



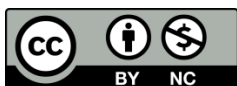
# Effects of Plant Health Rallies on Farmers' Knowledge, Attitude and Practice in Uganda

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*Front cover*: Plant health rally on fall armyworm carried out in Karamoja region (*Photo*: Benius Tukahirwa, MAAIF)

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## Abstract

A survey of 717 farmers (61% male, 39% female) was conducted in six districts in Uganda to assess the effects of Plant Health Rallies (PHRs) on farmers' knowledge, attitudes and practices, and to draw lessons about PHR implementation. The survey was complemented with Focus Group Discussions and Key Informant Interviews. PHR participants seem to have better access to formal information sources than non-participants. Nearly half of the non-participants recognized some differences in practices and outcomes between PHR participants and themselves. Over 90% of the PHR participants applied at least some of the advice given, thereby either completely or partially solving their plant health problems. Reasons for not applying all recommendations included: insufficient capital, distance to reliable input shops, inadequate skills to implement the recommendations, and in some cases, farmers preferred other solutions. PHRs influenced extension positively by: enabling extension workers to reach a larger number of farmers than they normally do; creating a platform for interaction between extension workers, farmers and input suppliers, and exposing extension workers to a wide range of plant health problems, which facilitates better programming. Farmers' constraints to accessing and using knowledge from PHRs included: irregularity of rallies, inappropriate rally venues (markets), distances to venues, insufficient print materials and limited follow-up by extension staff. PHR implementation was challenged by: high operational costs, workload, insufficient technical knowledge of some extension workers, and some farmers' expectation to receive free inputs. PHRs are considered a valuable extension approach to address plant health problems. Mainstreaming of PHRs requires multi-stakeholder collaborations, political commitment and pooling of resources to make the most of the scarce human and financial resources of Uganda's agricultural extension system. More research is needed to explore ways to enhance synergies between service providers and extension approaches to optimize farmer reach and learning outcomes in a cost-effective manner.

## Acronyms

CABI	Centre for Agriculture and Bioscience International
DCP	Department of Crop Protection
FGD	focus group discussions
KII	key informant interviews
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries, Uganda
NGO	non-government organisation
PHRs	plant health rallies

# Executive summary

## Background and purpose

Plant Health Rallies (PHRs) is one of the mass-extension approaches that the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) have piloted in partnership with Non-Governmental Organisations (NGOs) and CABI under the Plantwise Programme in Uganda since 2013 to target specific high-impact plant health problems in selected crops. A study was carried out to assess the effects of the PHR approach on farmers' knowledge, attitudes and practices with regard to plant health management for the target problems. The study also examined factors that enhanced or hindered farmer participation in PHRs and application of the advice given. Views on PHRs as an extension method were captured and lessons drawn on factors influencing design, implementation and sustainability of the PHR approach.

## Methodology

A survey of 717 farmers (61% male, 39% female) was conducted from October to November, 2017 in six districts in the Eastern, Central and Mid-Western regions of Uganda: Soroti, Bulambuli, Iganga, Mukono, Hoima and Masindi. On average, farmers travelled three kilometres to the venue of the rallies, which disadvantaged women given their preoccupation with domestic chores. The quantitative survey data were complemented by Focus Group Discussions (FGDs) with the extension workers who implemented the rallies in each district and Key Informant Interviews (KII) with partners at the district level.

## Findings

Several communication channels were used to advertise the PHRs. Most farmers got to know about PHRs through person-to-person contacts, mainly from fellow farmers, extension workers/community-based facilitators, local leaders, neighbours and community meetings. Of the 717 respondents, 22% had not participated in any PHR despite being aware of it because the purpose of the rallies was unclear to them; some had other commitments at the time of the rallies; and/or the venue was too far. However, 95% of those who did not participate indicated they would endeavour to attend if subsequent rallies were organized in their communities. Nearly half of them recognized some differences in practices and outcomes between those that participated in the rallies and themselves. Overall, PHR participants seem to have better access to formal knowledge and information sources and to use a broader range of information sources than non-participants.

The majority of surveyed farmers acquired knowledge from the PHRs related to the targeted pests and diseases, and found the knowledge adequate in most cases. Of the 556 farmers who participated in PHRs, 35% also obtained print information materials, in addition to the verbal messages. About two thirds of those read the information and found it useful in supporting implementation of the recommended interventions.

Over 90% of the farmers applied at least some of the advice given at the PHRs, thereby either completely or partially solving their plant pest and disease problems. Reasons for not applying all the recommendations included: inadequate capital to implement some recommendations, distance to reliable agro input shops, inadequate skills to implement the recommendations, and in some cases, farmers thought there were better alternative solutions than what was recommended.

According to the extension workers, PHRs influenced extension and dissemination of knowledge positively by: enabling extension workers to reach out to a larger number of farmers (compared to conventional approaches, such as farm visits); providing a rare opportunity for a large group of farmers to access reliable advice from technical experts on crop problems that affect them; creating a platform for interaction between extension workers, farmers and agro input suppliers and; exposing the extension workers to a wide range of plant health problems, which facilitates better programming.

Farmers rated the following as the main constraints to access and use knowledge from the PHRs: too few rallies conducted, distances to rally venues, insufficient print materials and limited follow-up by the technical persons to help farmers implement the recommendations. Whereas public market places and trading centres were the most convenient for the organizers to attract as many people as possible, the farmers did not find these venues appropriate for the purpose. People come to such places with multiple objectives, and learning may not be the main reason for their coming. They therefore will have little time devoted to learning, and besides, such places attract many non-farmers, including idlers who may congest or disrupt the learning activities.

The extension workers identified a number of additional challenges related to PHR implementation: The costs are considered high due to staff and logistical requirements (transport, materials, publicity, allowances). The few extension workers available are over-stretched in helping farmers to address their numerous challenges. Not all extension workers are sufficiently prepared to diagnose pests and give appropriate advice to farmers. Furthermore, some farmers also expect to receive free inputs and transport refund, which at times affect PHR attendance.

### **Recommendations and conclusion**

Farmers' suggestions for improvement of PHR implementation include issues of organisation (improved timing, location, regularity, staffing, advertising), service delivery (inputs, print materials, language, topics addressed) and connection to other service and information providers (input suppliers, community workers, radio, follow up by extension workers). Suggestions by extension workers and other partners also highlight the need for continuous training of extension workers, better funding and inter-institutional collaboration to implement the PHRs, enhanced use of ICTs and stronger enforcement of regulations regarding input supply. They also stress that PHRs should broaden their scope to address post-harvest and animal health issues, both of which are of high concern to farmers.

This study shows that PHRs are a valuable mass-extension approach to address specific problems that farmers face in their fields. Mainstreaming of PHRs requires multi-stakeholder collaborations, political commitment and pooling of resources in order to make the most of the scarce human and financial resources that currently constrain the actions of the Ugandan agricultural extension system. More research should be done to explore ways to enhance synergies between the different service providers and extension approaches with the aim to optimize farmer reach and learning outcomes in a cost-effective manner.



# 1 Background

Uganda's Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) in partnership with CABI and local Non-Governmental Organisations (NGOs) have implemented a plant health programme through the Global Plant Clinic initiative (2005-2011) and Plantwise (2012 to time of writing) (Mur *et al.*, 2015). The purpose of the programme is to strengthen the capacity of agricultural institutions and organizations to deliver timely and effective plant health advice to farmers.

Plant Health Rallies (PHRs) is one of the mass extension approaches used to reach out to farmers (See Box 1). PHRs are conducted at sub-county level, at a venue that may potentially attract as many people as possible. Some of the rallies are conducted at market places on market days to ease access by farmers and to take advantage of the multi-purpose objectives of farmers coming to such places, while others are conducted on agreed days at the sub-county headquarters.

## **Box 1.** Plant health rallies – a means to reaching out to farmers

A Plant Health Rally (PHR) as an open event for farmers conducted in public to rapidly disseminate a specific message for recognizing and managing a plant health problem. The topic is often related to a particular pest or disease but it could also concern soil fertility, planting techniques, choosing planting material or other abiotic problem. Plant health is interpreted broadly to include all aspects of crop management which limit production.

The PHR is held in rural locations, amongst farming communities and in public places such as markets and fairs, where farmers tend to congregate. Each event lasts for one to a few hours and can be repeated several times in a region over the course of a few days. The PHR aims to inform large numbers of farmers quickly with a targeted message on a common problem.

The PHR begins with the introduction of a topic to an assembled group of farmers. They are given printed, illustrated material related to the topic (if available). The extension agents and others holding the rally talk with the farmers and respond to questions after a short talk.

*From: Colmenárez et al. (2012)*



Plant health rally on maize lethal necrosis disease carried out in Karongi District, Rwanda.  
(Photo: Nicolas Uwitonze, One Acre Fund)

From 2013 to 2017, more than 200 PHRs were conducted in 39 districts of Uganda targeting specific diseases and conditions of selected crops, including: maize, cassava, citrus, coffee, groundnuts, beans and banana. A total of 12,477 farmers attended the PHRs (62% male, 38% female) across all regions with an average farmer attendance of 61 per PHR (Table 1). In 2017 alone, the PHRs reached 6,007 farmers. Topics covered in the PHRs were guided by the prevalent pests and diseases in the district as informed by the District Agricultural Officer. Each PHR typically addresses two to three problems. Ordinarily, each topic was introduced via a thirty-minute oral presentation by a plant doctor (extension worker). Although the PHRs targeted pests and diseases of specific crops, farmers also received advice on other pests and diseases as requested.

