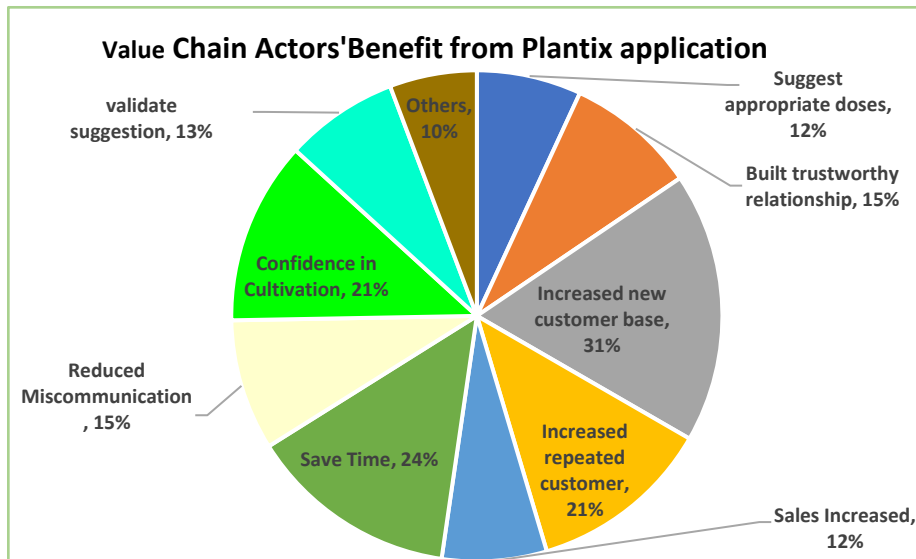


Figure 11: Value Chain Actors' Incentive from Plantix

increased, as participants gained more confidence in their business because of app features and information. There are other benefits such as reduced miscommunication with customers, increased sales volume (in volume around 19%), and more appropriate dosage suggestions in a timely manner to farmers, fostering a trustworthy relationship among customer and other actors.

During FGD and KII discussions, users requested to add some other options in the app for the betterment of their farming processes, such as soil testing, product promotions, and the addition of required vegetables and field crops in the crop list etc.

“

A value chain actor from Faridpur

Some pesticide groups were unknown to me, I got to learn some new group names from Plantix, and I applied it in the field and got a better result from the new groups. My input sales are also increasing after using Plantix, because now I can give right information for each crop diseases with correct dosage of pesticide.

”

5 Lessons Learned

The learnings found were pulled together through quantitative data analysis and qualitative discussion with relevant stakeholders, which are summarized below.

5.1 Lessons from Value Chain Actors

- After receiving a day long orientation from the Activity, VCAs who started to use the application as part of advisory service for their business had positive reflections, as the app brought several benefits for the input retailers. With this application, VCAs were able to recommend specific pesticides and fertilizers to customers and farmers as per Plantix's suggestion. Prior to Plantix, VCAs would provide 2-3 types of pesticides based on assumption of disease. Ultimately, Plantix suggestions contributed to reducing input cost for the farmer/customer, that leads to building trust among customer and retailers. **This created an increased customer base and increased sales of retailers.**
- Few input retailers expressed dissatisfaction regarding use of this application. We surmise this is due to the fact that Plantix **suggests generic groups of products instead of recommending specific brands**, which might reduce sales of small-scale input retailers due to lack of availability. In addition, there are some products available in India, where Plantix was originally launched, that are not available in Bangladesh, such as DDT. For these reasons, we conclude a small sample of small-scale retailers did not show a willingness to use and promote such applications in the future.

5.2 Lessons from Farmers

- **Farmers' digital literacy levels are lower in comparison to VCAs, and smartphone use is still limited.** We can conclude that alternate solutions could be disseminated with digital knowledge through a younger member of a farming household. This will be most effective when there is an eagerness of elder family members to adopt the advice provided and engage in new farming practices.
- To increase adoption rates among farmers, providing a demonstration of Plantix as well as **illustrating the various uses and potential outcomes may create increased usage and trust** with the tool. For example, Plantix could customize their recommendations and suggestions considering context-specific requirements, such as land units, fertilizer doses, and required crops in Bangladesh (e.g., guava, dragon fruit, mung bean, betel leaf, lentil, red amaranth, cauliflower, pumpkin, bottle gourd etc.)
- **Due to lack of a regular follow-up mechanism, VCAs were not always strongly encouraged to share Plantix to farmers/customers.** As a commitment with the Activity, only some features were introduced to the farmers, such as taking pictures to detect diseases, weather information, etc. For this reason, the adoption rates were found to be quite low for add-on participants (findings summarized in BNA add-on participants survey)
- **Adoption of the tool was greater among female farmers.** All female farmers had the tool installed in their phone, and most of the female participants had a good understanding of the

features of the application. Thirty one percent (31%) of the female farmers could name all the features in Plantix. The majority (85%) of female farmers could use the application, 31% had the skills to navigate all the features of application, and 85% had skills to navigate at least one of the features. 69% of female participants could apply the suggested information from Plantix, and most of them applied pest and disease control related information. 54% of female participants gained confidence in cultivating crops, and other major benefits for female participants included saving time, yield increment, and production cost reduction.

“

A Female Farmer from Faridpur

....as I am a woman, I can't go to Faridpur Sadar market any time to get fertilizer and pesticides. By using Plantix I can easily understand which fertilizer I need and can buy my needed pesticide/insecticide/ chemical fertilizer for my vegetable plants. Often other women are also seeking help from me.