**Table 1.** PHR farmer attendance from 2013-2017 in three regions of Uganda.

Region	Total PHR held (#)	Total farmer attendance (#)	Attendance/ per PHR (#)	Male (%)	Female (%)
Central	58	2,976	51	57	43
Eastern	66	4,149	63	66	34
Western	79	5,352	68	62	38
Total	203	12,477	61	62	38

Source: Field reports.

In some districts, the PHRs were complemented by other mass extension methods, such as, radio talk-shows to reach out to as many people as possible. A study was conducted to assess the effects of the PHRs approach on farmers' knowledge, attitudes and practices with regard to plant health management for the targeted crops. Specifically, the study sought to:

1. Ascertain the level of knowledge acquired by farmers from PHRs;
2. Ascertain the extent to which the farmers put the knowledge acquired into use;
3. Identify factors that accelerate or hinder participation in PHRs and application of the acquired knowledge;
4. Capture views on PHRs as an extension method;
5. Draw lessons on factors influencing the design, implementation and sustainability of PHRs approach.

## 2 Methods

A quantitative survey was conducted between October and November, 2017 with farmers in six districts representing the Eastern, Central and mid-Western regions of Uganda. The six districts were purposively selected in consultation with the implementing partners, mainly MAAIF and CABI based on the intensity of engagement in the PHRs in the respective districts, and considering the time and resources available for the study. The districts were selected to represent the diversity of the regions and all the target crops: Soroti, Bulambuli and Iganga from the Eastern; Mukono from the Central; and Hoima and Masindi from the mid-Western regions. In surveyed sub-counties, one or two rallies had been conducted from mid-2014 to mid-2017 except in Bulambuli district where up to six rallies were conducted in different sub-counties, made possible by additional resources provided by the district local government.

Originally, farmers not participating in PHR were to be selected from sub-counties farthest from the sub-county where the PHRs were conducted in each of the districts. It was presumed that the furthest sub-county would be a partial control group with most farmers not participating in the PHR due to distance to the PHR venue. In reality, there was no significant difference in participation by



farmers nearby and those far from the PHR venues. This was because PHR is a mass extension method conducted at large weekly markets, which attracted people from all over the district and beyond. In this circumstance, the idea of a pure control was not tenable. Therefore, a different sampling approach was used.

The extension workers who conducted the PHR kept lists of farmers that they followed up after the rallies. Although the lists did not include all farmers who participated in PHRs, they served to identify some farmers to start with. A snow-ball technique was then used to identify other farmers who had participated in PHRs within a radius of 4-5 kilometres from the first respondent. For each participating farmer selected – a farmer from the next homestead was interviewed to represent the non-participants in the PHR. However, in the course of the interviews, it was found that many of the neighbouring farmers actually did attend a PHR. As a result, it was not possible to balance the numbers of participants and non-participants. Although the target was 100 participating farmers from each district, this was often exceeded because of the efforts to find a reasonable number of non-participants. In total, 717 farmers were interviewed (61% male, 39% female). Of these 161 respondents (22%) were non-participants (Table 2). A perfect balance of male and female respondents was not possible as the population of farmers who participated in the PHRs was skewed towards more men for reasons discussed later.

**Table 2.** Composition of survey sample (P = PHR participants; NP = non-participants)

Region	District	Male			Female			Total
		P	NP	Total	P	NP	Total	
Eastern	Soroti	46	10	56	48	8	56	112
Eastern	Bulambuli	95	17	112	27	4	31	143
Eastern	Iganga	59	15	74	44	16	60	134
Central	Mukono	33	20	53	32	14	46	99
Western	Hoima	44	14	58	31	13	44	102
Western	Masindi	66	17	83	31	13	44	127
	Total	343	93	436	213	68	281	717

The survey questionnaire captured information about farmers knowledge, attitudes and practices vis-a-vis their plant health problems and the usefulness of PHRs to convey actionable information (Annex 1).

The survey was complemented by Focus Group Discussions (FGD) with the extension workers who participated in the planning and execution of the PHRs and Key Informant Interviews (KII) with implementing partners at district and national levels. One FGD with 2-4 extension workers was conducted in each of the six districts, totalling 18 extension workers. Three KII were conducted per district. The qualitative information generated from the FGDs and KIIs was used to obtain the experiences and views of those involved in implementation of the PHRs, as well as for triangulation and explaining the *how* and *why* things happened the way they did. Checklists used for the FGDs and KII, respectively, are included in Annexes 2 and 3.



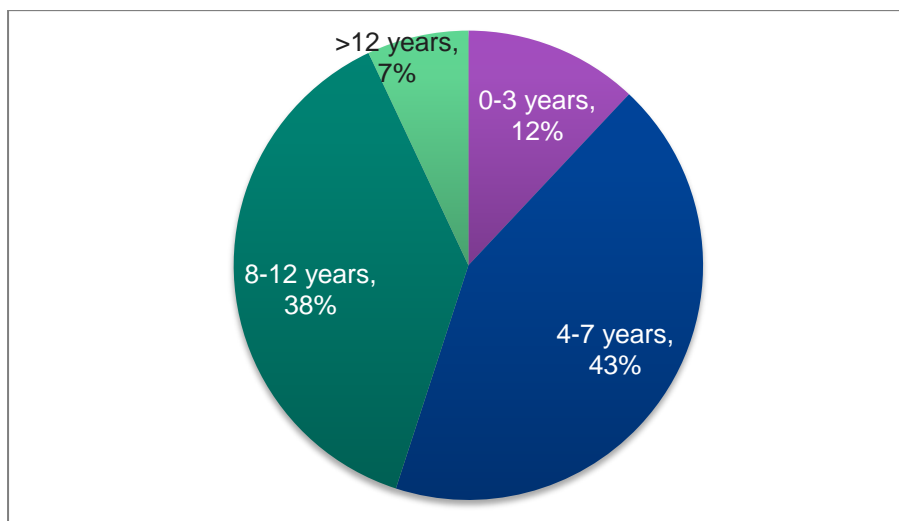
High quality factsheets are an important visual aid during rallies. Osukuru Subcounty, Tororo district.  
(Photo: Christine Alokit, CABI)

### 3 Results and discussion

#### 3.1 Characteristics of respondents

The PHRs were conducted in a central place within a sub-county, in most cases at market places. On average, farmers travelled three (3) kilometres to the venue, with the longest distance travelled by a respondent to the rally venue being 13 km. The distance was prohibitive to the majority of women as they had to attend to their domestic duties. It was explained in the FGDs that men usually have more flexibility to travel to the rally venues as they tend to have more time compared to the female counterparts who are preoccupied with household productive and reproductive roles, similar to what Schwarz *et al.* (2014) reports with regard to community resource management. Further, it emerged that because of the long distances to the PHRs venues, some men would ride bicycles to the venue, and would take first priority to use the family bicycle over the women. It was uncommon that both man and woman from the same household attended the rallies.

As is typical of the Ugandan farming system, most respondents were smallholder farmers cultivating an average of 3.7 acres of land. The farmer with the largest land size had 50 acres, while the smallest had 0.25 acres. The average age of the respondents was 43 years, the youngest being 17 and the oldest being 87 years, respectively.



**Figure 1.** Years of education of respondents (n=717).

With regard to education, respondents had attained an average of 8 years of education. Figure 1 indicates that 43% and 38% of the respondents had acquired at least upper primary education or ordinary level education, respectively.

About 73% of the respondents were the household heads, while 26% were spouses to the household heads, and 1% were a dependent (son or daughter to the household head). It would therefore be expected that nearly all the respondents to some extent participate in making farm decisions related to use of the knowledge and information acquired through the PHRs.

Whereas some crops like maize and cassava were common among sampled farmers in all districts, others varied in relative importance among the districts (Table 3). For example, citrus and groundnuts were predominantly grown in Soroti district; coffee was predominantly grown in Bulambuli, Mukono and Iganga districts. This distribution of crops in the study districts has implications on the overall proportions of farmers who received and implemented crop-specific advice provided at the PHRs. The cells highlighted in grey indicate in which districts the respective crops were targeted by the PHRs.

**Table 3.** Percentages of farmers in the study districts growing crops targeted by the PHRs\*.

Crop targeted in PHR	% sampled farmers growing the PHR target crops in each district						Overall % (n=717)
	Soroti (n=112)	Bulambuli (n=143)	Iganga** (n=134)	Mukono (n=99)	Hoima (n=102)	Masindi (n=127)	
Maize	55	93	96	86	91	85	85
Banana	3	59	46	80	55	52	49
Cassava	91	48	87	84	89	91	80
Citrus	54	6	10	8	10	6	15
Coffee	0	45	43	51	25	4	28
Beans	9	80	41	43	57	61	50
Groundnuts	72	32	51	14	47	48	44

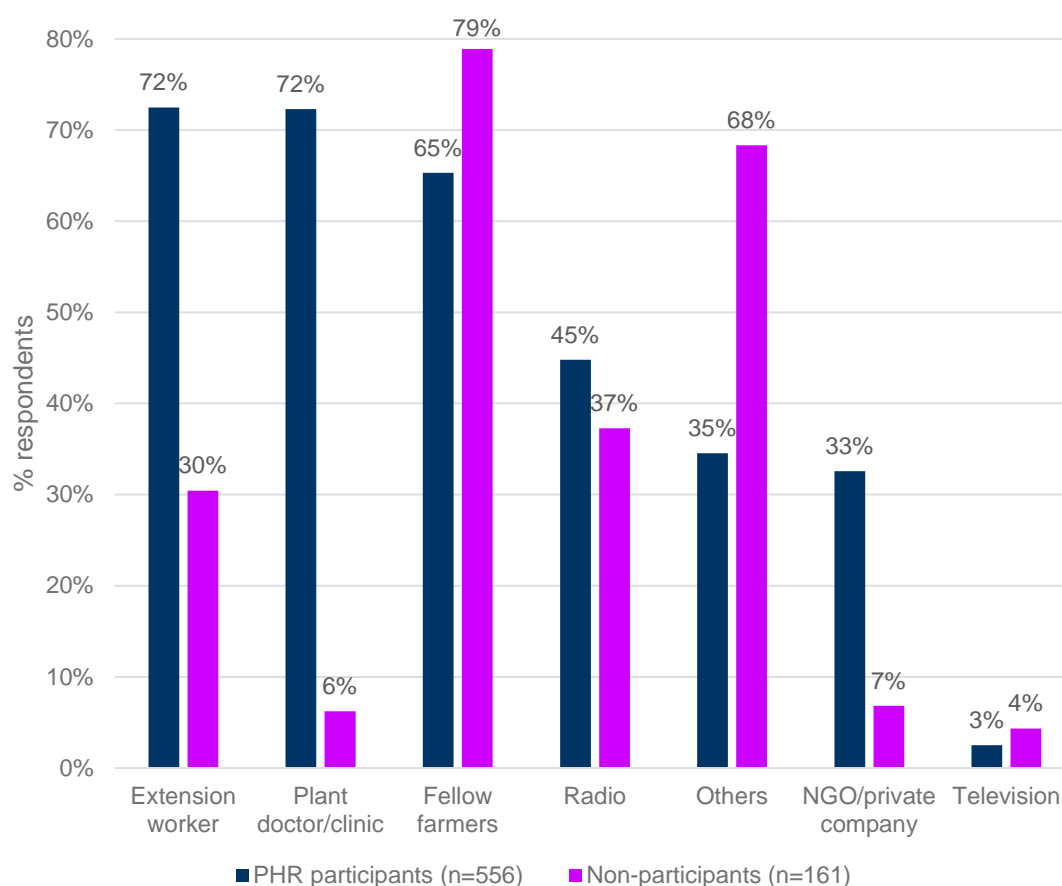
\* Grey cells indicate districts in which the respective crops were targeted by the PHRs.

\*\* In Iganga, the PHRs focused entirely on fall armyworm in maize.

### 3.2 Farmer access to agricultural knowledge

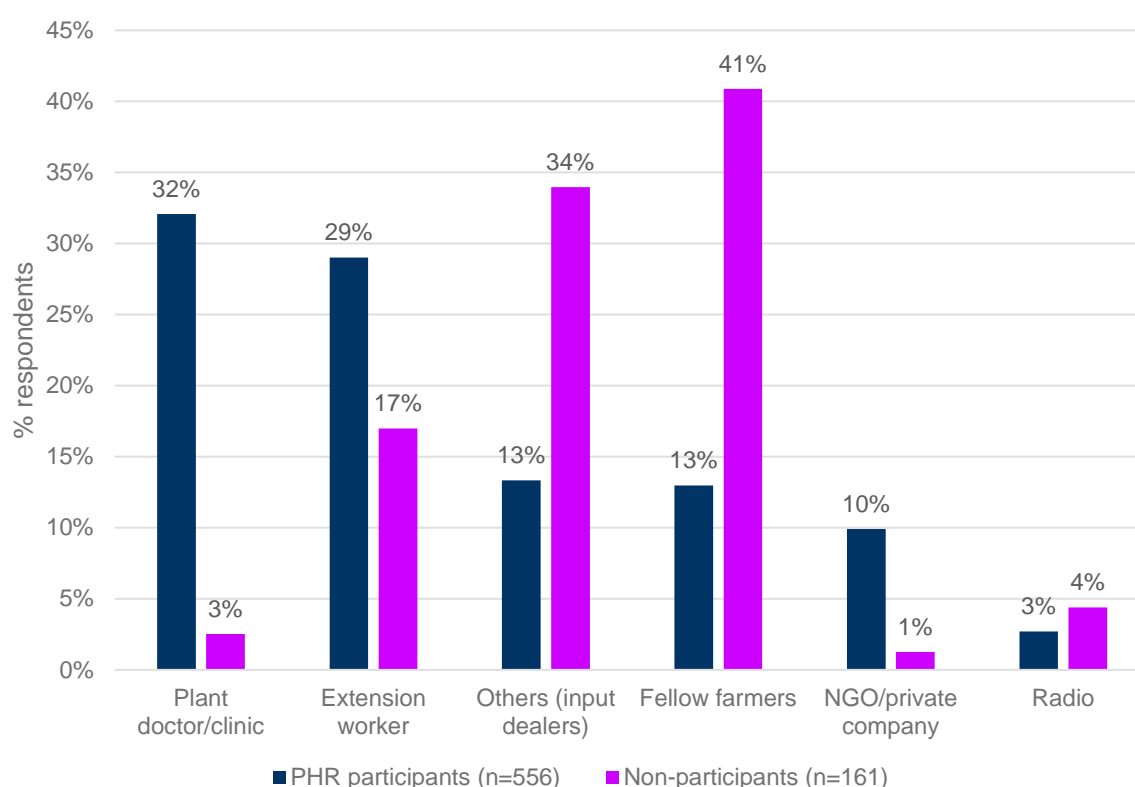
The PHRs focus on providing advice and information related to management and control of pests and diseases of targeted crops. In this regard, it was necessary, first, to establish the farmers' sources of knowledge related to management and control of pests and diseases. Despite the imbalance in sample size between PHR participants and non-participants, a distinct pattern appears when comparing the two groups. Figure 2 illustrates that for PHR participants, district extension workers, plant doctors (under Plantwise) and fellow farmers were the most frequently mentioned sources of knowledge, with 65-72% of the respondents relying on those sources. For non-participants, fellow farmers and 'other' sources (mainly agro-input dealers) were the most frequently mentioned with 79% and 68% of respondents referring to those sources. Agro-input dealers were mentioned twice as frequently by non-participants (65%) compared to PHR participants (35%). Radio was referred to fairly equally by the two groups (37-45%) while NGOs/private companies were mentioned by far more PHR participants (33%) than non-participants (7%). Television was not used much as a source of plant health knowledge by any of the groups. Overall, the PHR participants seem to have better access to formal knowledge and information sources and to use a broader range of information sources than non-participants.

Other studies have found a similar pattern for plant clinic users who tend to be better connected to formal sources of information and advice, while non-users rely more on informal information networks including fellow farmers and agro-input dealers (Rajendran and Islam, 2017; Bett *et al.*, 2018; Danielsen *et al.*, 2019).



**Figure 2.** Farmers' sources of knowledge on crop pests and diseases (multiple responses).

We also asked the farmers what they considered to be their first choice of source of knowledge for crop pest and disease management. A similar pattern emerged, with more than half of PHR participants referring to formal sources – plant doctors/ clinics (32%) and extension workers (29%) – as their preferred knowledge sources (Figure 3). These sources were the number one choice for only 3% and 17% of non-participants, respectively. In contrast, three quarters of the non-participants mentioned informal sources – fellow farmers (41%) and ‘other’ (mainly agro-input dealers) (34%) – as their preferred information source, as opposed to 13% of the PHR participants for each of these sources. It is important to note here that the plant doctors were also extension workers who had been trained to become plant doctors, but not all extension workers were plant doctors. In this survey, plant doctors are distinct from extension workers. Radio is least trusted as a source of knowledge on pests and diseases and NGOs/private companies were not trusted a great deal more.



**Figure 3.** Farmers’ single most important source of knowledge on crop pests and diseases (single responses).

A Chi-Square test comparing men’s and women’s preferences shows some significant gender differences, both among PHR participants and non-participants (Table 3). Key differences were that women are more likely than men to rank fellow farmers first, while men are more likely than women to rank extension agents first, both for PHR participants and non-participants. For non-participants, a significantly larger proportion of men than women ranked agro-input dealers (‘other’) as most important knowledge source. This could imply that more involvement of community members and input dealers in the mobilization, may increase both men’s and women’s participation in the PHRs.

**Table 4.** Most important source of knowledge for men and women farmers (% respondents within gender group). P = PHR participants; NP = non-participants.

Knowledge source	P (n=556)				NP (n=161)			
	Women	Men	Chi value	Probability	Women	Men	Chi value	Probability
Plant doctor/clinic	36%	29%	2.639	0.1043	3%	2%	0.094	0.7586
Extension worker	24%	32%	4.307**	0.0380	10%	22%	3.651*	0.0560
Fellow farmers	17%	10%	5.922**	0.0150	54%	30%	9.319***	0.0023
Other (input dealer)	13%	13%	0.011	0.9182	25%	40%	4.608**	0.0318
NGO/private company	9%	10%	0.379	0.5380	1%	1%	0.047	0.8291
Radio	0%	4%	6.556**	0.0105	6%	3%	0.642	0.4229

Key: \*, \*\*, \*\*\* Significant at 10%, 5% and 1%, respectively

### 3.3 Knowledge acquired through PHRs

#### Awareness about the PHRs

Access to knowledge delivered through PHRs starts with the awareness about the PHRs. Several channels were used to communicate and mobilize farmers to participate. Table 5 presents the proportions of farmers who received information about the PHRs through different communication channels. Most farmers got information through person-to-person contacts, mainly from fellow farmers or the extension workers/ community-based facilitators. Perhaps the person-to-person contacts are more convincing, but also provide more detailed information including the purpose, as opposed to other channels that may not provide sufficient information as to purpose and clarifications where necessary. Others were through local leaders, neighbours and community meetings. About 14% mentioned having obtained information through radio. However, not all those who were aware, participated in the PHRs.