”

5.3 Opportunities for the Private Sector and Tool Owners

There is an opportunity to increase business growth through the increased adoption of Plantix. Input companies' sales agents might play a vital role in disseminating this application among eligible farmers (those engaged in farming activities, own smart phones, and are digitally literate) and provide doorstep advisory service. If tool owners were to customize the application with company product/brand names instead of general pesticide/chemical fertilizers group names, this may attract large companies to engage directly with the tool through a B2B Approach.

6 Recommendations

- ✓ Considering the above findings on business incentives of VCAs and contributions to the farm productivity, there is an opportunity to expand this application among both actor groups. However, to spread the application more widely among farmers and value chain actors, a B2B (Business to Business) approach is more appropriate with large scale private companies or processing companies, who have a strong footprint with the farming communities.
- ✓ To spread use of the tool more widely, they also can consider the Department of Agriculture Extension (DAE) department, because they have field level extension staff (called Sub Assistance Agriculture Officer-SAAO), who have mandatory requirements to disseminate technological knowledge to farmers.
- ✓ To increase the adaptability of this application, tool owners can come up with additional features, which mostly require contextualizing the application, such as changing the pesticide/chemical fertilizer group names to have private sector focused product names, contextualizing the measurement unit or suggested doses units, and incorporating context specific new crops.

Annex: Case Stories



“So much happy using this application, it is very helpful to identify disease and get recommendation/suggestion for quick solutions”

Mahima Begum, a 38-year-old woman, she lives in the Ratnapara village of the Sultanpur union of Sadar upzila under the Rajbari district. She has two daughters and is married to a farmer, providing regular support to his farming practices, especially those regarding vegetables. Her husband cultivates various seasonal vegetables and crops on their 135 decimals of land, both commercially and to enhance family nutritional needs.

Initially, her husband led agriculture activities, but due to illness, he is now unable to contribute. Therefore, Begum leads the agriculture activities for her family. Prior to using Plantix, if she faced any problems related to diseases or pests, she was bound to rely on her past experiences, peers, and Agriculture Input Retailers (AIRs) for pest management recommendations.

Now, Begum can rely on Plantix to detect diseases and offer solutions along with the correct dosage of pesticides. While she is decently technologically oriented, she sometimes gets supplemental support from her child, Mehedi Hasan, in using the Plantix app.



“My input sales are also increasing after using Plantix, because now I can give right information for each crop diseases with correct dosage of pesticide.”

Mr. Shawan, an Agriculture Input Retailer (AIR), is more confident in his skills after using the Plantix app for disease detection. Before using Plantix, when Shawan went to farmer's fields to solve issues such as disease detection and pest control management, he would suggest pest control methods based on his experiences. However, he never felt fully confident in his services, as, while it was possible to detect the right diseases, it was difficult to give the exact types and dosages of pesticide for those diseases. As such, most AIRs suggest using more than one pesticide for a disease. Now, after using Plantix, Shawan can give an exact solution for a crop disease, reducing the cost of pesticides for farmers.

Some pesticide groups were unknown to me. I got to learn some new group names from Plantix and I applied it in the field and got a better result from the new groups,” Shawan advised to the farmers who took services from him.

He advised one young new farmer, Awlad Khondoker, who was previously not at all involved in farming, to install the Plantix app. Now, Khondoker is very happy that he can get instant solutions to problems he faces in his crop cultivation. In total, Shawan has advised more than 15 farmers to install the Plantix app.



“I am very grateful BDAA and SDC Agro to provide me timely suggestion of Plantix which reduce my crop loss and increase my yield. Plantix increases my confidence for my agriculture farming”

Reshma Khatun is a 27-year-old rural woman living in the Gandiya village within the Faridpur district. She is actively engaged in farming, alongside her husband, to ensure food security for her family. Her family fully depends on their 63 decimals of land and her husband's income. As her husband works as a day laborer, Khatun looks after all farming activities.

Khatun cultivates onions, bottle gourds, sweet gourds, jute, and rice. She has faced challenges in identifying appropriate reasons for crop disorders as well as uncertainty of weather disasters in the Faridpur district. Before her training on the Plantix app, her family fully depended on local Agriculture Input Retailers (AIRs) for information, advisory services, and inputs on farming. If any problem occurred in their crop fields, Khatun would inform her husband, whom would then purchase inputs and receive information from a local retailer business center located far from their village. Sometimes, this process could be delayed due to her husband being occupied with his construction work, resulting in significant crop loss. This year, due to uncertain rainfall in the early stages of crop production, her family faced crop loss due to not having early weather advisory services at hand.

Khatun's situation has changed significantly after receiving training on Plantix now that she has implemented use of the digital app in caring for her gourd and onion fields. When her gourd field was affected by fruit flies and fruit rot diseases, she used Plantix's community groups to receive quick suggestions from their expert farming community. Her quick use of these advisory services resulted in a 40-50% increase in gourd production. Similarly, when her onion field was affected by purple blotch and blight diseases, she received timely suggestions from Plantix's pest and disease identification features, which helped her reduce crop loss by 20-30%.

Khatun has now encouraged her friends, Sumon Sheikh and Eliash Sheikh, to use the Plantix app. Sumon Sheikh said “I got orientation from Resma about Plantix. I am now using Plantix to know about weather condition. This application giving me 3-4 days early weather information which helping to schedule my irrigation & pesticide spray time on my crop field”.