#### Non-participants in the PHRs

All of the 161 non-participants (22%) were aware about the PHRs but chose not to participate in any. The reasons provided for non-participation included:

- the information obtained was not clear (39%);
- they had other commitments and could not adjust their schedules (37%);
- the distance to the venue was long (11%);
- the information came at short notice and could not adjust so quickly (8%);
- not interested (3%);
- timing was not convenient and it would interfere with other activities (2%)



**Table 5.** Communication channels used to create awareness of PHRs.

Source of Information about PHRs (n=717)	(%)
Other farmers	43
Extension officer, community-based facilitator	38
Local leaders	17
Neighbours	15
Radio	14
Community meetings	8
Mobile loud speaker	7
Church/mosque	4
Household/family member	4
Newspapers	3
By coincidence	2

In some cases, for example in Masindi district, rallies were conducted in the morning, which was not convenient for all farmers. However, 95% of the farmers who did not participate indicated that they would endeavour to participate if the rallies were organized again in their communities. This willingness could probably be associated with benefits witnessed from those that participated. Only 3% indicated reluctance to participate, but that they would consider participating if they were facilitated to get to the rally venues. Less than 1% indicated they would only attend if they had nothing else to do. A similar proportion clearly indicated they would not be interested in participating. The farmers who had never participated in the rallies were asked if they observed any differences in practices on pest management between themselves and those who participated in the rallies. In their view:

- 46% observed that those who participated in the rallies sprayed their crops more regularly to control pests and diseases,
- 41% acknowledged that yields of participants were higher than for those that did not participate in the rallies;
- 11% observed better agronomic practices among those who participated in the rallies;
- 2% did not see any difference between themselves and those who participated in the rallies

Based on these observations, it was evident that the benefits of those who participated in the rallies were visible in the community and among farmers themselves. This in itself offers a positive motivation for participation in the PHRs.

#### **Advice given at the PHRs**

The respondents were asked to assess the advice they received through PHRs on specific pests and diseases. Table 6 presents the PHR-participants' perceptions on the adequacy of the advice given on the different topics. Only PHR topics mentioned by more than 5% of all PHR participants (556) are included in the table. On average, the PHR participants had received advice on approximately four different topics.

More than half of the respondents considered the advice given adequate to solve the problems related to: Fall armyworm, maize lethal necrosis disease, black coffee twig borer, groundnut rosette,

bean anthracnose, as well as soil fertility management and safe use of pesticides. The proportion of farmers who considered the advice given not adequate ranged from 21% (safe use of pesticides) to 72% (angular leaf spot in citrus).

The view that the knowledge acquired was not adequate could partly be due to the limited number of rallies conducted in the sub-counties and possibly the limited time allocated to the topics covered. Usually a maximum of one hour is spent on one rally site including mass address to attendees. It is therefore unrealistic to expect one or two rallies over three years to provide adequate knowledge to solve farmers' pests and disease problems. The knowledge requires further reinforcement through more rallies and individual farmer follow-ups by technical experts to help build and consolidate farmers' knowledge and confidence to solve their most pressing plant health problems. Additionally, it is likely that a proportion of farmers present at the rallies received advice on crops or problems that were not relevant to them (see also Table 3).

**Table 6.** PHR-participants' perception of the adequacy of the advice given (multiple responses).

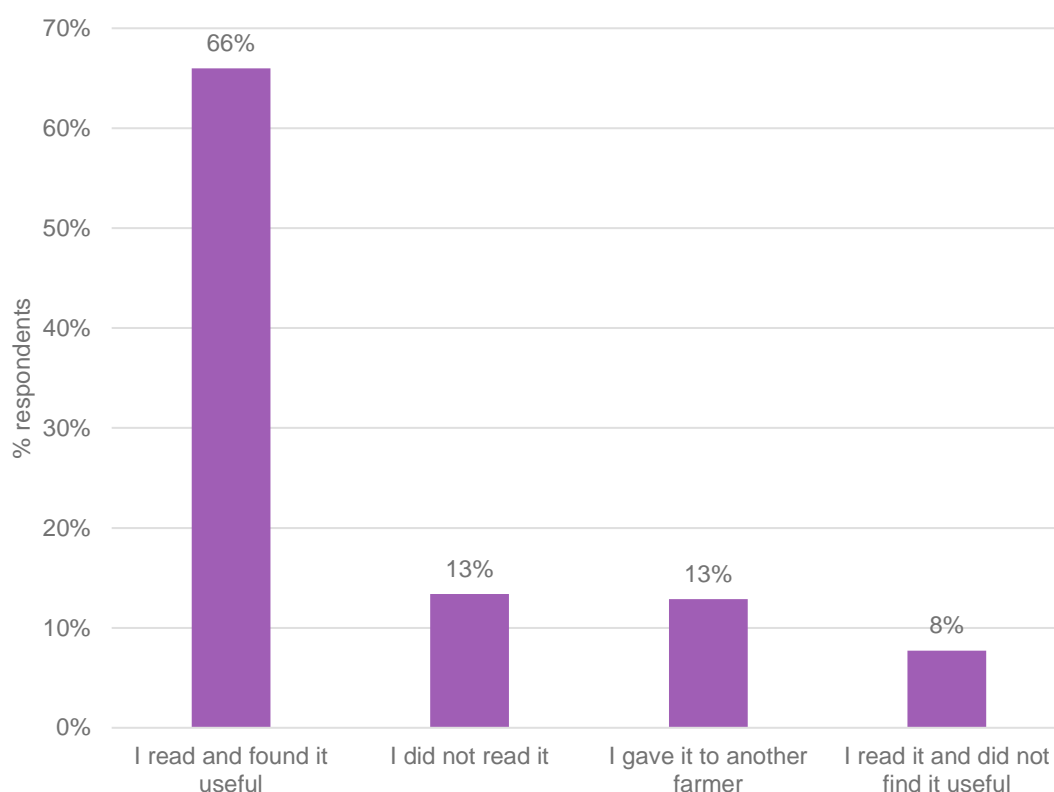
Crop	Pest/ disease/ topic	# farmers receiving advice	Perceived adequacy of advice (%)		
			Adequate	Not adequate	Not relevant
Maize	Fall armyworm	431	70	30	0
	Maize lethal necrotic disease	66	58	42	0
Cassava	Cassava brown streak virus	115	46	54	0
	Cassava mosaic	28	0	61	39
Citrus	Angular leaf spot	54	28	72	0
	Fruit fly	41	43	56	1
Coffee	Black coffee twig borer	76	70	30	0
	Coffee berry disease	29	43	57	0
Groundnuts	Groundnut rosette	88	59	39	2
Beans	Bean anthracnose	89	54	46	0
Bananas	Banana bacterial wilt	174	48	52	0
	Banana weevil	32	40	60	0
General topics	Soil fertility management	388	76	24	0
	Safe use of pesticides	392	79	21	0

To complement the verbal technical advice, print materials from different collaborating agencies were provided to some farmers for further information on some of the pests and diseases, as well as good agronomic practices, safe use of pesticides and soil fertility management. Out of the 556 farmers who participated in the PHRs, 196 (35%) had received the print information packs. Table 7 presents the proportion of farmers who received print information packs on the respective topics, while Figure 4 shows how print information was used by the farmers. More than half (66%) of those who received print information materials were able to read them and indeed found them useful in the processes of implementing more effective management of the pests and diseases. Others did not read it (13%) or gave it to another farmer (13%), which in some way depicts dissemination of

information beyond those who attended the PHRs. Eight percent did not find the print information useful.

**Table 7.** Topics for which print information was provided to farmers at the PHRs (n=196).

Crop and disease/ pest on which print materials were provided	% farmers received
Maize (fall armyworm, maize lethal necrosis disease)	69
Banana (banana bacterial wilt, banana weevils)	24
Cassava (cassava brown streak virus)	11
Coffee (coffee berry disease, black coffee twig borer, coffee leaf rust)	11
Beans (bean anthracnose)	4
Groundnuts (groundnut rosette)	3



**Figure 4.** Use of printed materials by farmers (n=196).

Table 8 relates the level of education of the farmer and the use of print information materials provided at the PHRs. Most of the people who made good use of the print information materials ('I read it and found it useful') had eight or more years of education (87% of farmers with eight years of education or more, calculation not shown), while most of those who did not read it, or did not find it useful or gave the materials to other farmers had seven years and below of education (82% of farmers with seven years of education or less, calculation not shown). For obvious reasons, education affects the use of print information materials. However, an implication is that if farmers are to be organized in groups for more effective service delivery, it would be desirable that the

groups include some members with at least eight years of education. These better educated individuals could help the other farmers understand and benefit from the print information.

**Table 8.** Relationship between farmer education and perceived usefulness of print information materials (n=196).

Years of education of the farmer	Usefulness of print information packages (%)				Total (%)
	I read and found it useful	I did not read it	I gave it to another farmer	I read it and did not find it useful	
0-3 years	3%	2%	1%	0%	6%
4-7 years	23%	9%	10%	5%	47%
8-12 years	34%	2%	2%	2%	39%
>12 years	7%	0%	0%	1%	8%
Total	66%	13%	13%	8%	100%



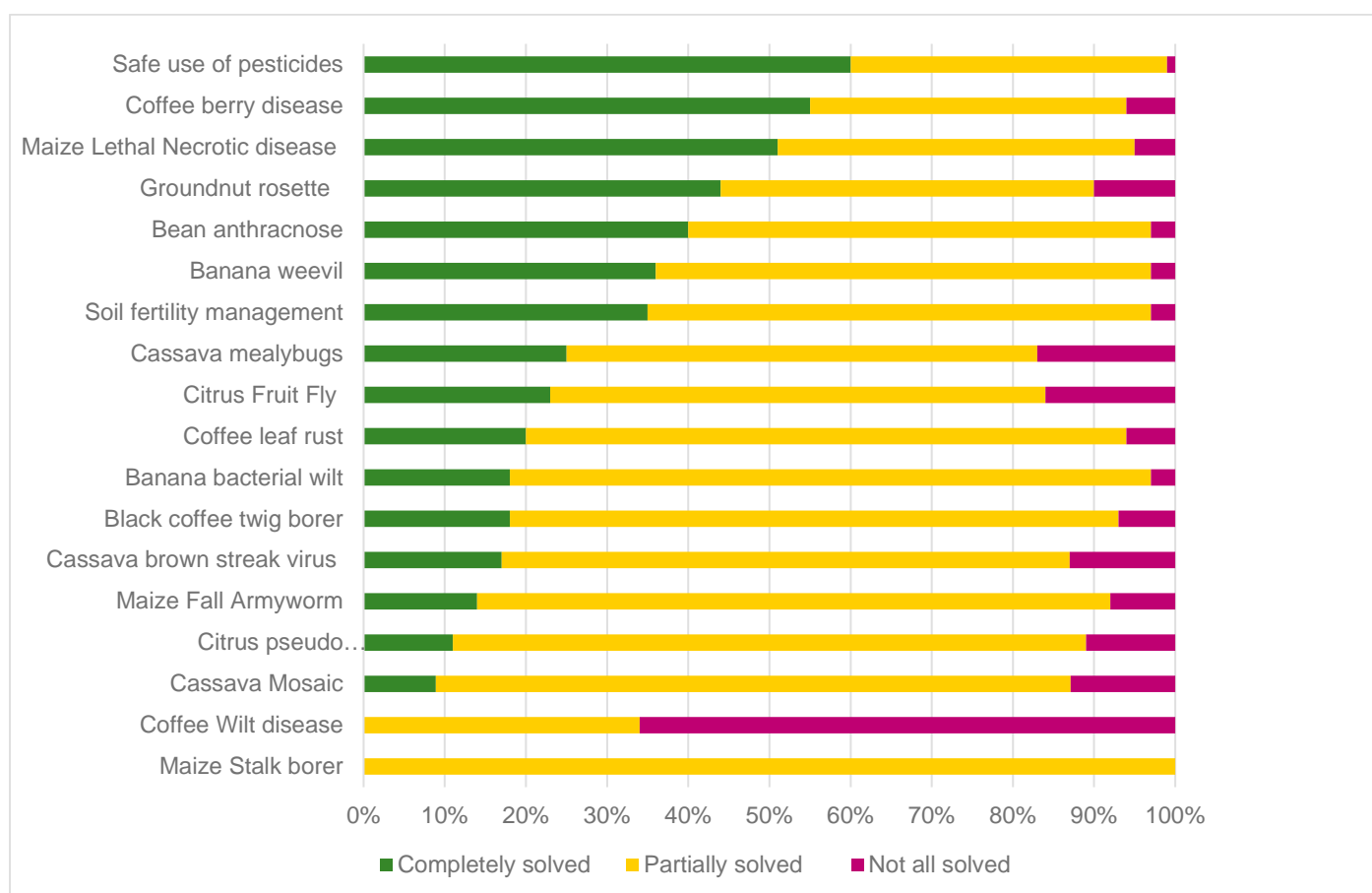
Farmers examine a factsheet on maize lethal necrotic disease during pretesting in Osukuru, Subcounty, Tororo district in September 2016 (*Photo: Christine Alokot, CABI*).

### 3.4 Application of acquired knowledge

The intention of acquiring knowledge is to solve problems on the farm. It was therefore pertinent to explore how the advice was used. All the farmers who participated in the PHRs attempted to apply the advice given to solve the different problems they experienced. Figure 5 illustrates the extent to which farmers think their different pest and disease problems were solved as a result of the knowledge acquired in the PHRs.

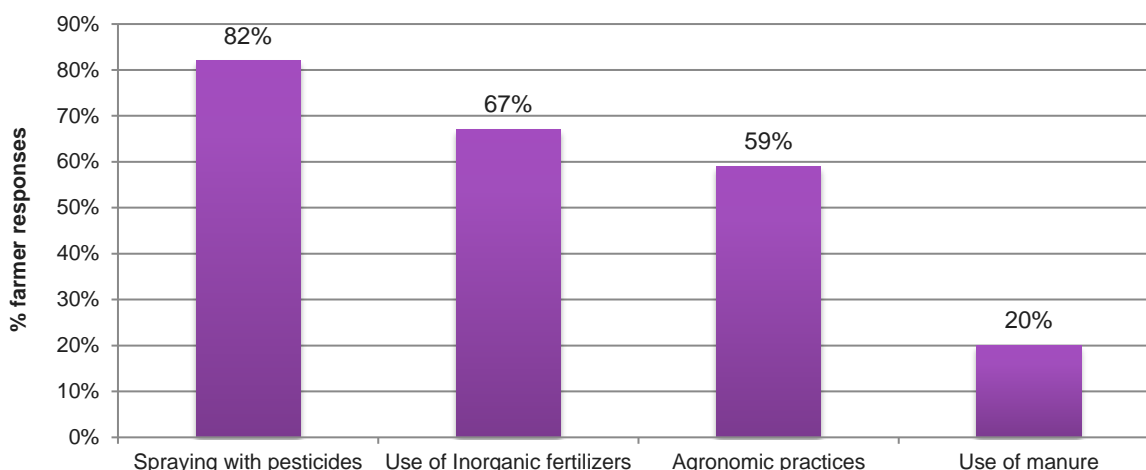
Generally, the majority reported their problems being only partially solved. Safe use of pesticides, management of coffee berry disease and maize lethal necrosis disease were the specific cases where more than half the respondents reported to have completely solved their problems. Less than 20% of the farmers were able to completely solve problems related to banana bacterial wilt, black coffee twig borer, cassava brown streak virus, fall armyworm in maize, citrus angular leaf spot and cassava mosaic virus after participating in the PHRs. Some plant health problems can be persistent and require multiple or rapid interventions (Wilkinson *et al.*, 2011).

No single farmer reported to have completely solved the problem of coffee wilt disease and maize stalk borer, which is not surprising as these are persistent and stubborn crop health problems. For example, coffee wilt disease has cumulatively destroyed over 50 percent of Uganda's old Robusta coffee trees since 1993 (Bategeka *et al.* 2013) and maize stalk borer is indigenous in Uganda, with wide distribution and abundance in areas of intensive cultivation (Matama *et al.* 2007).



**Figure 5.** Effect of applying knowledge from PHRs to solve problems as perceived by farmers (% farmer responses).

Figure 6 shows the specific actions related to putting the acquired knowledge into practice. These included spraying with pesticides (>80%) especially on maize, beans, and groundnuts; use of inorganic fertilizers (67%) to improve soil nutrients but also enhance the plant vigour; agronomic practices (59%) such as timely planting, using improved seed, recommended spacing and; use of manure for soil fertility improvements (20%). Cultural practices such as destruction of maize crop residues to control the fall armyworm, and removal of the male buds to control the banana bacterial wilt were also mentioned.



**Figure 6.** Farm practices by farmers resulting from PHR participation.

An Ordered Probit regression analysis was performed to establish the factors that influenced application of the advice given during the PHRs. Table 9 lists the factors that were significant for advice given on a particular topic.

**Table 9:** Factors significantly influencing application of knowledge acquired at the PHRs.

PHR topic	Significant factors	P-value	Coefficient	SE
Maize fall armyworm	Age of the farmer	0.0160	-.010**	0.005
	Size of the farm	0.003	0.38***	0.013
Coffee berry disease	Education level	0.063	0.246*	0.133
Banana weevil	Age of the farmer	0.083	-0.057*	0.033
	Reception of print materials	0.022	2.62**	1.15
Soil fertility management	Education of the farmer	0.00	0.089***	0.022
	Reception of print materials	0.017	0.341**	0.142
Safe use of pesticides	Education of the farmer	0.017	0.030**	0.023
	Household head	0.010	0.021***	0.509

Key: \*, \*\*, \*\*\* Significant at 10%, 5% and 1% respectively; SE: Standard error

Age had a negative coefficient for fall armyworm and banana weevil advice, meaning that the older the farmer are the less likely to apply the advice for controlling the pest. Factors positively correlated to the application of advice were: size of farm (fall armyworm), farmers' education level (coffee berry disease, soil fertility management, safe use of pesticide), whether the PHR participant was household head (safe use of pesticide) and whether the participants received print materials (banana weevil, soil fertility management).

### 3.5 Factors constraining access and application of knowledge

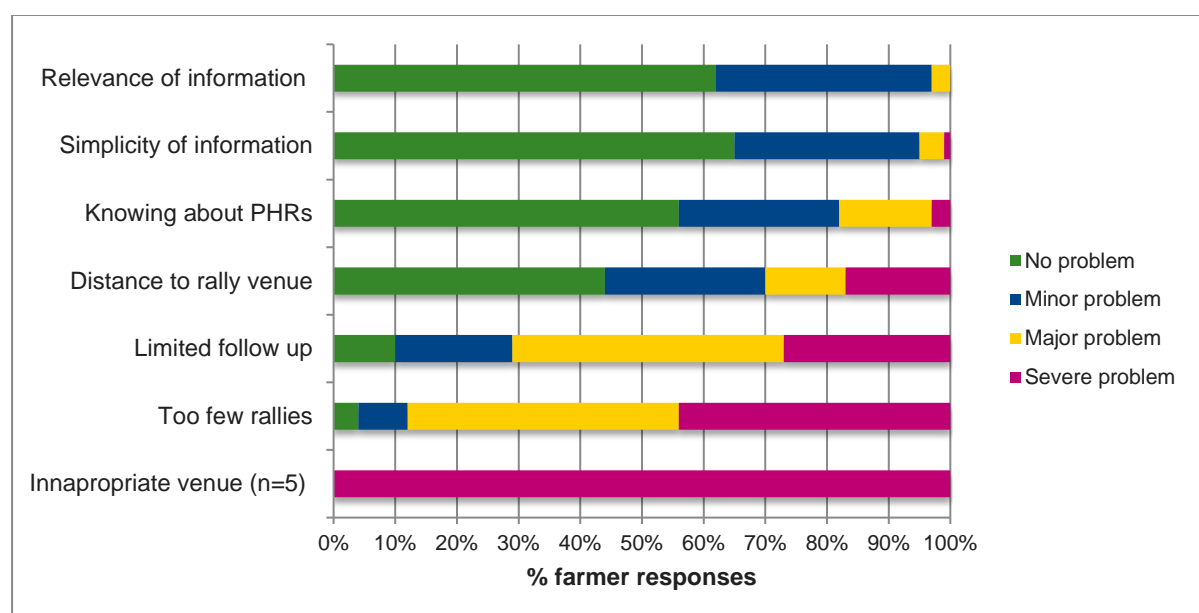
#### Constraints to access of knowledge from PHRs

The survey further explored constraints affecting farmers' access to knowledge from PHRs. Aspects related to organisation of the PHRs and knowledge provided were rated by each respondent as being either; no problem, minor problem, major problem, or severe problem (Figure 7). The major



constraints rated as either major or severe, were the rally venues, the frequency of the rallies and limited follow-up for technical support from the extension workers. Distance to the rally venue was also mentioned as problematic by more than 50% of farmers. On average, farmers travelled three (3) kilometres to the rally venues, while the furthest farmer travelled 13 km, which is a long distance, especially for female farmers. Karubanga *et al.* (2016) also described how long distance to venue and timing constrained farmer access to video-mediated extension in Uganda.

Although only five people mentioned the inappropriateness of the venues for the rallies (it wasn't included on list of aspects to rate), they all thought it was a severe challenge. This aspect was also stressed during the FGDs, with the organizers of the PHRs. Most rallies were conducted at the market place during the market days or in the trading centres. These venues were considered inappropriate as people come to these places with different objectives, other than learning.



**Figure 7.** Constraints to accessing knowledge from PHRs according to farmer survey (n=717).

This is not only specific to rallies as an earlier study on plant clinics in Uganda also indicates that market places are not appropriate venue for learning (Karubanga *et al.*, 2017). Farmers do not devote time to the learning and the rallies tend to attract many people who are not necessarily farmers, including some idlers around the trading centres. One of the District Agricultural Officers said in an FGD;

“It was hard to get suitable place to conduct the PHRs because for example, most of the people in the trading centres are businessmen and not farmers. If farmers are to come to the rallies, they demand to be facilitated with transport refund as some of them travel long distances”.

As earlier explained, the rallies were considered too few to enable farmers to internalize the knowledge and possibly to allow further consultation to be able to solve their problems. This combined with minimal follow-up by the extension workers constrained application. Follow-up with technical support usually reinforces learning and builds confidence of the farmer to put the knowledge into use.

Because the survey targeted farmers who were aware of or had participated in the PHRs, awareness about the rallies was not a major challenge for most farmers. Largely, the farmers who participated

in the rallies thought the information provided was relevant to the challenges they faced and it was presented to them in manner that they could easily understand.

### Reasons for not implementing advice

There are several reasons that explain why farmers could not use all the knowledge acquired at the PHRs. Farmers usually do not implement all the recommendations given to them to address a particular problem. Some scholars, e.g. Farid *et al.* (2015); Mwangi and Kariuki (2015) attribute this to the particular socio-economic factors of the farmers. Out of the 556 farmers who sought knowledge at the PHRs, 508 (91%) confirmed that they did not put all the recommendations given to them into practice. Table 10 provides the reasons given.

Insufficient resources to purchase inputs, and the long distance to agro-input shops were the major barriers to full implementation of the advice provided. The farmers also felt they lacked the necessary expertise to implement some of the recommendations. Furthermore, some felt recommendations were not clear enough to enable implementation. For these reasons, some farmers preferred alternative solutions to the recommendations provided at the PHRs, which some farmers considered irrelevant to their circumstances. In some cases, the farmers did not consider the problem severe enough or worth the recommended interventions.

**Table 10.** Farmers' reasons for not implementing some recommendations (n=508).

Reason	% responses
Farmer did not have the resources required to put the recommendations into practice	28
The distance to agro input shops to purchase the necessary inputs was too long	23
Farmer lacked the requisite expertise to implement the recommendations	18
Farmer thought there were better alternatives to solving the problem than what was recommended	17
The recommendations were not clear enough to enable the farmers putting it into practice	12
Problem was not severe enough to warrant the recommended action	1
Recommendations were not relevant or applicable in the context of the farmer	1

## 3.6 Views on PHRs as an extension method

### Advantages of PHRs

During the FGDs and KIIs, extension workers who participated in organizing the PHRs reflected on the influence of PHRs on extension. They were of the view that the PHRs:

1. Enabled them to **reach a large number of farmers** at the same time compared to the extension methods regularly used, such as home visits and field demos. There are very few extension workers in Uganda to cover the massive number of farmers and limited available funds to cover operational costs. The PHRs are therefore seen as an opportunity to reach out to a large number of farmers in one go.
2. **Exposed the extension workers to a wide range of farmers' problems**, which facilitates better programming to deliver relevant services. In many cases, it was the first time for the farmers to interact with the extension workers in charge of their sub-county.

3. Provided an opportunity to **receive immediate feedback from the farmers** on what has worked and what has not worked in their context, thus enabling the extension workers to explore alternative solutions available.
4. **Enhanced the technical capacity** of extension workers through plant doctor training.
5. Helped to **link the extension workers, farmers and input suppliers**. At the rallies, the extension workers would recommend the most reliable input suppliers where farmers could purchase the required inputs. This reduced incidences where farmers would end up purchasing counterfeit inputs.
6. **Enhanced the networking and collaboration** between the local government extension workers and other extension service providers in the districts. These relationships are established during joint activities of the PHRs.

### Challenges encountered from implementing PHRs

During the FGDs, the extension workers discussed the challenges they experienced in organizing PHRs, how the PHRs could be mainstreamed in their normal extension operations and how they would do that without the support of Plantwise. The ideas that emerged include:

1. **Costs of PHRs.** Whereas PHRs reach a large number of farmers in one go, organizing and executing PHRs requires more resources than other methods of extension. PHRs require intensive mobilization (publicity) through a variety of media including mobile loud speakers, as well as engaging a wide range of actors, including local and religious leaders. The area for mobilization (sub-county) is large and the transport costs to traverse the sub-county are quite high. Further, the rally facilities such as tents and chairs are hired, adding to the costs. Overall, implementing funds are inadequate.
2. **Staff unavailability and workload.** The few extension workers available are over-stretched in helping farmers to address their numerous challenges of which pests and diseases are only one part. The time for organizing timely PHRs is therefore limiting.
3. **Expectations of free handouts.** In the recent past, extension in Uganda through the National Agricultural Advisory Services (NAADS) and now Operation Wealth Creation (OWC) Program is associated with distribution of free inputs. Farmers have become used to receiving free inputs alongside knowledge. In some cases, political leaders influence farmers' expectations for free inputs and other incentives like money. Knowledge that is not accompanied by free input is less valued. Some farmers also expect facilitation in form of transport refund. Some of these unmet expectations affect attendance to PHRs. Dealing with this kind of dependence by farmers and local leaders requires a change in mindset for them to take full responsibility for their development.
4. **Timing and location** of the PHRs are critical for farmer attendance. In some cases, rallies were conducted in the morning and very few farmers attended. Whereas market places may be good for attendance, they were not the most appropriate for imparting knowledge due to several interruptions of multiple activities taking place at the same time.
5. **PHR regularity.** The PHRs were very few and some farmers could not participate due to the distance they had to travel to get to the venues.
6. **The print information materials** were few and many farmers who would otherwise benefit, missed out.
7. **Capacity of extension workers.** Some extension workers who have not been trained as plant doctors do not have sufficient knowledge to correctly identify the pests and diseases, and appropriately advise farmers. At the rallies, extension workers are met with diverse problems needing attention.

8. **Capacity and attitude of farmers.** Farmers often fail to implement the advice fully (if at all) due to high costs, issues with availability and accessibility of quality inputs and/or insufficient knowledge and skills. In addition, the limited initiative by some farmers to proactively seek further advice and guidance, either physically or via telephone, hinders continuing learning.

### 3.7 Suggestions for improvement and mainstreaming of PHRs

#### Farmers' views

Table 11 presents farmers' suggestions for improvement of PHR implementation. These include aspects of PHR organisation (venue, timing, regularity, staffing, advertising), service delivery (inputs, print materials, language, topics addressed) and connection to other service providers (input suppliers, community workers, radio, follow up by extension workers). The high request for more regular PHR implementation (62%), confirms the general low coverage of extension services in Uganda.

**Table 11.** Suggestions by farmers for improvement of PHRs (n=556).

Suggestion	% responses
Increase the number of rallies at appropriate time to enable more farmers to attend	62
Provide inputs to model farmers to incentivize uptake of recommended practices	31
Communicate information about PHRs in advance so that farmers can plan accordingly and improve mobilization by the local leaders	20
Conduct rallies at parish level to reduce distance farmers travel to the rallies	18
More follow up by the extension workers to encourage and help farmers put the knowledge into practice	14
Recommend trusted sources of agro inputs close to the farmers to avoid purchasing fake inputs	12
Conduct demonstrations at the rallies for farmers to learn the practical and proper ways of carrying out operations	5
Increase number of plant doctors available at the rally	4
Train some model farmers in the community to advise others on plant health	4
Include post-harvest management to enable long storage of products to access better markets	4
More radio talk shows to complement the PHRs	3
Venue should be changed from market places and trading centres to more appropriate venues for learning	3
Translate in common languages especially for multicultural communities that do not have commonly spoken language like some places in Masindi	2
Increase availability of print information materials on all crops	2

### Extension workers' and other partners' views

Several suggestions presented by extension workers and other partners coincide with the farmers' views. Others referred to: the need for continuing training of extension workers; better funding and inter-institutional collaboration to implement the PHRs; enhanced use of ICTs and; stronger enforcement of regulations regarding input supply. They also stress that the PHRs should broaden their scope to address post-harvest and animal health, both of which are of high concern to farmers. Their recommendations are summarized as follows:

#### Improving PHR operations

1. The PHRs should have a **regular and known schedule**, more conveniently before the seasons start to enable farmers get better prepared to identify and manage any emergent pest and disease incidences.
2. **Increasing the number of rallies** to at least one per season also serves to provide feedback to the providers of the information/ advice on what works and what does not work in a particular context.
3. **Implementing the PHRs at parish levels**, which are closer to the farmers, would reduce travel distances, thus enabling more farmers to participate.
4. The production departments of the districts need to **acquire some basic equipment** such as public address systems and tents to reduce on the cost of hiring them. Some promotional materials and incentives such as T-shirts (with specific messages of plant protection) to extension workers would be motivating and encouraging.
5. **More funding** is needed to organize rallies more effectively. Resources are needed for publicity and to set up appropriate facilities (tents) at the venues. Considering the costs of rallies, they need to be **deployed strategically** to target crops of high importance and potentially epidemic pest/diseases.
6. Because effective pest management in some cases possibly implies more use of agro-chemicals, the PHRs should also focus on **demonstrating safe use of pesticides** as well as ensuring **availability of quality inputs** in close proximity of the farmers.
7. This also provides an opportunity to **enforce the regulatory functions** of district and sub-county staff to ensure supply of genuine inputs to farmers.
8. PHRs should broaden the focus to also address other topics in high demand such as, **post-harvest pest management**. and **animal health**. In other words, using rallies as a universal method in extension, not limited to plants.

#### Strengthening farmer learning and information sharing

9. The print information packages were better utilized by farmers who had attained eight years of education or more. **Farmer groups should be encouraged** for such farmers to interact and share their knowledge and experiences with other farmers.
10. Proactive **follow-up by the extension workers** to individual farmers or farmer groups would reinforce internalization and subsequent application of the advice for greater impact on the household.
11. Similarly, farmers need to be **encouraged to be proactive** and follow-up to seek further information from the extension workers or other service providers – enhancing the demand for knowledge.

#### Building and sustaining staff capacity

12. **More extension workers** including those from **NGOs and private sector** need to be trained as plant doctors to handle a large number of farmers who come to seek knowledge and skills
13. **Community-based facilitators** should be trained and deployed within the communities to help farmers as soon as the pest or disease occurs.

14. A mechanism is required for **continuous updating of extension workers** on plant health diagnostics and management including diagnostic facilities and equipment.

#### Strengthening cooperation among stakeholders and approaches

15. Different **extension service providers and other stakeholders** including research agencies and local leaders and administrators at all levels of the district need to **pool resources and have joint program for PHRs**. This also involves lobbying the central government and district local governments to increase their budget allocations for extension and particularly ring-fence resources for PHRs (see Box 2).
16. A platform for **continuous engagement of researchers and extension workers** is necessary for updates on emerging pests and diseases, backstopping and coordinated action, including provision of consistent information/ advice to farmers.
17. This also involves enhanced use of **smart phones and tablets** to facilitate relaying of information and consultations between the partners, especially between extension workers and researchers to find solutions to emerging pests and diseases.
18. PHRs need to be **complemented with other dissemination channels** including music, drama, radio and farmer videos to further spread and reinforce the PHRs messages.

#### **Box 2.** Sustaining the plant health rallies

The interviewed extension workers think that the districts can afford to support PHRs if they are integrated into the district budgets. Some districts like Bulambuli have provided resources for conducting PHRs and already demonstrated that it is possible. If the positive contribution of the PHRs is appreciated, the existing budget for plant health can be rationally used to conduct PHRs. The private sector, especially the input suppliers, if well mobilized, can also contribute towards implementation of PHRs, as they can use the opportunity to reach out to potential clients. What is required most is for the district production departments to adopt PHRs as one of the extension delivery methods and the cooperation of the political leaders including district councillors to participate in mobilization of the communities.

Source: FGD and KII



Plant health rally on fall armyworm carried out in Karamoja region (*Photo: Benius Tukahirwa, MAAIF*).



## 4 Conclusions

The PHRs in Uganda found a huge farmer demand for knowledge on crop pests and diseases. As a mass extension method, PHRs provided a rare opportunity for large groups of farmers to access reliable knowledge through face-to-face encounters with technical experts amidst pest and disease occurrence including new pest outbreaks, like the fall armyworm.

The surveyed farmers largely found the knowledge gained from the PHRs and print information packs relevant. Of those who received advice, the majority put at least some of it into use, thereby completely or partially solving the problems related to the target pests and diseases. This is an indication of relevance of PHRs in targeting specific pests and diseases that are of importance to the farmers.

Despite these positive results the study also revealed a number of aspects that need to be improved to ensure more effective PHR implementation. There are major logistic and financial challenges that require multi-stakeholder collaboration, political commitment and pooling of resources in order to make the most of the scarce human and financial resources that currently constrain the actions of the Ugandan agricultural extension system.

This study shows that PHRs are a valuable mass-extension approach to address specific problems that farmers face in their fields. More research should be done to explore ways to enhance synergies between the different service providers and extension approaches with the aim to optimize farmer reach and learning outcomes in a cost-effective manner.

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# Appendices

## Appendix 1 Farmer survey questionnaire

### Effects of Mass Extension Campaigns on Farmers' Pest Management Knowledge, Attitudes and Practices, in Uganda

**Introduction:** Plant Health Rallies (PHRs) have been conducted in your area to enhance farmer knowledge and skills in management of diseases and pests of several crops. The questionnaire aims to collect information from male and female farmers about changes in knowledge, attitudes and practices resulting from participation in PHRs. I therefore kindly request you to answer the questions I am going to ask you, whether you participated or did not participate in the PHRs conducted in this area.

Name of interviewer: \_\_\_\_\_ Sub-county: \_\_\_\_\_  
 Date of interview: \_\_\_\_\_ Parish: \_\_\_\_\_  
 District: \_\_\_\_\_

1. **Name** of the Farmer \_\_\_\_\_

2. **Sex** of Farmer

1. Male
2. Female

3. **Age** of Farmer

..... years

4. What is highest education level of farmer? (**Record highest class attained**) .....

5. Mobile number: .....

6. Are you the **Head** of household?

1. Yes (Go to No.8)
2. No (Go to No.7)

7. What is your relationship with the Head of the Household?

1. Spouse
2. Son/daughter
3. Sister/brother
4. Other (Specify)

8. What is the **size** of your farm?

..... acres

9. Which of these crops have you grown in the last 3 years? (**Tick all that apply**)

1. Maize
2. Banana
3. Cassava
4. Sweet potato
5. Citrus
6. Coffee
7. Ground nuts
8. Beans
9. Others (Specify) .....

<b>10. Where do you normally get the knowledge about management of pest diseases of the crops you grow (Tick all that apply)</b>		
	1. Agricultural extension agent /worker 2. NGO/Private company 3. Plant doctor/clinic 4. Other farmers 5. Radio (Specify) ..... 6. Television (Specify) ..... 7. Other (Specify) .....	
<b>11. Out of the above sources of information, mention the two most important ones for you (in order of importance)</b>	<b>First</b>	<b>Second</b>
<b>12. Which of these cultural practices have you been using to control pests and diseases in the crops you mentioned in (8) above in the past three years? (Tick all that apply)</b>		
	1. Use of ash, sand, animal waste, soapy water etc. 2. Handpicking 3. Regular weeding 4. Crop rotation 5. Use of insecticidal plant parts/extracts 6. Use of local farmer saved seed 7. Other, specify: ..... 0. None	
<b>13. Do you know about the Plant Health Rallies where they provide knowledge on management of pests and diseases of some crops?</b>	1. Yes 2. No	
<b>14. How did you get to know about the plant health rally? (Tick all that apply)</b>		
1. From extension agent /worker 2. From a Household member 3. From other family 4. Through church /Mosque 5. From neighbours 6. From another farmer	7. Mobile loud speaker announcements (muzindalo) 8. From Newspaper 9. From a pamphlet /poster 10. At community meeting 11. Radio (specify) 12. TV (Specify) 13. Other specify: .....	
<b>15. Have you attended a plant health rally in the last 3 years?</b>	1. Yes How many times? ..... 2. No (Go to Qn 28)	
<b>16. Where was the Plant Health Rally held?</b>	1. Market/Village:..... 2. Parish:.....	
<b>17. How far is the venue of the Plant Health Rally from your home? ----- km</b>		

18. What information did you get from the Plant Health Rallies in relation to the crops you grow (Tick all that apply)	<b>Crop</b>	<b>Pest/Disease to solve</b>
	Maize	1. Maize Lethal Necrotic disease 2. Fall Army Worm 3. Other (Specify).....
	Cassava	1. Cassava Brown Streak Virus 2. Cassava Mealybugs 3. Other (Specify) .....
	Citrus	1. Angular leaf and fruit spot disease 2. Fruit fly 3. Other (Specify) .....
	Coffee	1. Coffee Berry Disease (CBD) 2. Black Coffee Twig Borer (BCTB) 3. Coffee Leaf Rust (CLR) 4. Other (Specify).....
	Groundnuts	1. Groundnut Rosette 2. Other (Specify) .....
	Beans	1. Bean Anthracnose 2. Other (Specify) .....
	Banana	1. Banana Weevil 2. Banana Bacterial Wilt 3. Other (Specify) .....
	Other Crop (Specify)	..... .....
	General topics	
	Soil	Soil fertility management
	Agricultural chemicals	Safe use of pesticides

19. Please explain if the information obtained at the Plant Health Rallies was adequate and whether it enabled you to solve the problems pests and diseases on the crops you grow.

		Adequacy of information to solve problem	Extent to which problem is solved
Maize	1. Maize Lethal Necrotic disease	2. Adequate 1. Not adequate 0. Not at all relevant	2. Completely solved 1. Partially solved 0. Not solved at all
	2. Fall armyworm	2. Adequate 1. Not adequate 0. Not at all relevant	2. Completely solved 1. Partially solved 0. Not solved at all

Cassava	1. Cassava Brown Streak Virus	2. Adequate 1. Not adequate 0. Not at all relevant	2. Completely solved 1. Partially solved 0. Not solved at all
	2. Cassava Mealybugs	2. Adequate 1. Not adequate 0. Not at all relevant	2. Completely solved 1. Partially solved 0. Not solved at all
Citrus	1. Pseudo Cercospora	2. Adequate 1. Not adequate 0. Not at all relevant	2. Completely solved 1. Partially solved 0. Not solved at all
	2. Fruit fly and Leaf Spot	2. Adequate 1. Not adequate 0. Not at all relevant	2. Completely solved 1. Partially solved 0. Not solved at all
Coffee	1. Coffee Berry Disease (CBD)	2. Adequate 1. Not adequate 0. Not at all relevant	2. Completely solved 1. Partially solved 0. Not solved at all
	2. Black Coffee Twig Borer (BCTB)	2. Adequate 1. Not adequate 0. Not at all relevant	2. Completely solved 1. Partially solved 0. Not solved at all
	3. Coffee Leaf Rust (CLR)	2. Adequate 1. Not adequate 0. Not at all relevant	2. Completely solved 1. Partially solved 0. Not solved at all
Ground nuts	Groundnut Rosette	2. Adequate 1. Not adequate 0. Not at all relevant	2. Completely solved 1. Partially solved 0. Not solved at all
Beans	Bean Anthracnose	2. Adequate 1. Not adequate 0. Not at all relevant	2. Completely solved 1. Partially solved 0. Not solved at all



Banana	1. Banana Weevil	<b>2. Adequate</b> <b>1. Not adequate</b> <b>0. Not at all relevant</b>	<b>2. Completely solved</b> <b>1. Partially solved</b> <b>0. Not solved at all</b>
	2. Banana Bacterial Wilt	2. Adequate 1. Not adequate 0. Not at all relevant	2. Completely solved 1. Partially solved 0. Not solved at all
Soil	Soil fertility management	2. Adequate 1. Not adequate 0. Not at all relevant	2. Completely solved 1. Partially solved 0. Not solved at all
Agricultural chemicals	Safe use of pesticides	2. Adequate 1. Not adequate 0. Not at all relevant	2. Completely solved 1. Partially solved 0. Not solved at all
<b>20.</b> Please list the specific activities you implemented as a result of participating in the Plant Health Rallies		1. .... 2. .... 3. .... 4. ....	
<b>21.</b> If you did not implement some of the recommendations given at the Plant Health Rallies, why (Tick all that apply)		1. The recommendation (s) were not relevant in my context 2. The problem was not severe enough 3. I did not have the resources required to implement the recommendation(s) 4. I lacked the expertise required to put the recommendation(s) in practice 5. I think there were better ways of solving the problem 6. The advice/recommendation was not clear 7. Others, Specify .....	
22. Did you receive informational materials (mini-factsheet or factsheet) at the plant rally?		1. Yes 2. No	
23. How useful was the information in materials (mini-factsheet or factsheet) (Tick all that apply)		0. I did not read it/could not read 1. I read it and did not find it useful 2. I read and found it useful 3. I gave it to another farmer/person 4. Other, specify .....	
24. What crops were the informational materials (mini-factsheet or factsheet) targeting? ( <b>Tick all that apply</b> )		1. Maize 2. Banana 3. Cassava 4. Other specify.....	

**25. On a scale of 1 – 5 where 1 = the least important and 5 = the most important, how would you rank the different sources of agricultural information available to you (Tick the appropriate box)**

1. Conventional government/extension worker	1	2	3	4	5
2. Extension work provided by NGOs	1	2	3	4	5
3. Information obtained from fellow farmers	1	2	3	4	5
4. Information obtained from the Plant Health Rallies	1	2	3	4	5
5. Information obtained from radio and TV	1	2	3	4	5
6. Information obtained from print media or brochures/pamphlets	1	2	3	4	5
7. Information obtained from plant doctors/clinics	1	2	3	4	5

**26. On a scale of 1 – 4, rate how the following conditions may have constrained you in accessing and utilising the information obtained from the Plant Health Rallies; Where: 1 = Not a problem, 2 = Minor problem, 3 = major problem, 4 = Severe problem (Tick the appropriate box)**

Condition	Score			
	1 No problem	2 Minor problem	3 Major problem	4 Severe problem
1. Getting information about the Plant Health Rally and what they offer	1	2	3	4
2. Distance from home to the venue of the Plant Health Rally	1	2	3	4
3. Relevance of the information to my specific farm problems	1	2	3	4
4. The way the information is communicated or provided was not easy to understand	1	2	3	4
5. Limited/inadequate follow up by extension workers to provide technical guidance	1	2	3	4
6. Frequency of the rallies was too few	1	2	3	4
7. Others (specify)	1	2	3	4
8. Others (specify)	1	2	3	4

27. Suggest ways in which Plant Health Rallies could be organised or improved to benefit you more:

1. ....
2. ....
3. ....

28. What are the reasons you were not able to participate in any Plant Health Rally

1. ....
2. ....
3. ....

<b>29. Do you know of some farmers in your village who participated in the Plant Health Rallies?</b>	<b>1. Yes (Go to Qn 27)</b> <b>2. No</b>
30. Do you observe any difference between those who participated in the Plant Health Rallies and yourself with regard to the way you manage your crops?	1. Yes (Go to Qn 28) 2. No
31. What are the differences you observe? ..... ..... .....	
32. If a Plant Health Rally is organized now, would you be willing to go and participate?	1. No 2. If I have nothing to do at the time 3. Reluctantly or if I am facilitated to go there 4. Yes, I would make sure I participate

END

## Appendix 2 Checklist for Focus Group Discussions

### Background

The focus group discussion targets the extension workers and district/sub-county councillors who participated in organizing the Plant Health Rallies. The intention is to obtain the views of the implementer on the effects of the Plant Health Rallies. The views expressed here are regarded as consensus of participants of the FGDs and will not be associated to any particular individual. The questions here below are only indicative of the boundaries of the discussion. The interviewer can probe for details where necessary.

1. How many Plant Health Rallies were conducted in the district and in which sub-counties?
2. In a sub-county, how many rallies were conducted?
3. Please describe the activities involved in organizing and conducting the Plant Health Rallies?
4. What was your major roles in conducting the rallies?
5. What is your impression on the attendance of farmers in the rallies you organized/conducted?
6. To what extent did the services you offered at the rallies meet the needs of the farmers?
7. Beyond the rallies, what did you do to follow up and support farmers to implement the information they got from the Plant Health rallies?
8. In your view, what new opportunities do Plant Health Rallies offer in the provision of extension services?
9. What challenges/constraints did you face in organizing and conducting the Plant Health Rallies?
10. What do you think needs to be done to improve and mainstream the Plant Health Rallies in the extension system?
11. Would you be able to organize PHRs in your districts without the support of Plantwise? How? If not, why?

## Appendix 3 Checklist for Key Informant Interviews

### Background

The key informants in this case are the partners of MAAIF in the implementation of Plant Health Rallies. They include the researchers and representatives of collaborating NGOs. These will be interviewed individually. The questions here below are only indicative of the boundaries of the discussion. The interviewer can probe for details where necessary.

1. What was your role in implementation of Plant Health Rallies?
2. What is your impression on the attendance of farmers in the rallies you were involved?
3. To what extent did the Plant Health rallies meet the needs of the farmers?
4. In your view, what new opportunities do Plant Health Rallies offer in the provision of extension services?
5. How did your organization benefit from participation in the Plant Health Rallies?
6. What challenges/constraints did you experience during your engagement in the Plant Health Rallies?
7. What do you think needs to be done to improve and mainstream the Plant Health Rallies in the extension system?
8. Would your organization be a position to organize PHRs without Plantwise support? If yes, how, if no why?

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